American Dietetic Association
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June 3, 2003

Food and Drug Administration
Department of Health and Human Services
ATTENTION: FDA-305
Docket #: 03N-0069
5630 Fishers Lane
Rockville, MD 20852

Dear Sir or Madam:

The American Dietetic Association (ADA) represents nearly 70,000 food and nutrition professionals serving the public through the promotion of optimal nutrition, health and well being. ADA appreciates this opportunity to respond to questions posed by the Task Force on Consumer Health Information for Better Nutrition, and complement materials we provided you at a March 13, 2003 stakeholder meeting on this issue at the Center for Food Safety and Applied Nutrition.

1. What body of scientific evidence do you think should be adequate for a qualified health claim?

Health claims authorized for foods and dietary supplements should be based on the totality of the publicly available scientific evidence, including results from well-designed studies conducted in a manner that is consistent with generally recognized scientific procedures and principles. For a statement to be valid or scientifically sound, it cannot be preliminary or speculative. For example, if just any statement in a publication from a scientific body were allowed to form the basis for a qualified health claim, misleading and potentially harmful statements could appear on food labels. A sufficient body of evidence must exist to avoid confusing millions of consumers and losing their trust.

For determining the body of evidence needed for a qualified health claim, ADA recommends a methodology similar to the one ADA has adopted for use with evidence-based guides for practice. This grading system, consisting of "strength" grades I-IV, are described by Myers et al in the enclosed copy of the September 2001 issue of *Journal*

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of the American Dietetic Association. A system like the one described by Greer et al (Jt Comm J Qual Improv 2000; 26(12): 700-712) determines the weight of evidence in favor of, or the extent to which evidence submitted supports, a qualified claim. This system was developed to communicate the strength of evidence with health care professionals. Whether the terminology or concepts would be understood by consumers is unknown.

ADA supports the recommendations made by the Institute of Medicine in its report *Evolution of Evidence for Selected Nutrient and Disease Relationships* (Food and Nutrition Board. Washington: National Academy Press, 2002). Those recommendations also may be helpful also in discerning the weight of scientific evidence (i.e. studies supporting vs. studies refuting a qualified claim) and are as follows:

- Large randomized controlled studies play an important role in establishing the relationship between nutrient intake and the risk for disease. Caution should be used when using epidemiological evidence to endure the consumer can discern that association is not interpreted to necessarily be a causal relationship.
- Caution should be exercised in using preliminary evidence from non-controlled studies as the basis for recommendations for increased intakes of a nutrient.
- Claims about nutrient-disease relationships are more easily made than scientifically supported. Because the implications for public health are so important, caution is urged prior to accepting such claims without supportive evidence from appropriately designed, typically large, clinical trials.

2. What types of safety concerns should be factored into FDA's decision-making?

Government standards and guidelines should help prevent excessive nutrient intakes from fortified foods and dietary supplements. At present there is little regulation to guide the amount of nutrients in highly fortified foods, meal replacements, or oral nutritional supplements.

Several resources are available to help address the safety of non-nutrients, which are often included in dietary supplement products and are increasingly being included in food products as well. The *Natural Medicines Comprehensive Database*, which is designed for use by medical professionals and most recently published in print in 2001, might be helpful in discerning possible mechanisms of action and active ingredients, possible interactions with herbs, other dietary supplements, drugs, foods, lab tests, diseases and conditions, and typical dosages and routes of administration. The *Natural Medicines Comprehensive Database* is designed to provide health care professionals with a "collection of data and consensus of available scientific information on natural medicines" in order to help patients. The list of natural medicines includes herbs, vitamins, minerals, phytochemicals, fatty acids, fiber and amino acids. The *Journal of*

understandable, useable and credible information on both food products and dietary supplements.

Additionally, a small study in 1998 concluded that informational labels may be more effective than warning labels in food products containing various levels of fat (Bushman, B. "Effects of warning and informational labels on consumption of full-fat, reduced-fat, and no-fat products" *J Appl Psychol* 1998; 83(1): 97-101). Limited data is available from other sources. Please see addendum at end.

5. What kinds of empirical data should FDA rely upon to show that consumers are, or are not, mislead by claims?

ADA recommends pre-market research of consumer perceptions of the various label layouts, designs and effectiveness of communication strategies be conducted prior to the qualified claim's approval. For example, FDA should require, at a minimum, focus groups reflective of the sample of consumers to whom a claim is targeted. We suggest these focus groups should test consumers' reactions to and understanding of the product without a claim, the product with a claim without a disclaimer and at least two variations of a disclaimer. The information should be presented on product packages with all other information held constant. These results then could be field tested in a larger survey or shopping mall intercept study to validate impressions gained in the focus group research.

FDA also should consider information gathered by the Federal Trade Commission (FTC)'s research on disclosure statements. FTC staff research on consumer interpretation of food nutrition and health claims in advertising was conducted in 1998. The report generated from this, "Generic Copy Test of Food Health Claims in Advertising," examines consumer reactions to three categories of hypothetical print advertisements that make claims about nutrient content and health benefits of food products.

6. Should conventional foods and dietary supplements be treated the same or treated differently, and why?

Health claims for conventional foods and health claims for dietary supplements should meet identical standards for sound scientific agreement. With respect to qualified health claims, the same evidence-based system to determine the weight of scientific evidence supporting such a claim should be used for both dietary supplements and conventional foods. While it is clear that dietary supplements and conventional foods are not alike in every way, FDA should mandate a single standard for qualified claims and apply it to both dietary supplements and conventional foods. Use of a single standard and system is less likely to confuse consumers and will make them better able to identify if products may be beneficial to them.

We hope these comments are useful as the agency moves forward with this initiative to facilitate and encourage the flow of high quality, science-based information on the health benefits of conventional foods and dietary supplements to consumers. Please do not hesitate to call ADA's government relations staff at (202) 775-8277 with any questions. We are always available to assist FDA with efforts to better educate and inform the public about food and nutrition and their linkages to health.

Sincerely,

M. Stephanie Patrick
Vice-President
Policy Initiatives and Advocacy

Esther Myers, PhD, RD
Director
Scientific Affairs and Research

Addendum
Additional References and Comments

Hancock, H.; Rogers, W.; Fisk, A. "An evaluation of warning habits and beliefs across the adult life span." *Hum Factors* 2002; 43(3): 343-354. [1]

Moore, M. "Product warning effectiveness: Perception versus Reality" *Professional Safety* 1991; 36(4): 21-24. [2]

Stutts, M; Hunnicut, G. *Journal of Advertising* 1987;16(1):41-46. [3]

Truitt, L et al. *Tob Control* 2002; June Supplement (2):59-63. [4]

The following comments from Dr. Esther Myers from the above references lend support to ADA's position articulated in this document.

1. Hancock, Rogers and Fisk reported that persons older than 55 years attended to warning symbols more often than younger consumers; however, they thought the warnings were less important.

2. Limited data is available from other sources citing lack of positive effects of warning labels in other products. The Failure Analysis Associates in Palo Alto (FAA), CA classify studies on disclaimers/warnings into two categories: qualitative and quantitative. The first would be related to surveys of users' claims of safety behavior, and the second would be based on exposure versus injury rates. While this framework was developed for a different type of product (e.g. seatbelt use and injuries related to lack of seatbelt use), it might be useful in identifying the types of empirical data that the agency should strive for. The author, summarizing the FAA article, further concludes that for a field that receives so much attention, the product warning field lacks objective data for drawing conclusions.

3. Stutts and Hunnicut define a disclaimer as a "disclosure made with the intent of clarifying potentially misleading or deceptive statements made within an advertisement."

4. Truitt et al reported that font size was an important factor in determining effectiveness of tobacco warning/disclaimers.

ICSI

INSTITUTE FOR CLINICAL SYSTEMS IMPROVEMENT

EVIDENCE GRADING SYSTEM

Development

Evidence grading was introduced into ICSI guidelines and technology assessment reports in 1996. At that time, a modification of the system used in the Agency for Health Care Policy and Research (AHCPR) Unstable Angina: Diagnosis and Management Clinical Practice Guideline was used[1]. The system called for assignment of an A (randomized, controlled trials published in peer-reviewed journals), a B (other well-designed studies published in peer-reviewed journals including cohort studies, case-control studies, trials with historic or non-randomized controls, and meta-analyses), or a C (uncontrolled case series or expert opinion) to individual research reports. No grades were assigned to other guidelines, consensus statements, or review papers. If there was "A" evidence supporting a conclusion, the conclusion grade was "A."

Based on feedback from the guideline and technology assessment work groups, it became obvious that this system was not meeting their needs. Specifically, the system was viewed as too simplistic, there were objections to grading conclusions strictly on research design type (given that quality can vary greatly within a research design type and that not all of the design types are feasible/appropriate for all research questions), there was concern that there was no consideration for how much evidence there was, and there was concern that all design types were not adequately considered.

As a result of this feedback, ICSI assembled a work group to review the evidence grading system in use at ICSI, to review other evidence grading systems available in the literature, and to make recommendations for changes to the ICSI system. The group included physicians and researchers with backgrounds in quality improvement, clinical epidemiology, and biostatistics. Recommendations formulated by the work group were submitted for approval to the ICSI committees that oversee the guideline program and the technology assessment program.

The evidence grading review work group started by establishing goals for an evidence grading system. These goals were:

1. to increase the systematic use of evidence by work groups by providing a framework and a step-by-step process for reaching key conclusions;
2. to provide a method for reaching evidence-based conclusions that busy, practicing clinicians accept as practical;

3. to provide a reliable method for grading conclusions based on the strength of the underlying evidence; and
4. to convey to readers and users of the documents the strength of the underlying evidence.

The work group reviewed many existing evidence grading systems including the system used by the United States Preventive Services Task Force[3], the system developed by Sacket[4] and modified by Cook et al.[5,6], and the system presented in the series on Users' Guides to the Medical Literature[7]. Overall, it was apparent that no one system was universally applied and that the systems varied a great deal in complexity. Although the ICSI work group decided that no one existing system fulfilled the goals identified above, there were features of the existing systems that could be incorporated into a new ICSI system. Specifically, the work group agreed that it was important to separate the evaluation of individual research reports from the assessment of the totality of evidence supporting a conclusion. The work group also agreed that assessing the quality of the individual research reports was important.

The System

The centerpiece of the evidence grading system is the conclusion grading worksheet. Conclusion grades are assigned to key conclusions and/or recommendations as determined by the guideline or technology assessment work group members. The worksheet, similar to an evidence table, is used to display and synthesize the evidence supporting a particular conclusion. An example of a worksheet from the Congestive Heart Failure guideline is presented in Figure 1. The work group formulates a tentative conclusion statement and, based on a literature search done by a medical librarian using keywords suggested by the work group, identifies the key references to include on the worksheet. The work group is encouraged to identify the strongest possible evidence (based on design type, sample size, patient population, etc.) that supports or disputes the conclusion statement. The worksheet is then prepared by ICSI staff and includes, for each reference, the citation, design type, class of research report, quality score, information about the population studied, results of the study, and the authors' conclusions. The conclusion grading worksheet is reviewed by a designated member of the work group and a tentative conclusion grade is selected. The designated work group member then presents the worksheet to the rest of the work group. There is discussion of the individual research reports and comments from the work group may be added to the worksheet. There is also discussion of the proposed conclusion grade and a final decision is made on the appropriate grade. Involvement of a member of the work group in the development of the worksheet and the deliberation by the work group in determining the final conclusion grade are considered strengths of the system. Further information about the classes of research reports, quality scores, and conclusion grades is presented in Figure 1.

Figure 1. Conclusion Grading Worksheet

Work Group's Conclusion: Digoxin improves symptoms, exercise tolerance, and quality of life, but neither increases or decreases mortality.

Conclusion Grade: I

Author/Year	Design Type	Class	Quality +,−,ø	Population Studied/Sample Size	Primary Outcome Measure(s)/Results (e.g., p-value, confidence interval, relative risk, odds ratio, likelihood ratio, number needed to treat)	Authors' Conclusions/ *Work Group's Comments (italicized)*
Captopril-Digoxin Research Group (1988)	RCT	A	ø	-Patients (<75 years) with sinus rhythm and heart failure secondary to ischemic heart disease, primary myocardial disease, or in heart failure without significant valvular regurgitation after valvular surgery (receiving diuretic therapy if needed) -Randomized to 1 of 3 groups (after withdrawal from therapy and stabilization of diuretic dose). captopril (25 mg 3x/day increased to 50 mg 3x/day after 1 wk if tolerated), digoxin (0.125-0 375 mg daily based on trough serum levels), or placebo -Included· ejection fraction ≤40%, treadmill time >4 min but < age- and sex-predicted average maximum -Excluded. MI within preceding 2 mos, unstable angina, hypertension (SBP>160 mmHg, DBP >95 mmHg) despite diuretic therapy, pulmonary disease (FEV^1/FVC ratio <60%) -Concomitant therapy with inotropic agents, vasodilators, β-adrenergic blockers, calcium antagonists, immunosuppressive agents, or other investigational drugs was prohibited	-Follow-up at 1, 2, & 6 mos after randomization -300 patients randomized (104 to captopril, 96 to digoxin, and 100 to placebo), baseline characteristics were similar (captopril group younger, p=0. 02) -Mean changes from baseline (analysis while adhering to assigned therapy). Variable — Captopril — Digoxin — Placebo Exer time (s) — 82* n=101 — 54 n=95 — 35 n=97 NYHA class — -0.20** n=100 — -0 09 n=95 — 0 02 n=98 Eject. fraction (%) — 1 8 n=87 — 4 4*** n=82 — 0.9 n=78 Premature beats per hour# — -29.4**** n=55 — 2 3 n=47 — -16.1 n=45 *different from placebo (p<0 05), ** different from placebo with respect to proportion of patients improved (p<0 01) (see below), *** different from placebo (p<0 01) and captopril (p<0 05) groups, **** different from digoxin (p<0 05), #only patients with >10 ventricular premature beats/hr at baseline -NYHA class improved for 41% of captopril, 31% of digoxin, and 22% of placebo groups -Withdrawal from study because of treatment failure occurred with 15% of placebo group (vs. 5.8% of captopril group and 4.2% of digoxin group; p<0.05); more patients in placebo group required increase in diuretic dose (p<0 005) and hospitalization (or emergency visits) (p<0.05) than in other groups -Similar trends seen in intention-to-treat analysis -Rate of discontinuation due to adverse drug reactions: 2.9% captopril, 4.2% digoxin, 0% placebo -More possible adverse drug effects attributed to captopril (44 2%) during blinded portion of study than to other treatments (30.2% digoxin, 24% placebo) (usually mild and transient dizziness and lightheadedness) -21 deaths (8 captopril, 7 digoxin, 6 placebo)	-Captopril therapy is significantly more effective than placebo and is an effective alternative to digoxin treatment in patients with mild to moderate heart failure who are undergoing maintenance diuretic therapy. Significant improvements in exercise tolerance and functional class compared to the placebo group were seen in the captopril group but not the digoxin group. Captopril also significantly reduced ventricular premature beat rates compared with digoxin in patients with more than 10 premature beats/hour at baseline. Digoxin significantly increased left ventricular ejection fractions compared with both placebo and captopril. Patients receiving placebo had a greater incidence of treatment failure and required significantly more diuretics, hospitalizations, and/or emergency department visits for heart failure than did patients receiving captopril or digoxin. NOTES. trial was double-blind; did intention-to-treat analysis (as well as analysis while patients adhered to assigned therapy); most patients were NYHA functional class II,

Digitalis Investigation Group (1997)	RCT	A	ø	-6800 patients (302 clinical centers) with heart failure and left ventricular ejection fraction < 0.45 in normal sinus rhythm -988 patients with heart failure and ejection fraction >0.45 were enrolled in ancillary trial -May have been already receiving digoxin -Randomly assigned to digoxin or placebo (digoxin dose varied) -Other therapy used if patient had worsening symptoms of heart failure; if remained symptomatic, allowed open-label treatment with digoxin	-Follow-up visits at 4 and 16 wks then every 4 mos (mean duration 37 mos, range 28-58 mos) -No significant differences between groups (baseline) -1181 deaths in digoxin group (34.8%), 1194 in placebo group (35 1%) (RR=0.99, 95%CI· 0.91-1.07) -1016 deaths from cardiovascular causes in digoxin group (29.9%), 1004 in placebo group (29.5%) (RR=1.01; 95%CI: 0.93-1.10) -Trend toward lower risk of mortality attributable to worsening heart failure in digoxin group (p=0.06) -910 patients hospitalized for worsening heart failure in digoxin group and 1180 in placebo group (RR=0.72, 95%CI: 0.66-0.79) -Risk of death from any cause or hospitalization for worsening heart failure was lower in digoxin group (RR=0.85; 95% CI. 0.79-0.91); similar results for death due to worsening heart failure or hospitalization related to worsening heart failure -Fewer hospitalizations for any cause (per patient) in digoxin group (p=0 01) and for cardiovascular causes (p<0.001) -Benefit of digoxin appeared to be greater among patients at high risk (lower ejection fraction, enlarged heart, or NYHA III or IV) -At 1 yr, 85.6% of digoxin group patients were taking study drug and 82.9% of placebo group were taking placebo, at final study visit 70.8% of surviving patients in digoxin group were taking study drug and an additional 10.3% were taking open-label digoxin, 67.9% of surviving placebo group patients were taking placebo and 15.6% were taking open label digoxin. -Suspected digoxin toxicity greater in digoxin group -In ancillary trial, no difference in number of deaths or combined outcome of death or hospitalization due to worsening heart failure	-In patients with left ventricular ejection fractions ≤0.45 digoxin had no effect on overall mortality when added to diuretics and ACE inhibitors, the risk of hospitalization was reduced and the combined outcome of death or hospitalization attributable to worsening heart failure was also reduced. In clinical practice, digoxin therapy is likely to decrease the frequency of hospitalization but not survival. NOTES exclusion criteria were not given in this publication (previously published); trial was double-blind, did intention-to-treat analysis, physicians were strongly encouraged to give patients ACE inhibitors; patients receiving digoxin at entry were randomly assigned with no washout period; vital status of 47 patients in digoxin group and 46 in placebo group (1 4% of total) were unknown (a sensitivity analysis assuming that either all placebo or all digoxin patient died did not change overall result)

Figure 1. This is an example of a worksheet included in the ICSI guideline on Congestive Heart Failure in Adults. The work group identifies the key research articles to be summarized on the worksheet and, once the information is entered on the worksheet, determines the appropriate conclusion statement and conclusion grade. The worksheets appear as an Appendix to the guideline.

Classes of Research Reports

Each individual research report cited in a guideline or technology assessment report is assigned a class by ICSI staff (see Table 1). Primary reports of new data collection are assigned a letter A, B, C, or D based on the design type. The hierarchy of design types (with "A" representing randomized, controlled trials etc.) is fairly consistent among evidence grading systems and reflects the fact that different study design types vary in the likelihood that an individual study will be biased[8]. Secondary reports (reports that synthesize or reflect upon collections of primary reports) are assigned an M, an R, or an X. The definitions of the various design types are those found in epidemiology textbooks[9,10,11].

Table 1. Classes of Research Reports

Primary Reports of New Data Collection	
A	randomized, controlled trial
B	cohort study
C	nonrandomized trial with concurrent or historical controls case-control study study of sensitivity and specificity of a diagnostic test population-based descriptive study
D	cross-sectional study case series case report
Reports that Synthesize or Reflect Upon Collections of Primary Reports	
M	meta-analysis systematic review decision analysis cost-benefit analysis cost-effectiveness study
R	narrative review consensus statement consensus report
X	medical opinion

Research Report Quality Categories

The quality of an individual research report is designated as plus (+), minus (-), or neutral (ø) based on the questions presented in Table 2. The quality considerations reflected in the table are considerations standardly addressed in textbooks of clinical epidemiology[10,11]. The assessment of quality is completed by ICSI staff.

Table 2. Research Report Quality Categories

PLUS (+)

Y N 1. Were the inclusion and exclusion criteria exceptionally well-defined and adhered to?

Y N 2. Were no serious questions of bias introduced in the study (e.g., through the processes of subject selection, end point selection, and observation or data collection)?

Y N 3. Does the report show a statistically significant and clinically important treatment effect or, for a negative conclusion, have high power?

Y N 4. Are the results widely generalizable to other populations?

Y N 5. Were other characteristics of a well-designed study clearly addressed in the report (e.g., treatment and control groups comparable at baseline, compliance with the intervention, use of intention to treat analysis, all important outcomes measured, statistics appropriate for study design)?

If the answer to 2 or more of the above questions is "yes", the report may be designated with a plus on the Conclusion Grading Worksheet depending on the work group's overall evaluation of the report.

MINUS (–)

Y N 1. Were the inclusion and exclusion criteria unclear or was there evidence of failure to adhere to defined criteria?

Y N 2. Were serious questions of bias introduced in the study (e.g., through the processes of subject selection, end point selection, and observation or data collection)?

Y N 3. Does the report show a statistically significant but clinically insignificant effect or, for a negative conclusion, lack power and sample size?

Y N 4. Are the results doubtfully generalizable to other populations?

Y N 5. Were other characteristics of a poorly-designed study clearly evident in the report (e.g., treatment and control groups different at baseline, low compliance with the intervention, important outcomes were not measured, inappropriate statistics for study design)?

If the answer to 2 or more of the above questions is "yes", the report may be designated with a minus symbol on the Conclusion Grading Worksheet depending on the work group's overall evaluation of the report.

NEUTRAL (Ø)

If the answers to the questions pertaining to the PLUS or MINUS criteria do not indicate that the report is exceptionally strong or exceptionally weak, the report should be designated with a neutral symbol on the Conclusion Grading Worksheet.

Conclusion Grades

Conclusions and recommendations are graded either I, II, III, or IV. Descriptions of the conclusion grades as well as examples of the types of evidence that would support a specific grade are presented in Table 3.

Table 3. Conclusion Grades

Grade I: The conclusion is supported by good evidence.

The evidence consists of results from studies of strong design for answering the question addressed. The results are both clinically important and consistent with minor exceptions at most. The results are free of any significant doubts about generalizability, bias, and flaws in research design. Studies with negative results have sufficiently large samples to have adequate statistical power.

Examples:
Supporting studies might consist of two or more randomized, controlled trials or even a single well designed, well executed trial. The evidence might also come from several smaller trials combined in a single well done meta-analysis. For a question of the soundness of a diagnostic test, the evidence might be the results of a single well done comparison of the test against an established test for the same purpose, provided that there is no evidence to the contrary. For a question of the natural history of a disease, in the absence of evidence to the contrary, the evidence might be results from a single well done prospective cohort study.

Grade II: The conclusion is supported by fair evidence.

The evidence consists of results from studies of strong design for answering the question addressed, but there is some uncertainty attached to the conclusion because of inconsistencies among the results from the studies or because of minor doubts about generalizability, bias, research design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from weaker designs for the question addressed, but the results have been confirmed in separate studies and are consistent with minor exceptions at most.

Examples:
Supporting studies might consist of three or four randomized, controlled trials with differing results although overall the results support the conclusion. The evidence might also be the results of a single randomized, controlled trial with a clinically significant conclusion but doubtful generalizability. For a question of causation, the evidence might consist of two independent case-control studies with similar conclusions. The evidence might also consist of several careful case series reports with similar conclusions from investigators working separately.

Table 3. Conclusion Grades (continued)

Grade III: The conclusion is supported by limited evidence.

The evidence consists of results from studies of strong design for answering the question addressed, but there is substantial uncertainty attached to the conclusion because of inconsistencies among the results from different studies or because of serious doubts about generalizability, bias, research design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from a limited number of studies of weak design for answering the question addressed.

Examples:
For a question of efficacy of medical treatment, the evidence might consist of three or four randomized trials with contradictory results or serious methodological flaws; or the evidence might consist of a single trial that used historical controls. Alternatively, for a question of efficacy, the evidence might consist of one case series report. For a question of causation, the evidence might consist of results from a single case-control study, unconfirmed by other studies.

Grade IV: The conclusion is supported only by opinion.

The support for the conclusion consists solely of the statements of informed medical commentators based on their clinical experience, unsubstantiated by the results of any research studies.

Examples:
The support might consist of a review article citing only single case reports. (If the review article cites clinical trials, cohort studies, or other stronger evidence, then that evidence should govern the assignment of the grade to the conclusion.) The support might also be an editorial, consensus report, or a position statement from a national body without citations of the results of research studies. (Again, if research studies are cited, they should govern the grade assignment.)

Summary of Process

The process for reaching a conclusion grade, specifically for a guideline in development, is summarized in Figure 2. For guidelines undergoing revision and for technology assessment reports, a similar process is followed.

Figure 2. Conclusion Grading Process for Guidelines in Development

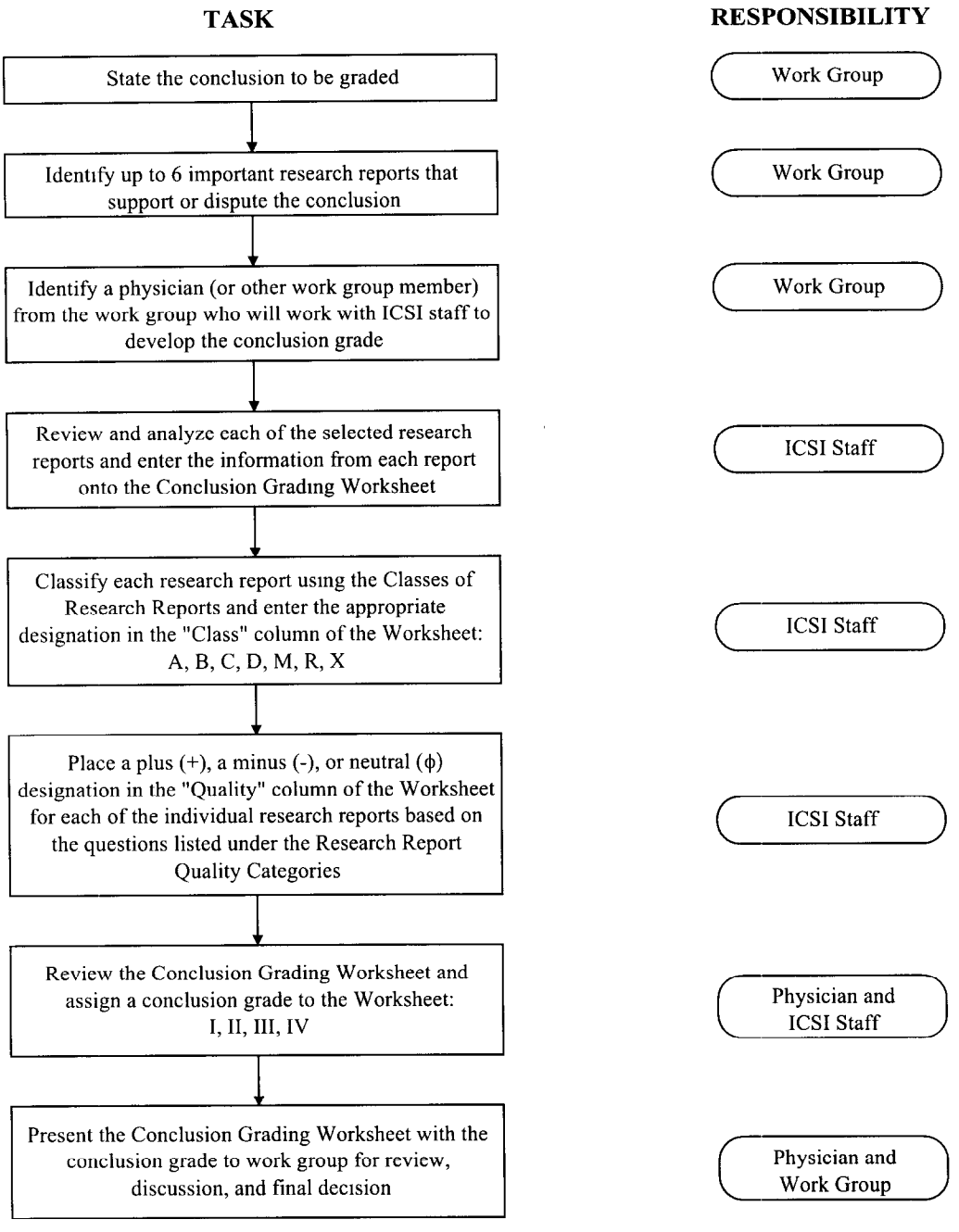
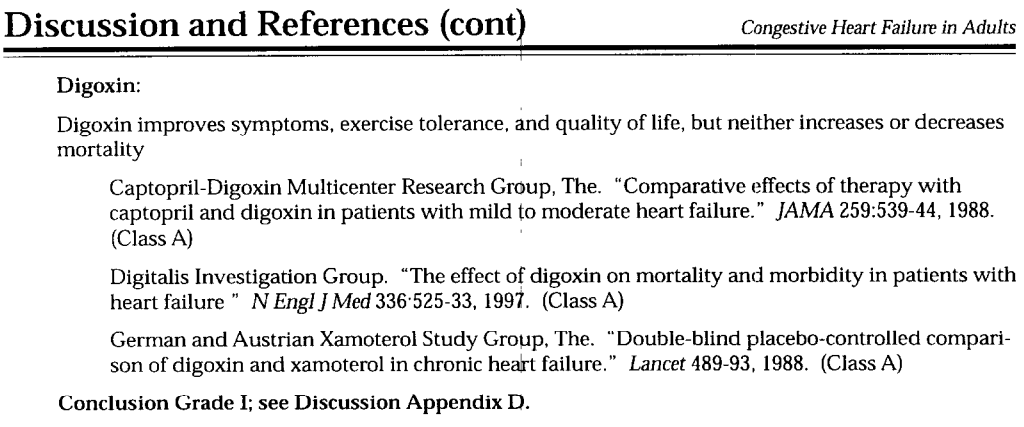


Figure 2. This figure represents the process for reaching a conclusion grade. The left column states the task to be completed and the right column identifies who is responsible for completion of that task.

Descriptions of the "Classes of Research Reports" and the "Conclusion Grades" are included in each guideline and technology assessment report. The class of research report assigned to an individual article is presented at the end of the bibliographic citation for that article. The conclusion grades are incorporated into the text of the guideline or technology assessment report with a reference to the Appendix containing the conclusion grading worksheet (see Figure 3 for an example from the ICSI Congestive Heart Failure in Adults guideline). Therefore, the reader of the document is able to use the conclusion grading information in weighing the strength of the evidence supporting the conclusion statement. This knowledge should ultimately assist the physician in making decisions about patient care.

Figure 3. Congestive Heart Failure Guideline



Discussion and References (cont)

Congestive Heart Failure in Adults

Digoxin:

Digoxin improves symptoms, exercise tolerance, and quality of life, but neither increases or decreases mortality

Captopril-Digoxin Multicenter Research Group, The. "Comparative effects of therapy with captopril and digoxin in patients with mild to moderate heart failure." *JAMA* 259:539-44, 1988. (Class A)

Digitalis Investigation Group. "The effect of digoxin on mortality and morbidity in patients with heart failure " *N Engl J Med* 336:525-33, 1997. (Class A)

German and Austrian Xamoterol Study Group, The. "Double-blind placebo-controlled comparison of digoxin and xamoterol in chronic heart failure." *Lancet* 489-93, 1988. (Class A)

Conclusion Grade I; see Discussion Appendix D.

Figure 3. This figure presents a small portion of the Discussion and References section of the ICSI guideline on Congestive Heart Failure in Adults. The work group's conclusion statement is presented along with the references pertaining to that conclusion. The class of research report follows each reference citation. The conclusion grade and a reference to the Appendix containing the worksheet complete the section.

Guidelines and Technology Assessment reports both undergo a critical review process in which ICSI member medical groups have an opportunity to submit written critiques of the documents while still in draft form. It is expected that any critical evidence overlooked by the work group in their search of the literature would be identified during the review phase.

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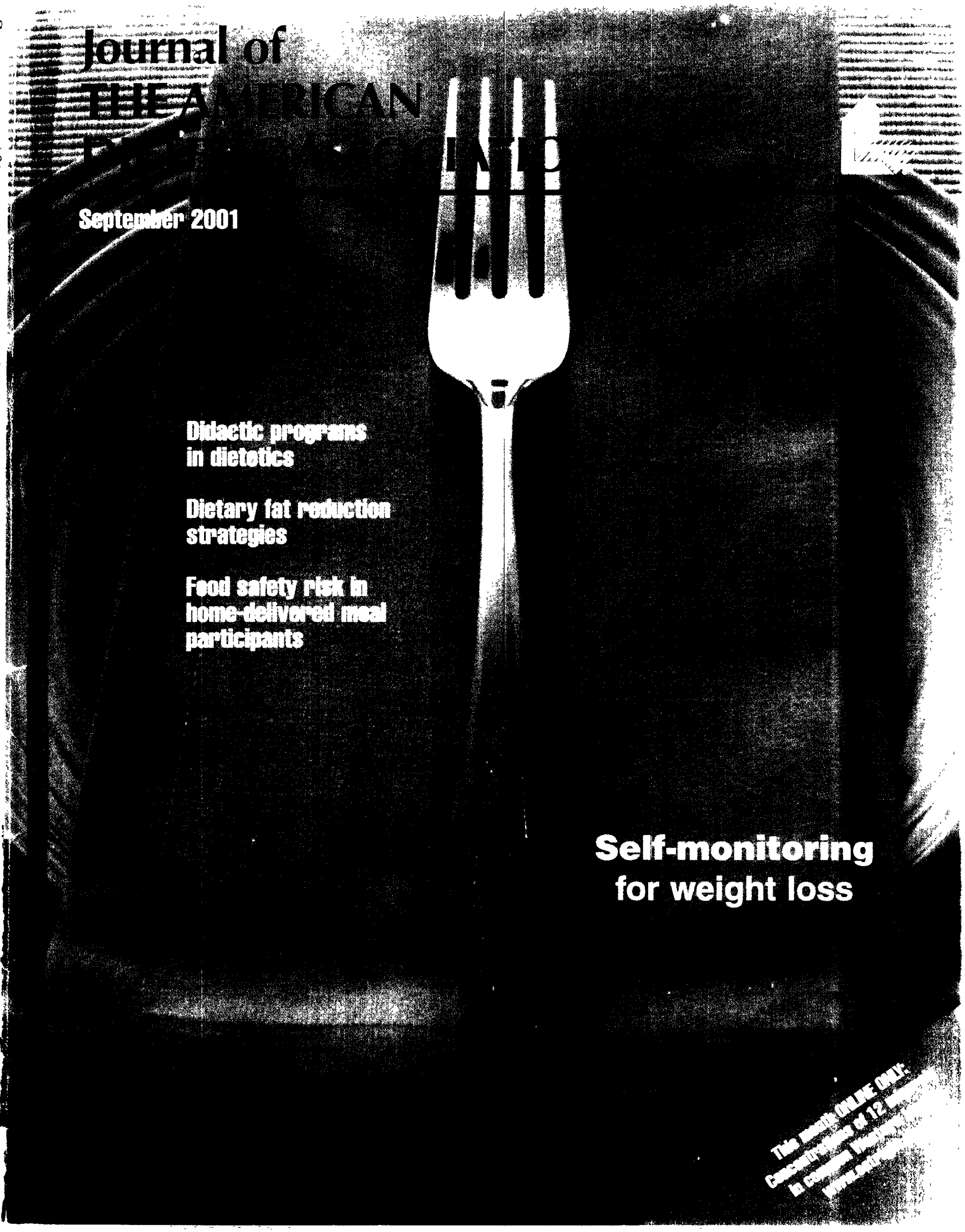
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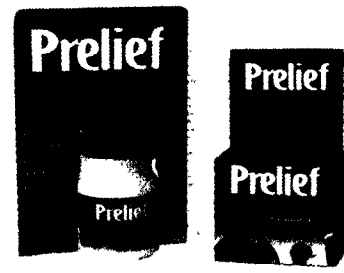

INTERSTITIAL CYSTITIS (IC): Prelief was demonstrated to be of value in the diets of IC patients in a retrospective study of 203 study-completing IC patients who consumed acidic foods and beverages with Prelief and compared their symptoms with their prior experience without Prelief.

- **70% of IC patients reported a reduction in pain and discomfort with the use of Prelief when consuming acidic foods.**
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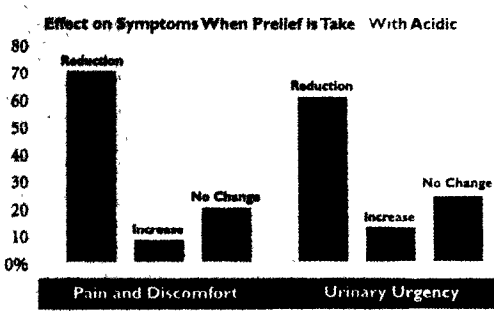
R.A.Bologna, A.Gomelsky, J.C.Lukban, L.M.Tu, A.S.Holzberg, & K.E.Whitmore *Urology* 57-6A, 119-120, June 2001 (Abstract)



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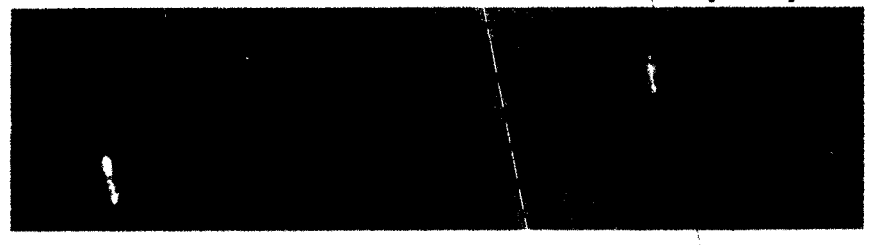

...thank you for giving me the ability to eat the foods I so enjoy. I can now eat salads, strawberries and even drink orange juice and tea. I have a better balanced and healthy diet and certainly enjoy life more fully... you've been an answer to my prayers!"

PH, Nazareth, PA

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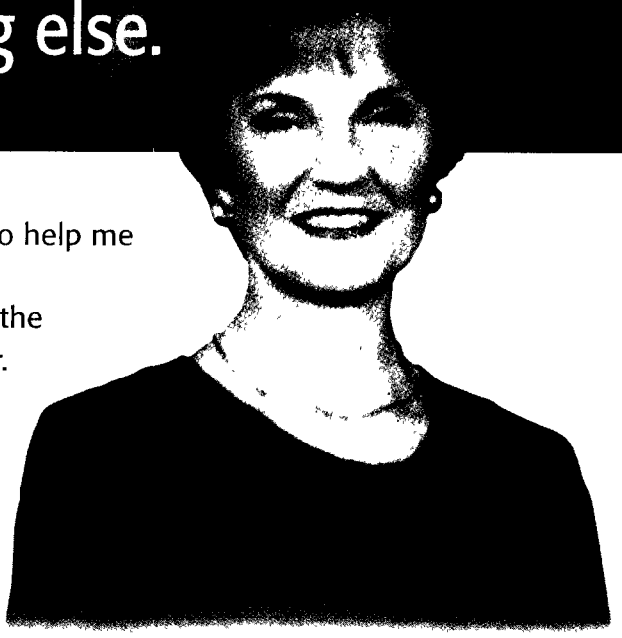

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Journal of

SEPTEMBER 2001 VOLUME 101 / NUMBER 9 (ISSN 0002-8223)

COMMENTARY

RESEARCH

Examination of self-monitoring tools used in low-fat dietary intervention (p 1031) and to achieve weight loss (p 1041). Art direction by David Zwierz

Journal of the American Dietetic Association (ISSN 0002-8223) is published monthly for $150 per year in the United States, $150 per year in Canada and $2[illegible]5 per year in all other countries by the American Dietetic Association, 216 W Jackson Blvd, Chicago, IL 60606-6995. ADA members' yearly subscription [illegible] ...include [illegible] ...nondeductible therefrom. Web site address http://www.eatright.org. Periodicals postage paid at Chicago, Ill, and additional mailing offices. Canada Post International Publications Mail Product (Canadian Distribution Sales Agreement No 1028537). POSTMASTER: Send address changes to MEMBER SERVICES, *Journal of the American Dietetic Association*, 216 W Jackson Blvd, Chicago, IL 60606-6995.

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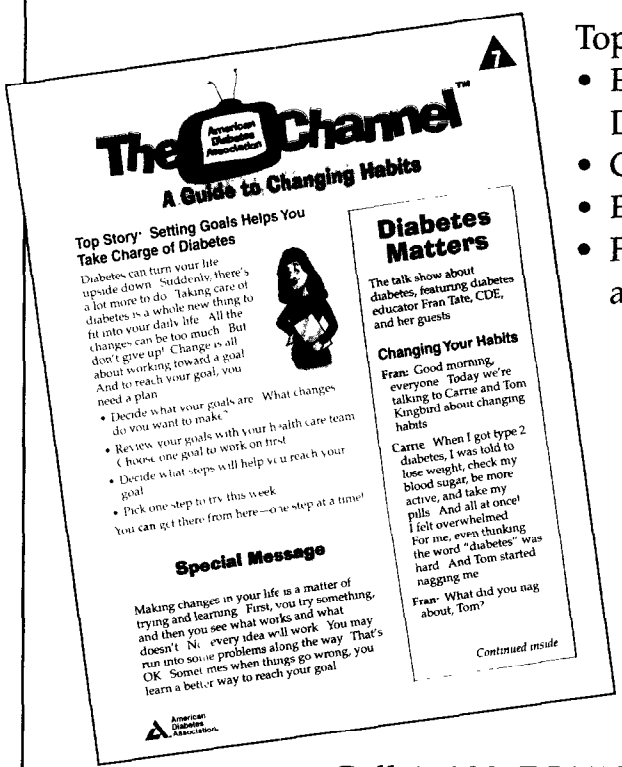

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Fran: What did you nag about, Tom?

Continued inside

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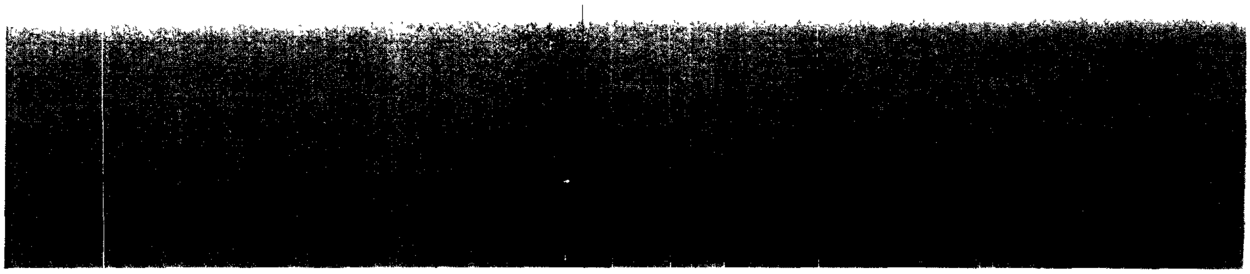

1024 Dietary fat reduction strategies used by a group of adults aged 50 years and older

[illegible] PhD, RD, [illegible] Hsieh PhD, Cheryl [illegible], PhD

Some of the [illegible] success strategies [illegible]lized by this group included an increase in [illegible] consumption of vegetables and grains. Researchers in this study believe dietetics pro[illegible]als should base their advice on these kinds of strategies – ones pr[illegible]d by consumers – rather than on hypothetical premises such as food [illegible] groupings to assist individuals in maintaining positive dietary changes

1031 Measurement characteristics of 2 different self-monitoring tools used in a dietary intervention study

Lesley Fels Tinker, PhD, RD, Ruth [illegible] Patterson, PhD, RD, Alan R Kristal, DrPH, Deborah J Bowen, [illegible]D, Alan Kuniyuki, MS, Holly Henry, MS, RD, Ann Shattuck, MP[illegible], RD

Both a food diary and a fat scan, used [illegible] the dietary intervention of the Women's Health Trial Feasibility in Minority Populations study, showed an underestimated fat intake compared [illegible] the criterion measure—enough to encourage dietary professionals to reassess the measurement properties of self-monitoring tools when using the[illegible] in support of dietary changes

1041 CD-ROM nutrient analysis database assists self-monitoring behavior of active duty Air force personnel receiving nutrition counseling for weight loss

Maj Jane E Heetderks-Cox, MS, RD Betty B Alford, PhD, RD, Carolyn M Bednar, PhD, RD, Cynthia J Hess, PhD, RD, Lisa A Tauai, RD, Kimberly K Edgren, MS, RD

How do active Air Force personnel, who typically have access to computers at work and are required to receive nutrition counseling if overweight, respond to self-monitoring strategies?

1047 Program directors' opinions in regard to Didactic Program in Dietetics graduates' failure to secure placement in Supervised Practice Programs

Ellen Parham, PhD, RD, Lucy Robinson, MS, RD, Joan Quinn, MEd, RD

Program directors have a high level of concern about their graduates' futures, according to this study, and they are frustrated by their limited ability to improve the situation.

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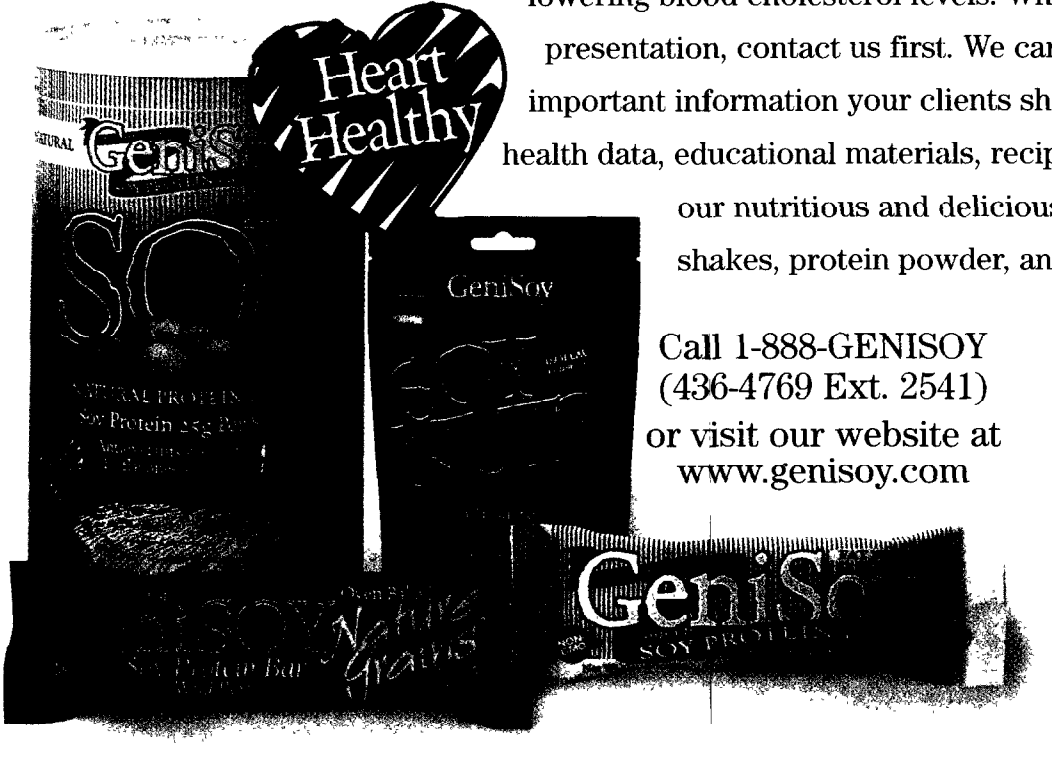

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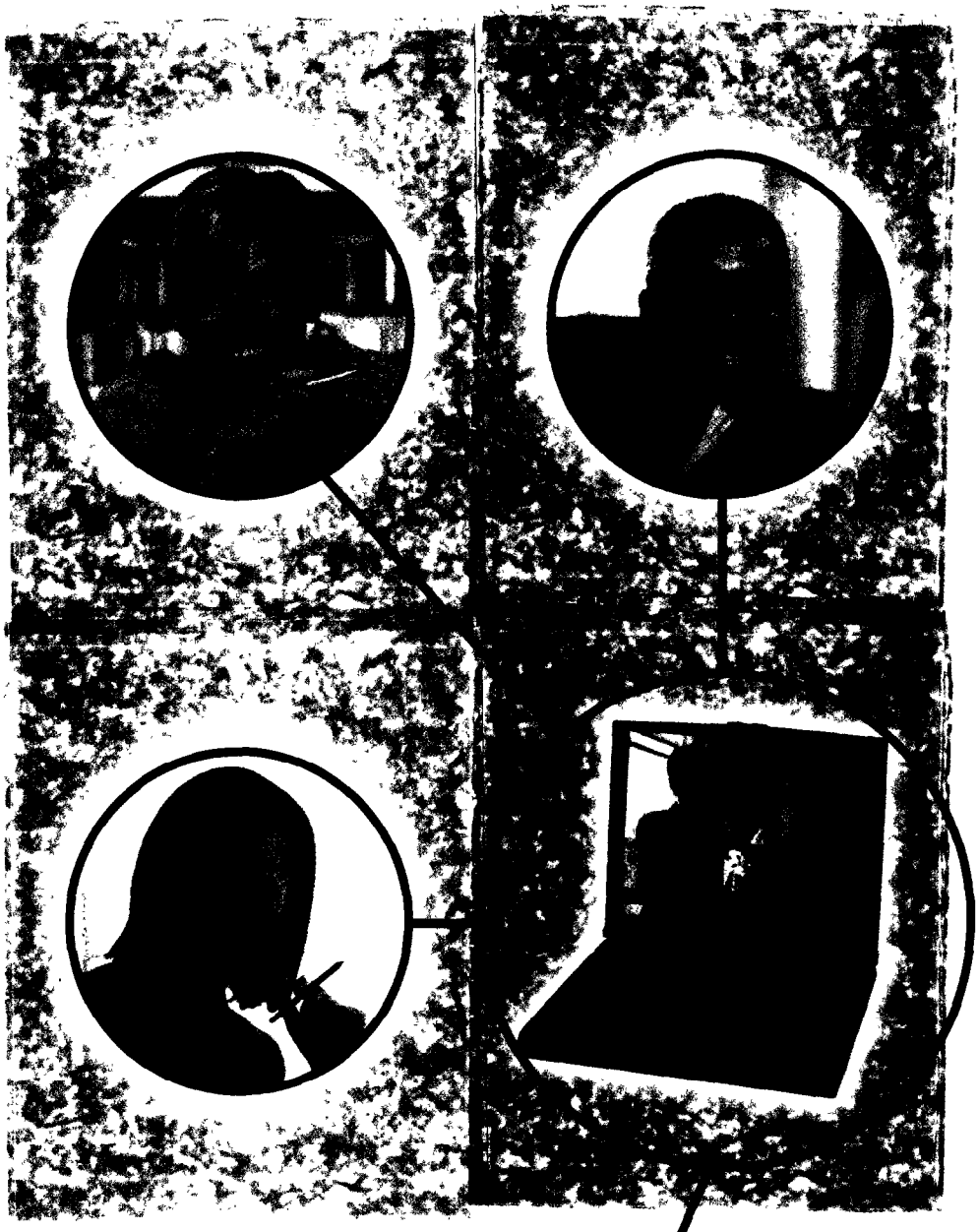

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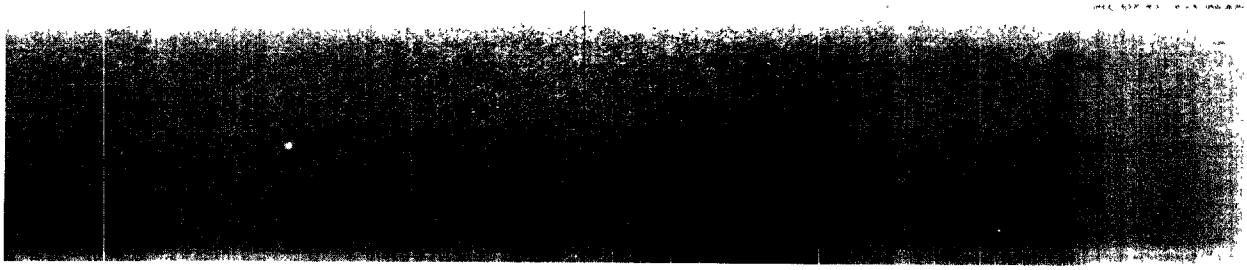

PROFESSIONAL INTEREST

THIS MONTH

COMING IN OCTOBER

R'S OUTLOOK

ry change: A journey beginning with one step

f this month's authors, Rayane AbuSabha, succinctly s a truism for our profession: "Dietary change is plex, dynamic, and does not happen overnight." Sub- hange requires sustained effort As is the case each he *Journal's* articles show how change is brought the small but continuous steps forward we take cientific efforts.

of small, comfortable changes over a prolonged time enabled a group of older adults to maintain dietary changes, as reported by AbuSabha and col- 1024). The 65 adults in this retrospective study had reduction strategies for 5 years or longer. The qualitative and quantitative methods revealed ting data, such as the fact that previous attempts diets were not "failures," but rather small successes: a participant tried to change his or her diet. .a dietary changes were adopted, several of which were contributing to the overall lower-fat diet."

the theme of fostering change is the article by Zimmerman (p 1006) that evaluates the effective- setting and self-monitoring to enhance a positive dietary fiber consumption. In a 2 x 2 factorial design omly selected college students, self-monitoring, and self-monitoring, and no goal setting and no ring were studied An objective of this study was to al setting and self-monitoring to see the relative s of each. The results indicated that self-monitor- did not directly contribute to behavior change, goal setting exerted a strong direct effect In fact, ho set goals for their dietary fiber consumption 1% more fiber than subjects who did not set goals

assessments of intake can lead to false as- of dietary adherence, according to Tinker and colleagues (p 1031). In an intervention group of the Women's Health Trial: Feasibility in Minority Populations study, 313 women used a food diary and a fat scan to assess and evaluate their change to a low-fat eating pattern. The authors wanted to know if the self-monitoring tools under- or overestimated fat intake. Both of these self-monitoring tools underestimated fat intake by 10% to 20% when compared to more comprehensive assessment instruments Self-monitoring tools should be user-friendly to our clients, but must also offer "a general marker of adherence."

Computer monitors assist self-monitoring? As computers facilitate our personal and professional needs, they can also be adapted to assist in self-monitoring behaviors, as evidenced in Heetderks-Cox and colleagues' study comparing a CD-ROM nutrient database with a food record booklet for self-monitoring among air force personnel being counseled for weight loss (p 1041). Participants found the software easy and quick to use, as opposed to the food booklet. For our clients with access to and comfort with computers (a growing population), this study points to a new and effective self-monitoring tool.

One significant change in this issue is the debut of a *Journal* Web site exclusive. Hunt and Meacham have estimated intake of 12 different minerals for Americans (p 1058) The table of mineral concentrations, too expansive to fit in its entirety on our print pages, can be found on the Members-only site (www.eatright.org). This online-only table is an exciting addition that was in the planning stages for many months—once again, proof that change does not happen overnight!

Elaine R Monsen, PhD, RD

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Where is ADA? Everywhere ... Especially St. Louis

In June, ADA created an e-mail address, ADAPresident@eatright.org, to provide an online place where members could raise issues, send comments and express their concerns. Many members accepted the invitation, and I appreciate every message and all input. You've offered suggestions, asked questions, contributed constructive criticism and even passed along thanks for our ongoing efforts to, as one member put it, "keep our profession on the forefront of the industry." We are moving simultaneously in many directions to achieve that goal

Susan T Borra

So many "everywheres"

At times it seems that ADA is everywhere. Certainly we are everywhere we need to be. For example, in the next few weeks in Washington, D.C., ADA will offer an unprecedented session for members of Congress on how they can successfully manage their diets and health during hectic congressional workdays This is a great opportunity for ADA to work face-to-face with our national representatives on the very subject we know best. It should be informative, fun and excellent exposure for our Association.

In October, many of ADA's "everywheres" will converge, along with thousands of members, at the Food & Nutrition Conference & Exhibition in St. Louis. It will be a perfect time to come together and share our experiences and accomplishments over the past year. In both geography and areas of involvement, here's a portion of what I mean when I say ADA is everywhere – and how all these everywheres tie into FNCE.

- The August issue of *Association Management* magazine, the journal of the American Society of Association Executives, carried an article that prominently featured ADA The story reported on ADA's strategic plan, our contract with the Health Resources Services Administration to create a national model for mentoring minority students into the dietetics profession and the California Dietetic Association's (CDA's) successful mentoring program. The story included a half-page color photo of CDA's professional mentoring coordinator, Kara Caldwell Freeman, DrPH, RD. The mentoring models and tool kits that have been developed under the HRSA grant will be shared with members at FNCE, in a session on Sunday, Oct 21.
- ADA made significant waves in the association management community in July We announced that Ronald S. Moen, executive director of the American Association of Orthodontists and a nationally respected nonprofit association executive, will become our CEO December 1. Ron will attend FNCE and speak at the Member Showcase on Monday, Oct. 22 (Incidentally, word that Ron is joining ADA traveled so far and wide that I received this e-mail from a member: "Please stop sending this message, this is now the 6th I've received from ADA or my local dietetic association " To be honest, I can't promise that we will solve the "problem" of members receiving *too much* information from ADA!)
- Following the recent National Institutes of Health (NIH) study demonstrating the benefits of moderate dietary changes and exercise in preventing diabetes, ADA wrote to President Bush commending NIH for its study and noting that the study provides more evidence of the need for nutrition strategies for managing conditions such as diabetes and cardiovascular disease for seniors. We asked for the Bush Administration's endorsement of the Medicare Nutrition Therapy Amendment Act of 2001, which would extend provision of MNT services under Medicare. I'm sure this study and its ramifications will be addressed at such FNCE sessions as "The Role of the Dietitian in the Epidemics of Obesity and Diabetes" and "Medicare, MNT and Me: A How-to on Successfully Providing the New Benefit "
- ADA staff and members are drafting an action plan for the Board's consideration on how we can best assume an ADA-wide leadership role in national efforts to address obesity, especially among children Upon Board approval, our plan will be forwarded to NIH to put into the context of the national initiative. Thanks to the efforts of Mary Jo Feeney, MS, RD, FADA, and her colleagues on the FNCE planning committee, more than a dozen FNCE sessions will tackle the subject of obesity, with three sessions devoted to childhood obesity. Sessions include "Initiatives to Promote Healthy Eating and Physical Activity in the School Environment" and "Childhood Obesity. A Family Approach."
- And ADA is showing up in places you'd really never expect.... But I'm not going to give this last one away just yet. Fans of a certain long-running TV show—in particular an episode that aired in August—may already know what I'm referring to. For everyone else, come to the FNCE Opening Session and your questions will be answered. And that's the only hint you're going to get!

Changing times, traditional values

Like ADA itself, the 2001 FNCE is changing with changing times, holding true to traditional ADA values and accommodating the diversity of member interests and commitments. In St Louis, you'll hear Rick Bayless, past "IACP Professional Chef of the Year," explore the culinary heritage and flavors of traditional low-fat Mexican food. Varro Tyler, PhD, a nationally recognized authority on medicinal herbs and phytochemicals, will deliver the President's Lecture on Sunday, Oct 21. And you won't want to miss the Ross Keynote Address, to be given by veteran TV journalist Catherine Crier at the Opening Session on Saturday, Oct. 20. As always at FNCE, you can enhance your professional skills and network with 10,000 colleagues, experts and industry representatives. There will be more than 100 educational sessions and 350 companies in the Exhibit Hall. Visit http://www.eatright.org/fnce/ for details. Then register! And I'll see you in St. Louis.

—Susan T Borra, RD
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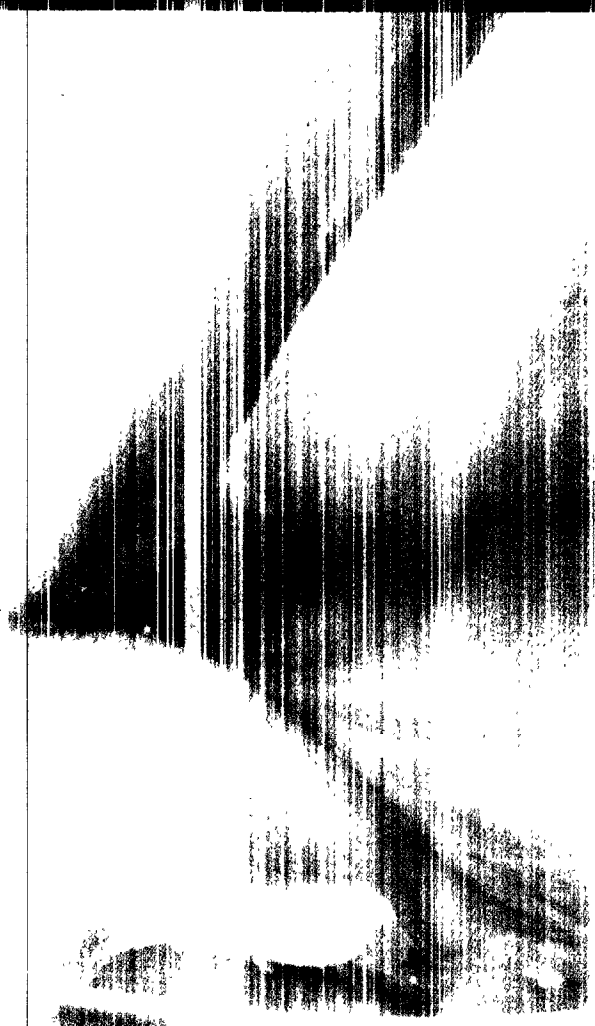

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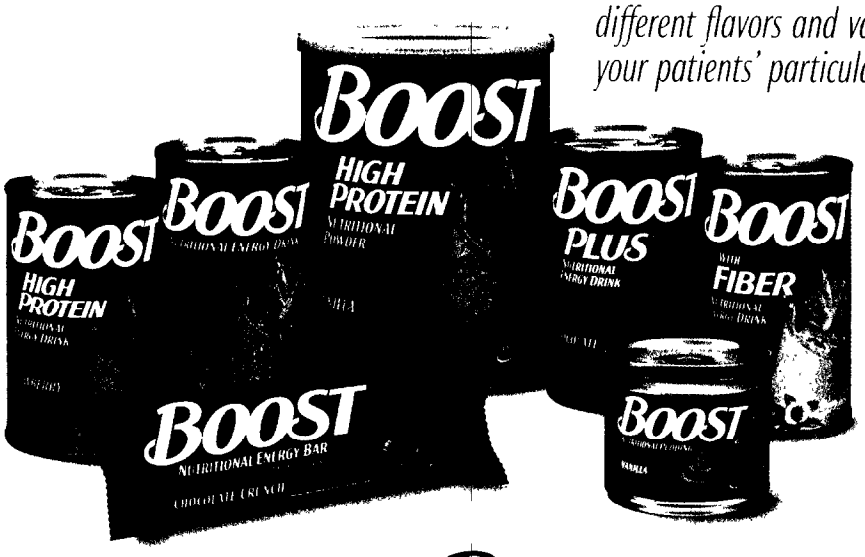

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Use of the air displacement plethysmograph to monitor body composition: A beneficial tool for dietitians

Many popular diets create weight loss through depletion of muscle and body water, not body fat. A useful component of nutritional assessment is the estimation of body composition by a new air displacement method called the air displacement plethysmograph, or Bod Pod® (Life Measurement Instruments, Concord, Calif.). This instrument was developed in cooperation with the US National Institute of Health For the past 30 years, hydrodensitometry or underwater weighing has been considered the gold standard for body composition analysis. Although body composition can be estimated via a variety of methods including skin folds, bioelectric impedance, hydrodensitometry, and dual energy x-ray absorptiometry (DEXA), each of these methods may have physical and financial limitations for some clients. The air displacement plethysmograph may be a viable alternative, replacing the inconvenience of water with the comfort of air to give the highest quality body composition available.

This article was written by ***Carolyn J. Hoffman****, MS, RD, associate professor, department of human environmental studies, and* ***Leslie A. Hildebrandt****, PhD, RD, assistant professor, department of human environmental studies at Central Michigan University, Mt Pleasant, Mich*

BENEFITS FOR THE DIETITIAN

This new equipment can be an asset to the dietetics practitioner in that it:

- measures the amount of lean and body fat tissue,
- measures the effectiveness of lifestyle programs focused on diet and exercise;
- provides motivational feedback for clients, and
- discourages the use of rapid weight loss programs that result in loss of metabolically active lean body mass.

Dietitians can use air displacement to monitor changes in body fat in response to dietary and exercise intervention. The success of weight loss programs is often measured through changes in body weight, not body composition Popular diets that focus on pounds lost, instead of changes in adipose and lean tissue, can result in progressive losses in muscle and declines in energy expenditure. This can be very misleading to clients and result in rapid weight gain once the diet is discontinued

Sometimes people begin a weight management program that includes exercise, and find their body weight doesn't change at all. This can be very discouraging, and can occur because fat is lost at the same time that muscle is gained. In addition, the dietetics professional may set a desirable range for a healthy amount of body fat for an individual that equates with optimal performance rather than using a "scale weight" that would penalize lean tissue increases from exercise If the dietitian focuses on body composition instead of weight, then clients can focus on losing fat while preserving or building lean body mass. Therefore, the method for estimating body composition must be accurate, quick, and noninvasive.

HOW DOES IT WORK?

Estimations of body composition using this method rely on principles similar to those used in underwater weighing; eg, density differences between lean tissue and fat tissue The overall density of one's body can be used to determine the percentage of fat and lean tissue. While the person sits inside the chamber, computerized sensors determine the amount of air displaced by the person's body Testing is fast, accurate and easy. A complete evaluation takes about ten minutes. The initial equipment purchase requires an investment of approximately $35,000. The only equipment that needs to be replaced with the measurement of each person is a breathing tube, which costs about five dollars.

HOW DO YOU MEASURE BODY COMPOSITION?

The system consists of a cabin, complete computer system, monitor, a data interface board, software, scale, and calibration standard. The subject should wear a synthetic swimsuit and cap to prevent erroneous air displacement Although some may not wish to wear a tight-fitting swimsuit and cap, it is important in order

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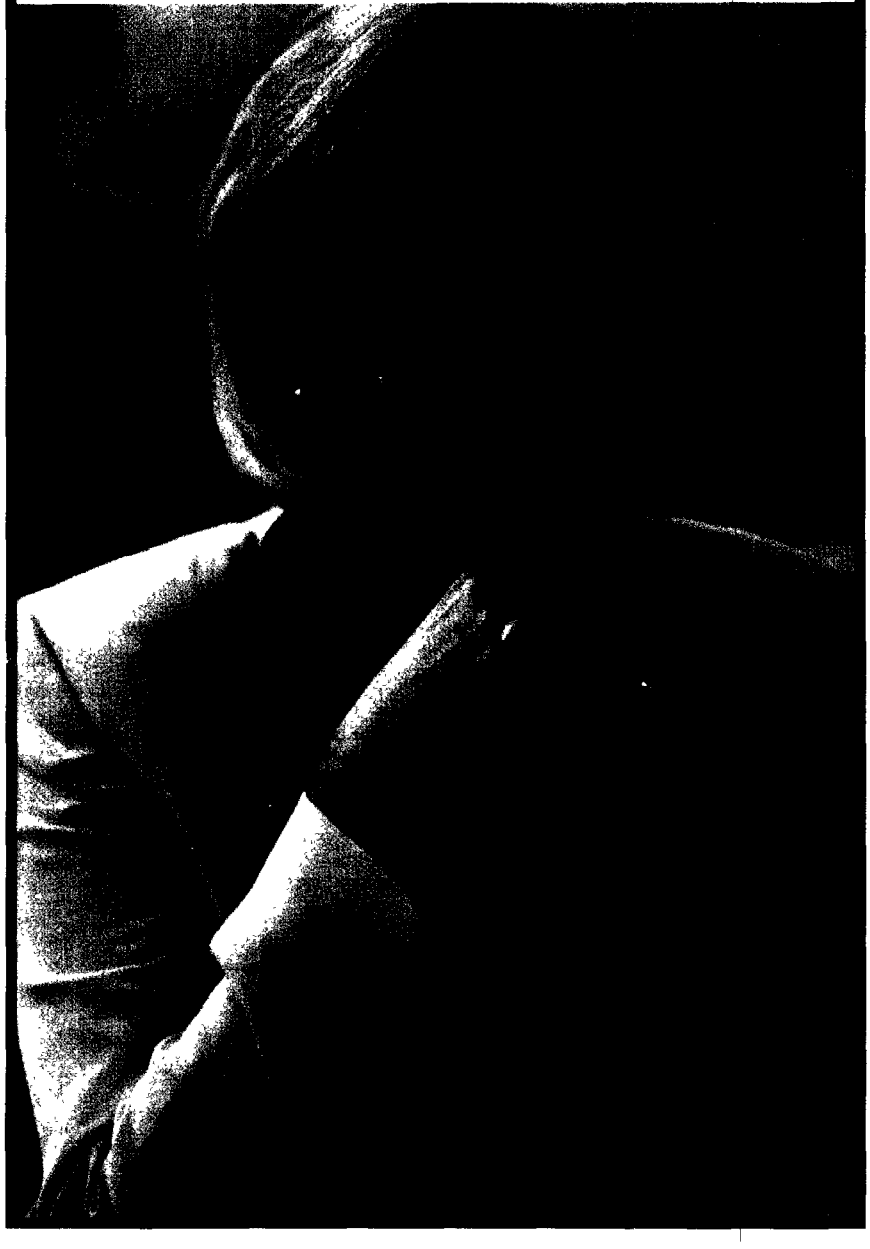

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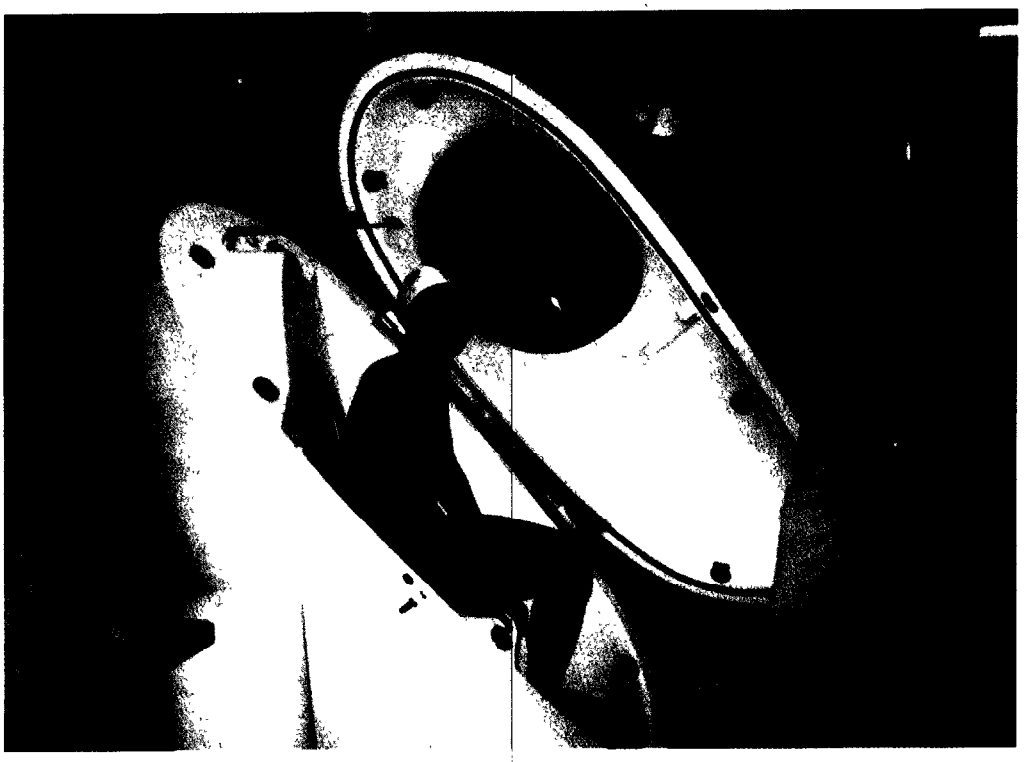

The Bod Pod® the future of body fat measurement?

to expel any air pockets present, since the system determines volume through air displacement. A movable diaphragm is mounted on the common wall separating the front and rear chambers. After initial measurement of body volume, the subject simply breathes into a breathing tube so the airway pressure can be measured. The subject breathes normally into a breathing tube and then puffs three times. The computer monitor measures the subject's compliance with the technique and this is automatically calculated to ensure validity. The Siri formula is used for the program (1) Body composition (percent body fat) then appears on the monitor screen and a printout of the results is immediately available.

HAS THIS SYSTEM BEEN EVALUATED?

Scientific studies evaluating the use of the Bod Pod® have been done and are published in several juried journals (2-5). In the healthy, normal weight population, these findings have consistently indicated that air displacement is a highly reliable and valid method for determining percent fat in adult humans compared with what has for years been considered the gold standard, hydrostatic weighing (5). However, it is recognized that the software used in this equipment is only accurate if it has been validated. Although research studies to date have only examined healthy individuals, use of this equipment should be validated with "nonhealthy" people, including obese subjects, disabled, pediatric, and geriatric populations. Since it has been estimated that one fourth of adults in the United States are considered obese (6), the Bod Pod®, once validated, may provide accurate measures of body composition for obese clients trying to make healthy lifestyle changes. It can also be utilized for competitive athletes wanting to create physiques for optimal performance and health. The Bod Pod® can be a very effective tool to use with normal, healthy clients in fitness centers and athletic departments and may be useful for many patients/clients in the future

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The authors wish to acknowledge the assistance of Ms Kristen Boff, competitive volleyball athlete, dietetics major, and graduate of Central Michigan University

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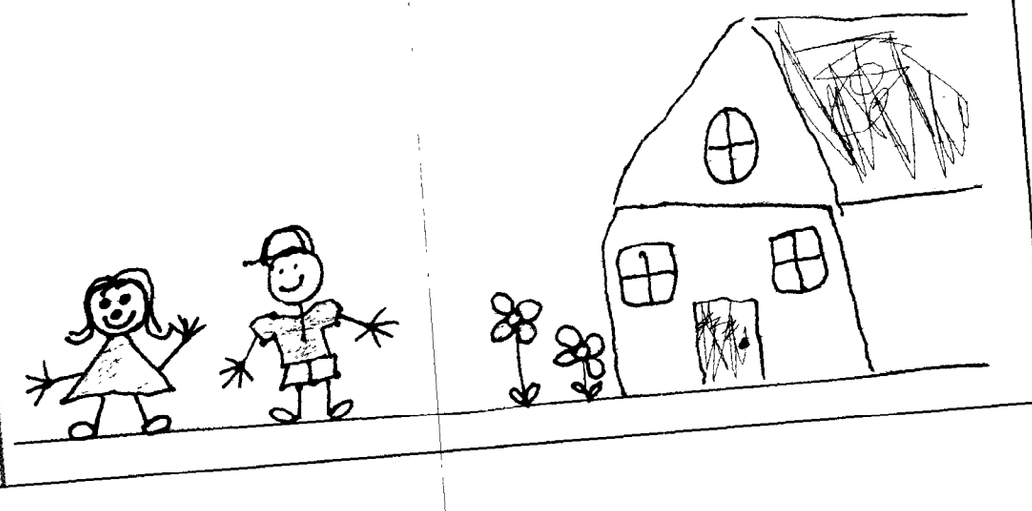

Low-fat diets: One size may not fit all

Weight loss, high blood pressure, and cholesterol counts are all motivating factors for people to switch to a low fat diet, and for years, low fat diets have been prescribed a sort of "one size fits all" solution

That may be about to change. Though in its infancy, genetic nutrition may change the way dietitians counsel people, whether they want to lose weight or better modify their diet around a particular condition.

The *Journal* (*JADA*) recently talked about how individual response to low fat diets could affect future nutrition counseling and recommendations with Michael Lefevre, PhD, chief of the division of Functional Foods Research at Pennington Biomedical Research Center in Baton Rouge, Louisiana, and a coauthor of the study "Distribution of ApoA-I-containing HDL subpopulations in patients with coronary heart disease" [illegible], and ADA spokesperson Wahida Karmally, MS, RD, director of nutrition at the Irving Center for Clinical Research New York, NY

***JADA*:** Can you summarize the impact of [illegible] research on individuality of responses to dietary fat intake to generalized guidelines such as the NCEP ATP III guidelines for treatment?

Michael Lefevre (ML): There are associations between certain genetic polymorphisms or certain variants and response to therapeutic diets. These associations ground this variability in response on a genetic basis, suggesting that response between individuals is based in part on differences in metabolism, and not necessarily on differences in adherence. Certain gene polymorphisms are repeatedly associated with differences in diet response across different studies so it suggests there is a clear genetic basis for individual response to identical diets.

It also suggests that failure to achieve a certain reduction in lipids with a particular diet does not necessarily mean that a particular patient/client is failing to adhere to the diet. I think this is an important concept. If a person is not achieving a certain reduction in lipids, we tend to think they're just not following our advice. And in fact, the opposite may be true—they may be following it or even going to an extreme, but because of their genetic makeup, that diet might not be the diet for them, and they may be resistant to a particular reduction in lipids.

There are people for whom a low-fat diet may be very effective in lowering LDL cholesterol, and there are those for whom it's not very effective, and that suggests that other dietary approaches should be considered or that they are direct candidates for drug therapy if their lipids are high enough

Wahida Karmally (WK): We know now that there is no universal agreement about the value of low fat diets because different studies have looked at the effect of unsaturated fat. We found that when you go on low fat diets, LDL cholesterol will go down, but HDL cholesterol falls. HDL is a good cholesterol, and the higher it is, the better it is, in terms of protecting the heart. All researchers do agree that lowering saturated fat intake is important.

Researchers have also been asking if there is a section of the population, say 25 million people, who have insulin resistance, should we also recommend low fat diets to this population?

***JADA*:** What additional research is needed before guidelines for treatment should be adapted?

ML: More research needs to be undertaken in the area of firming up the relationship between non-LDL risk factors and diet and overall impact on progression of disease.

Also, on the diet side, we need to look at alternate dietary plans—we've been advocating a low-fat, Step 1 or Step 2 diet for a very long time. Now we're seeing the emergence of a higher fat diet, the so-called Mediterranean Diet, a diet which is higher in total fats from monounsaturates. That's just one of perhaps many possibilities that are out there to optimize therapy to achieve a partial risk reduction for cardiovascular disease. Right now, our research is focused on genes which we suspect have a role in lipid metabolism. There are a lot of genes out there we have not reexamined in any meaningful way, which may be more powerful predictors of dietary response. For these studies you typically need controlled feeding trials because the impact of these genes is probably pretty small, relative to the impact of everyday variability and dietary intake.

We're not at a point where we can pull somebody in and take a blood sample and say, "This is the best diet for you."

WK: Genetic nutrition would be applicable to many diseases. Once we understand an individual's genetic blueprint, a registered dietitian will be able to give evidence-based nutrition advice to that patient and tailor the eating plan to the genetic blueprint. This knowledge would certainly help in preventing or delaying disease.

***JADA*:** What are the practical implications for dietitians at the present time that are counseling individuals on modifying dietary fat intake?

ML: One of the real practical applications is that there is a variability in response. Just because someone's not achieving a desired goal in terms of lipids doesn't mean they're not adhering to that diet And there should be consideration of alternate dietary approaches which may be better suited to that individual At some point we'll be able to use genetics to guide dietitians in that process

This article was written by ***Kim McCaffree****, an Editor of the Journal in Chicago, Ill*

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...Find out everything about the pa... ...before you make recommendations: ...t are on medications, if they are ... herbal supplements. The RD ...n give them practical examples of ...w the diet can be planned to enable ...patient to lower saturated fat intake ...cholesterol intake, then how to make ...ese calories with other sources of ...rients. The dietitian also needs to ...out their activity pattern—whether ...gular. Then what about the kidney ...ion? That will help you determine ...much protein to recommend.

...A: What do you see as future meth... ...to address the individual responses ...tary fat intake?

...A lot of the work we're doing right ...is looking at, let's say, the average ...rican diet and then looking at the ...nse to Step 1 or Step 2 diets And in ... individuals, a Step 2 diet theoreti... ...produces a worse lipid profile That ...t to say that we should leave these ...iduals on the average American diet. ...haps there are other diet plans which ...more appropriate, which are low in cholesterol, saturated fats, but maybe higher in monounsaturates, n-3 fatty acids, or polyunsaturates. We really have not yet begun to explore the impact of genetics on alternative diet therapy plans There haven't been many studies looking at gene profiles on a Step 1 diet, versus a Step 2 diet We haven't looked at these other options yet.

***JADA*:** What would you say to accurately translate the current science to clients who are confused about the differing recommendations for dietary fat consumption?

ML: It depends on what the goals are for the therapy. It's important to look at dietary patterns. I think we need to understand that risk for chronic disease is not just about dietary fat, there are a lot of components other than diet which may impact risk for cardiovascular disease. If you do some of the things you've always been told to do—increase intake of fruits and vegetables, increase low fat dairy product intake, the fat issue will take care of itself.

WK: RDs should tell them the science behind the recommendations; the lowering of saturated fat intake, lowering of cholesterol intake, increasing fiber intake, and explaining to them what these foods have. I use charts to show patients what corn oil has, or what chicken fat, beef fat, and fish fat have, and why I am asking them to choose one above the other, or eat more of something and eat less of something else. So you need to help them understand what these food sources have and how they contribute to either increasing your risk for heart disease or lowering your risk for heart disease

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The author would like to thank Esther F Myers, PhD, RD, FADA, ADA's Director of Research and Scientific Affairs for her assistance in formulating the questions in this article

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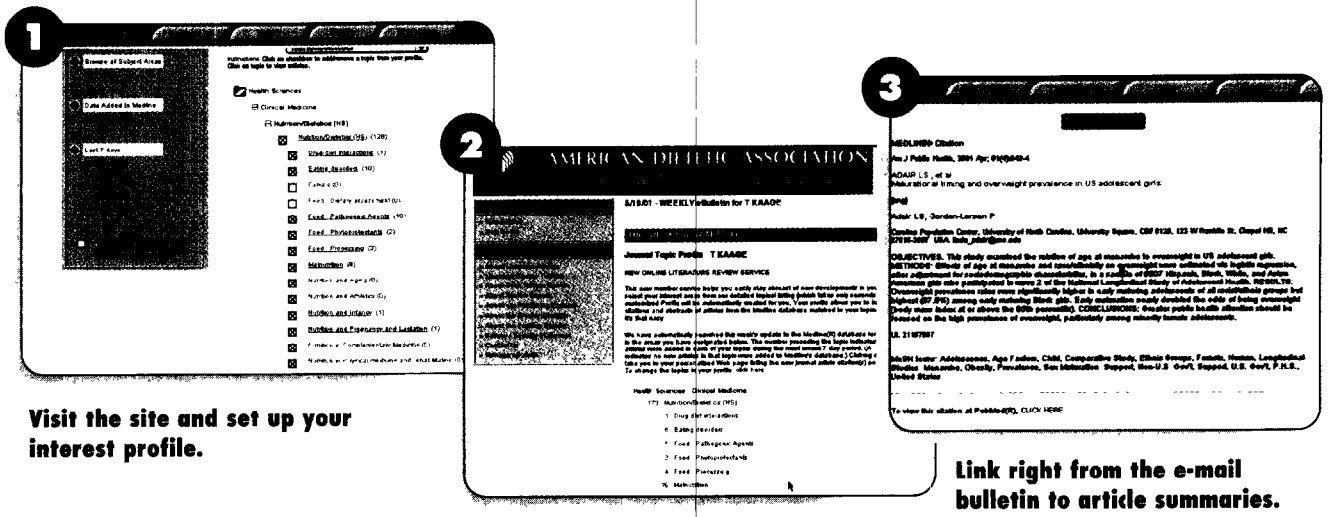

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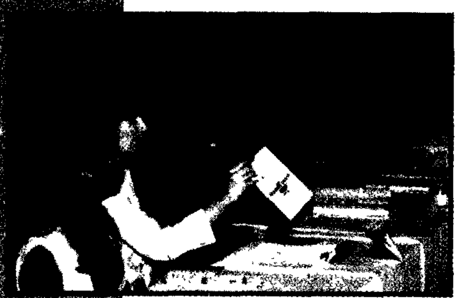

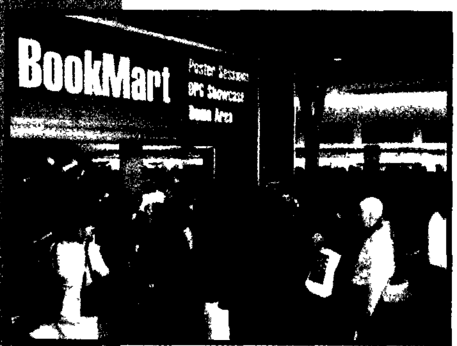

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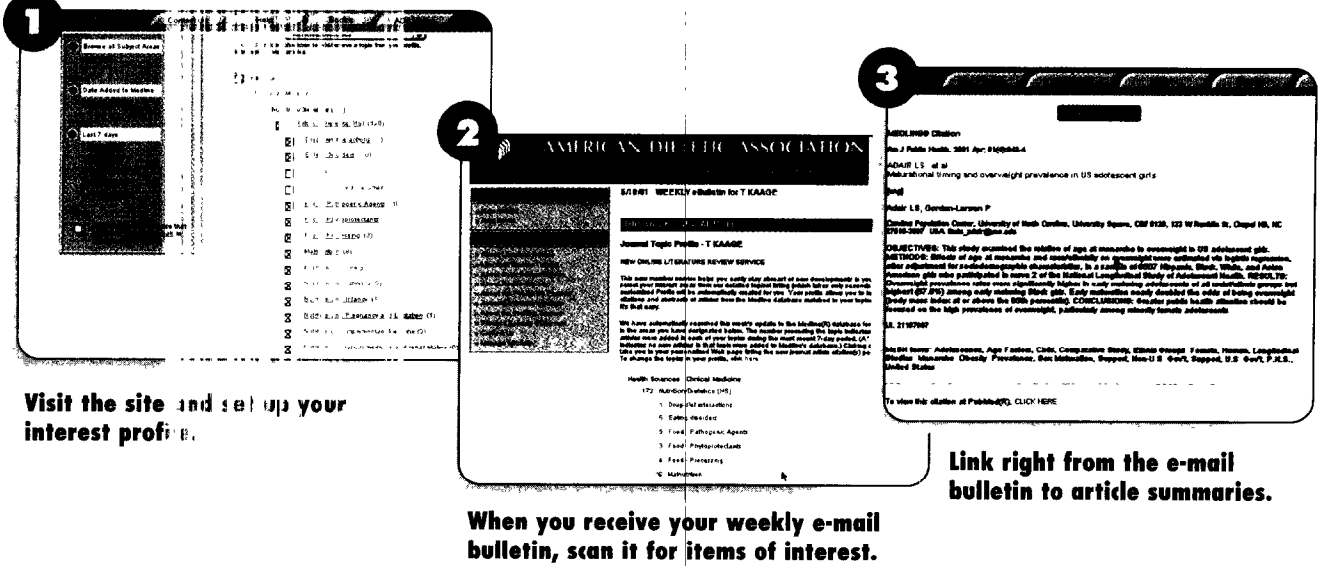

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Fruit juice consumption not related to growth among preschool-aged children enrolled in the WIC Program

To the Editors:

Excessive fruit juice consumption (≥12 oz/day) has previously been reported as being associated with short stature and obesity in preschool-aged children (1). Recent research, however, does not support such an association with short stature or obesity (2-4). The relationship between pediatric fruit juice intake and growth remains equivocal

Studies to date have primarily relied upon white, middle class populations. To extend previous research, fruit juice consumption and anthropometric indices were examined in a low-income, predominantly minority sample

SUBJECTS

Participants were 77 children, ages 12 to 59 months (mean = 32.9±15.1 months), enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in Atlanta, Georgia, during 1998 and 1999. Among the sample, 58% (45/77) were male, 95% (73/77) were black, 3% (2/77) were Asian or Hispanic, and 33% (25/77) were born prematurely (range = 23-37 weeks gestation, mean = 31.5±19.9 weeks)

METHODS

A registered dietitian interviewed parents or guardians regarding demographics and frequency of 100% fruit juice consumption using food models to demonstrate portion sizes The registered dietitian also measured the child's weight (using a digital scale) and height (using a stadiometer or length board). Children were measured in minimal clothing and without shoes

Body mass index (BMI = weight [kg]/height $[m]^2$) measured adiposity. Obesity was defined as BMI ≥ 75th age- and gender-specific percentile using the age- and gender-specific BMI percentiles from Hammer and colleagues (5). Short stature was defined as height less than the 20th gender-specific percentile for age. Height or age-adjusted height was plotted on National Center for Health Statistics gender-specific growth charts. Excessive fruit juice consumption was defined as consuming ≥12 oz of 100% fruit juice per day. Parameter definitions were consistent with those used in other studies (1,3,4).

Children with medical conditions affecting growth were excluded. Written informed consent was obtained from parents or guardians of children prior to study participation. Procedures were approved by the appropriate Human Investigations Committee. Data were analyzed using the Epi Info statistical software package (Centers for Disease Control, 1994, version 6.02, Atlanta, Ga). Growth parameters of children consuming ≥12 oz of 100% fruit juice per day were compared with those of children consuming <12 oz/day using the Student's t-test, chi square, Fisher's exact tests, and Pearson correlations.

RESULTS

Thirty percent (23/77) of participants were of short stature and 34% (26/77) were obese. Seventy-nine percent (61/77) of the children reportedly consumed ≥12 oz of fruit juice daily. The range for total daily fruit juice intake was 0 to 128 oz/day (mean = 24±20.7 oz). No statistically significant relationships were found between excessive fruit juice intake and obesity or short stature.

CONCLUSIONS

This study found no relationship between fruit juice intake and growth indicators among a sample of low-income, predominantly minority children, which is consistent with other recent reports that utilized children of other ethnic and socioeconomic backgrounds (2-4). The present findings do not support previous recommendations to limit intake of 100% fruit juice to <12 oz/day (1). On the contrary, consumption of 100% fruit juice by preschool-aged children should be encouraged, since a recent report suggests that intakes of less nutritious beverages increase as juice intake decreases among this age group (2)

AMY S KLOEBLEN-TARVER, MPH, RD, assistant director, Nutrition Services, Grady Health System, Atlanta, Ga

References

1. Dennison BA, Rockwell HL, Baker SL Excess fruit juice consumption by preschool-aged children is associated with short stature and obesity *Pediatrics* 1997,99 15-22
2. Skinner JD Carruth BR A longitudinal study of children's juice intake and growth the juice controversy revisited *J Am Diet Assoc* 2001, 101(4) 432-437
3. Alexy U, Sichert-Hellert W, Kersting M, Manz F, Schoch G Fruit juice consumption and the prevalence of obesity and short stature in German preschool children results of the DONALD study *J Pediatr Gastroenterol Nutr* 1999,29 343-349
4. Skinner JD, Carruth BR, Moran J III, Houck K, Coletta F Fruit Juice intake is not related to children's growth *Pediatrics* 1999,103 58-64
5. Hammer LD, Kraemer HC, Wilson DM, Ritter PL, Dornbusch SM Standardized percentile curves of body-mass index for children and adolescents *Am J Dis Child* 1991,145 259-263

Response:

This research by Kloeblen-Tarver confirming no relationship between preschool children's fruit juice intake and overweight and short stature is important for several reasons. Their sample was primarily minority children from low-income families rather than white children from families with middle or upper socioeconomic status as reported previously (1). In their study the percentages of overweight children (34%) and short stature children (30%) exceeded the expected percentages, 25% and 20%, respectively; thus overweight or short stature were concerns in this group Moreover, these children consumed large quantities of fruit juices, 79% had ≥12 oz daily with a mean of 24 oz; these amounts exceed the amounts provided by vouchers from the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). These new data and earlier studies (1-3) raise questions about why the American Academy of Pediatrics has recommended severely limiting children's fruit juice intake. The evidence suggests that less nutritious beverages (soda pop, fruit drinks) will replace 100% fruit juices, which are nutritious beverages that are well accepted by young children.

JEAN D SKINNER, PhD, RD, professor,
BETTY RUTH CARRUTH, PhD, RD, professor emeritus, Department of Nutrition, University of Tennessee

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1. Skinner JD, Carruth BR A longitudinal study of children's juice intake and growth the juice controversy revisited *J Am Diet Assoc* 2001, 101(4) 432-437
2. Skinner JD, Carruth BR, Moran J III, Houck K, Coletta F Fruit juice intake is not related to children's growth *Pediatrics* 1999,103.58-64
3. Alexy U, Sichert-Hellert W, Kersting M, Manz F, Schoch G Fruit juice consumption and the prevalence of obesity and short stature in German preshchool children results of the DONALD study *J Pediatr Gastroenterol Nutr* 1999,29 343-349

Prenatal WIC participation in relation to low birth weight and Medicaid infant costs in North Carolina—a 1997 update

To the Editors:

Previous studies have found that prenatal WIC participation is associated with improved birth outcomes and reduced infant medical costs (1,2,3,4) One of these studies, published in the *Journal*, was done in North Carolina using data on 1988 live births to women on Medicaid (1). We replicated and expanded the 1988 North Carolina results for the 1997 birth year, addressing some potential methodological issues in the earlier study

Live birth, Medicaid, and prenatal WIC records were linked as in the previous study. Within the 1997 Medicaid births, women participating in WIC were compared to women not participating in WIC We used logistic regression analysis to determine the effect of prenatal WIC participation on low birth weight while controlling for demographic and other risk measures available on the birth certificate. The difference in average Medicaid costs between newborns in the WIC and non-WIC groups was estimated using ordinary least squares regression analysis and compared to the cost of providing prenatal WIC services

There are some potential biases inherent in an evaluation of a prenatal care program. If a woman does not enter WIC until very late in pregnancy, there is a high probability she will have a normal birth weight baby just due to the length of gestation, yet she is counted in the WIC group We attempted to reduce this bias by counting women who started WIC after 33 weeks gestation in the non-WIC group

Another potentially serious problem in an evaluation of a prenatal care program is the "preterm delivery bias" Women who have a very early delivery may never have a chance to enroll in WIC. To address this problem, we defined three cohorts (5) (29, 33, and 37 weeks gestation) and logistic regression was done with all births occurring before the specified week of gestation excluded from the analysis This approach measures the effect of prenatal WIC participation on birth weight only for those pregnancies with a gestational age greater than or equal to the cutoff point

The logistic regression analyses indicated that the odds ratio for having a low-weight birth for women who did not participate in WIC or began WIC after 33 weeks of gestation was 1.14 and their odds ratio for having a very low-weight birth was 1 38, compared to women who began WIC by 33 weeks of gestation ($P< 05$) Using the adjusted cost difference between early WIC and all other births (from regression analysis), the Medicaid savings associated with WIC participation are estimated at approximately one dollar for every dollar spent on WIC prenatal services. However, the total cost savings are likely to be underestimated here since we measured only newborn Medicaid costs in the first 60 days of life

The cohort analyses indicated that, among births that reached 29 or 33 weeks gestation, the odds of low birth weight and very low birth weight are significantly higher for WIC nonparticipants compared to WIC participants ($P<.05$)

In the absence of a randomized study, it is difficult to measure precisely the improvements in birth outcomes and savings in newborn Medicaid expenditures associated with prenatal WIC participation We tried several methods to adjust for possible biases associated with gestational age, and these results generally confirm the positive effects of prenatal WIC found in the study of 1988 Medicaid births

A copy of the full study upon which this summary is based is available by request to the lead author below

PAUL A BUESCHER, PhD,
STEPHANIE HORTON, MS,
State Center for Health Statistics,
North Carolina Department of Health and Human Services

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1. Buescher PA, Larson LC, Nelson MD, Lenihan AJ Prenatal WIC participation can reduce low birth weight and newborn medical costs a cost-benefit analysis of WIC participation in North Carolina *J Am Diet Assoc* 1993,93 163-166

2. Schramm WF WIC prenatal participation and its relationship to newborn Medicaid costs in Missouri a cost/benefit analysis *Am J Public Health* 1985,75 851-857

3. Schramm WF Prenatal participation in WIC related to Medicaid costs for Missouri newborns 1982 update *Public Health Rep* 1986,101 607-615

4. Mathematica Policy Research Inc *The savings in Medicaid costs for newborns and their mothers from prenatal participation in the WIC program* Washington DC Food and Nutrition Service, US Department of Agriculture, 1990

5. Tyson J, Guzick D, Rosenfeld CR, Lasky R, Gant N, Jiminez J, Heartwell S Prenatal care evaluation and cohort analyses *Pediatrics* 1990,85 195-204

ERRATA

An author of the research article "Predictors of self-initiated, healthful dietary change" in the July *Journal*, p 762-766 was credited as "Marian Neuhauser, PhD, RD." The correct spelling of the author's last name is "Neuhouser "

The funding agency on page 792 of the July *Journal*'s Perspectives in Practice article "Nutritional status classification in the Department of Veterans Affairs," is listed as .. "the VA Center for Pediatric Management and Outcomes Research." The correct name of the agency is the "VA Center for Practice Management and Outcomes Research."

In the August Beyond the Headlines, page 872 ("Folic acid fortification. Informed mothers, healthy babies"), the information given, "the FDA has required that all enriched cereal grains be fortified with 140 g of folic acid..." should read "140 µg."

LETTERS TO THE EDITORS ARE WELCOME

Letters may have a maximum of 500 words, references should be kept to five or fewer Relevant charts or graphs are acceptable Letters should be typed double-spaced with wide margins Submission of a letter constitutes permission for The American Dietetic Association to use it in the *Journal*, subject to editing and abridgment Financial associations or other possible conflicts of interest should always be disclosed Letters relating to articles published in recent *Journal* issues have priority Send four copies to The Editor, Elaine R Monsen, PhD, RD, Journal of the American Dietetic Association, University of Washington, BOX 353410 Seattle, WA 98195-3410

ADA CALENDAR

2001 Food and Nutrition Conference & Exhibition
October 20-23, 2001 St. Louis, MO

ADA UPDATE

Dietetics in Practice
ADA's new member publication is officially launched. The fall issue of this quarterly publication will be included with the October issue of JADA. Please send comments and suggestions to *dip@eatright.org* or call 312/899-4854.

CPE credits available through Online Education Center
Continuing professional education course materials are now offered online as a part of the member-only section of the ADA Web site. These courses cover diverse subjects and disciplines in dietetics, including obesity prevention and treatment, Web design, Type 2 diabetes in children, ethnic cuisine and restaurant trends, and nutrition communication. The CPE courses are based on sessions presented at ADA's 2000 Food and Nutrition Conference and Exhibition. The registration fee for each session is $25 for members and $35 for nonmembers. To register, visit the member-only section of the ADA Web site under Meetings & Events and Online Education Center. For questions, please call the Member Service Center at 800/877-1600, ext. 5000

AWARDS

March of Dimes Agnes Higgins Award
Every year, the March of Dimes selects an individual who has made an outstanding achievement in maternal-fetal nutrition. This award, established in 1980, honors the late Agnes Higgins of the Montreal Diet Dispensary for her innovation and years of service to the cause of improved maternal nutrition. The March of Dimes seeks nominations for qualified candidates for the 2002 and 2003 Agnes Higgins Awards. Nominations for both years must be postmarked no later than March 1, 2002 to be eligible for review. For further information, please contact Leslie Kang at *Lkang@modimes.com*

EDUCATIONAL EVENTS

September

Conference on the Science and Policy of Performance Enhancing Products
September 28-29, Tuscon, AZ; This event will be hosted by the Council for Responsible Nutrition in collaboration with the NIH Office of Dietary Supplements. This conference will examine the available scientific evidence that addresses the safety and efficacy of performance-enhancing products and assess policy concerns related to their use by potentially vulnerable populations such as teenagers. *www.crnusa.org*

October

Diabetes Education in Patient Management Program/Joslin Professional Education
October 1-3, Boston, MA; This program will be conducted by distinguished faculty comprised of nurses, dietitians, researchers, exercise physiologists, and mental health professionals with experience in the diabetes field. This event will be presented as an extensive overview of the treatment and education methods used at the Joslin Clinic with adults and children who have diabetes. This course serves as an overview for those preparing for the CDE exam. Tuition is $450. Contact Joslin Professional Education at 888/567-5460 or by visiting *www.ProfessionalEd.joslin.org.*

North American Menopause Society (NAMS) 12th Annual Meeting
October 4-6, New Orleans, LA; This meeting will focus on diversity, gender difference, and menopause. Contact NAMS at 440/442-7550 or visit *www.menopause.org*

Certification Examination for Nutrition Specialists
October 5, Orlando, FL. The certification examination for eligible advanced degree nutritionists and licensed physicians will be conducted at the 42nd Annual Meeting of the American College of Nutrition. For applications and more information on programs offered, call 727/446-6086 or e-mail *office@certnutrition.org*

National Kidney Foundation Professional Councils Conference
October 11-14, San Francisco, CA; This conference will offer multidisciplinary programs for nephrology nurses and technicians, social workers, renal dietitian specialists and new renal and clinical dietitians. For more information and registration, call 800/622-9010.

Nutrition Entrepreneurs to hold Networking Breakfast
October 21, St. Louis, MO; This event will be presented by the Nutrition Entrepreneurs dietetic practice group, General Mills, and GFA Brands, and held during ADA's 2001 Food & Nutrition Conference & Exhibition. Members and guests will have the occasion to meet with successful entrepreneurs and attend one of eight workshops to gain insight on the latest entrepreneurial issues and opportunities. This event is approved for 2 hours of CPE credit. For more information and reservations, call Joanne Gibbons at 800/861-9406 or e-mail *Nedpg@aol.com.*

November

4th International Symposium on the Role of Soy in Preventing and Treating Chronic Disease
November 4-7, San Diego, CA; The topics of this event will include evaluation of the effects of soybean processing on efficacy and the relative merits of isolated soybean components. Issues in soy and health, as well as emerging technologies will also be addressed. Abstracts for oral and poster presentations are being accepted for inclusion in the technical program. For more information, contact symposium management at *meetings@aocs.org*, 217/359-2344, or visit the meetings Web site at *www.aocs.org/soy01.htm*

77th Semi-Annual Intensive Course in Pediatric Nutrition
November 5-9, Iowa City, IA. This course is designed primarily for health professionals working with infants and toddlers. Topics to be discussed include: failure to thrive; malabsorption; lactose intolerance; vegetarian

diets; herbal remedies; size and growth; dental health, diabetes mellitus; nutrition of the pregnant adolescent, management of preterm infants; follow up management following hospital discharge; recent knowledge of vitamins and minerals. The American Dietetic Association awards 33 hours of continuing education credit and the Iowa Department of Health grants 33 credit hours for Iowa licensures. The non-refundable course fee is $200. For an application and information contact Ekhard E Ziegler, MD at 319/356-3636 or visit *www medicine uiowa edu/Pediatric Nutrition*

Massachusetts Dietetic Association's Fall Conference
November 9, Springfield, MA; The keynote speaker of this conference, Tieraona Low Dog, MD, AHG, will present "Herbal Therapies in Pediatric and Women's Health An Evidence Based Approach." Other topics to be discussed include: medicare MNT benefit, functional foods, supplements, counseling, renal nutrition, and food safety For more information visit *www massnutrition org* or *www wamaa org*, e-mail *MDADirector@aol. com*, or call 617/501-7083

29th Annual KILO Diabetes Symposium
November 9-10, St Louis, MO; This symposium is designed for practicing physicians and health care professionals in internal medicine, endocrinology and family practice Topics of lectures and case studies will include diabetes, management of Type 1 and Type 2 diabetes, patient self-management issues, cardiovasular disease, hypertension, and lipids Contact Beverly Cantoni at 314/434-6500.

Iowa Dietetic Association Fall Meeting
November 13-14, Ames, IA: This conference,"Food & Nutrition in the 21st Century. Tools for the Nutrition Professional," will be held on the Iowa State University Campus. For more information and registration, contact, Jan Steffen, RD, LD, IDA, at 515/281-7095, *jsteffen@idph state ia. us*, or visit IDA's Web site,*www eatrightiowa org*.

INTERNATIONAL EVENTS

4th International Conference on Fats and Oil Consumption: Prevention of Childhood Obesity
October 4, New York City, NY; Recent clinical research indicates that obesity and related diseases are increasing in children and adolescents. During this conference, "Prevention of Childhood Obesity and Related Chronic Diseases," scientists will discuss how optimal nutrition can help prevent these serious chronic diseases of childhood. The presentations will focus on the most recent clinical, molecular and genetic research, and the implications of that research This conference, held at Rockefeller University, is for dietitians, nutritionists, pediatricians, nutrition researchers and others in health care interested in achieving optimal nutrition in childhood. For more information on how to register, contact Rachel Miller at 212/327-7713 or by e-mail at *millerr@rockefeller edu*

Evolving Evidence and Continuing Controversies in Carbohydrate Nutrition
November 9-10, Vancouver, British Columbia, Canada, This conference is intended for dietitians, nutritionists, nurse educators, dental hygienists and other health professionals interested in an update on carbohydrates and nutrition. For further information call 604/822-0054, e-mail *interprof@cehs.ubc ca*, or visit *www.geocities. com/UBCinterprof/*.

ABOUT PEOPLE

Susan J. O'Day Elected President of Statewide Association
The New York State Association of Nutrition and Aging Services Programs (NYSANASP), has elected Susan J. O'Day, RD, as their president NYSANASP is a statewide association dedicated to the enhancement of nutrition and support services for the elderly. Members communicate with officials, legislators, and organizations, advocating on behalf of the elderly in need of home delivered meals, congregate meals, and other nutrition services Ms O'Day is a registered dietitian, a certified nutritionist, and has more than 30 years experience in the food service industry providing meals for senior citizens For the past 22 years, Ms. O'Day has worked for the Erie County Department of Senior Services Nutrition Program, holding the positions of nutrition coordinator and assistant program director, prior to her appointment as director.

OBITUARIES

Dr. Oddis Calvin Turner, September 21, 2000, was a member of the American Dietetic Association since 1962 Turner was chairman and associate professor of the Department of Consumer Sciences and Human Services at Texas Southern University in Houston, Texas.

Margaret Mitchell Gannon, February 24, 2001 Gannon earned a BS in home economics from the MacDonald Institute of Ontario Agricultural College. In 1928, she began a career with the Stouffer corporation, serving the company for 42 years While at Stouffer, Gannon was named the director of food production, in 1945 became vice president and general manager of the Restaurant Division, and was elected to the board of directors for a three-year term. Before her retirement in 1970, she was named assistant to the president, Vernon Stouffer. Throughout her retirement, Mrs Gannon kept active volunteering her counsel, service, and support to non-profit organizations. In 1999, she was also awarded Volunteer of the Year at the Annual Philanthropy council Luncheon in California.

Deadline for submitting material for the People and Events section is the first of the month 2 months before the date of the issue (eg, February 1 for the April issue). Publication of an educational event is not an endorsement by the Association of the event or sponsor. Send material to: Melissa Thorpe, Journal of The American Dietetic Association, 216 W Jackson Blvd, 8th Floor, Chicago, IL 60606-6995; 312/899-0040, ext 4832; or fax, 312/899-4790.

CADE Public Notice

The Commission on Accreditation for Dietetics Education (CADE) periodically reviews the practices, procedures, and educational outcomes of its accredited and approved programs. This process includes the consideration of third-party comments regarding the program's compliance with the Standards of Education, which may be obtained from the American Dietetic Association, Accreditation, Education Programs, and Student Operations Team at Headquarters, 312/899-0040 ext. 4876. Comments must address substantive matters related to the quality of the educational program and should be sent to the attention of Beverly E. Mitchell, ADA, 216 West Jackson Blvd., Chicago, IL 60606-6995. The following programs are seeking initial accreditation or reaccreditation. Comments must be received thirty days prior to the program's scheduled site visit and will be forwarded to the appropriate program director for response during the review process.

Site Visits

Dietetic Internships
University of Kansas Medical Center,
Kansas City, KS
November 12 and 13, 2001

University of Kentucky Hospital,
Lexington, KY
December 3 and 4, 2001

Didactic Programs in Dietetics
University of Northern Colorado,
Greeley, CO
September 17 and 18, 2001

University of Rhode Island,
Kingston, RI
September 24 and 25, 2001

Texas Christian University,
Fort Worth, TX
September 24 and 25, 2001

Immaculata College,
Immaculata, PA
October 1 and 2, 2001

Virginia State University,
Petersburg, VA
November 5 and 6, 2001

McNeese State University,
Lake Charles, LA
November 12 and 13, 2001

New York University,
New York, NY
November 12 and 13, 2001

University of Florida,
Gainsville, FL
November 19 and 20, 2001

University of Massachusetts, Amherst,
Amherst, MA
December 3 and 4, 2001

Long Island University/C.W. Post Campus,
Brookville, NY
December 3 and 4, 2001

Concurrent Site Visits (to institutions with multiple dietetics programs):
University of Oklahoma,
Oklahoma City, OK
September 24 and 25, 2001
(Coordinated Program in Dietetics and Didactic Program in Dietetics)

University of Southern Mississippi,
Hattiesburg, MS
November 5 and 6, 2001
(Didactic Program in Dietetics and Dietetic Internship)

University of Michigan,
Ann Arbor, MI
November 5 and 6, 2001
(Didactic Program in Dietetics and Dietetic Internship)

University of Medicine & Dentistry,
Newark, NJ
December 10 and 11, 2001
(Coordinated Program in Dietetics and Dietetic Internship)

Below are programs under review for developmental accreditation. Third-party comments from these programs should be postmarked no later than October 1, 2001.

Coordinated Program in Dietetics
LaSalle University, Philadelphia, PA

Dietetic Internship Program
Florida Department of Education Dietetic
Internship, Tallahassee, FL

Seeds sown for first farm bill of 21st century

Congress traditionally modifies and renews a large number of US Department of Agriculture (USDA) programs with an omnibus piece of legislation called the "Farm Bill" (CRS, 1996) Typically reauthorized by Congress every few years, the Farm Bill is a complex statute affecting many programs administered by various USDA agencies. This summer, Congress began a series of hearings to gather information that will help the House and Senate write new farm legislation to replace the Farm Bill that expires next year.

The upcoming Farm Bill reauthorization provides a unique opportunity to ensure that policies under the purview of the House and Senate Agriculture Committees allow for the full implementation of the *US Dietary Guidelines* and other nutrition programs.

The Farm Bill is largely viewed as legislation to support farmers and rural America—by providing income support, commodity credit, and other programs to alleviate potential hardships US farmers may face Rarely is it considered a vehicle for setting nutrition policy However, Farm Bill provisions such as food assistance programs, nutrition education, nutrition science research, dietary recommendations, and others set policy and serve as a basis for nutrition program development and implementation.

The Food Stamp Act of 1977, as amended, is the focus of the Nutrition Assistance title of the Farm Bill which, historically, has been the vehicle for reauthorization of the Act. While the Food Stamp Program has generally done a good job at serving low-income people, Congress has missed the opportunity in past Farm Bills to develop nutrition policy that might improve the dietary quality of all persons in the United States

This article was written by ***Katherine J. Gorton****, Director of National Nutrition Policy, American Dietetic Association, Washington, D C*

As the next Farm Bill approaches, Congress should consider changing existing policy—or proposing new policy—that encourages all Americans to consume a diet that is balanced and incorporates a variety of foods in moderation.

There is good rationale for considering nutrition measures for all Americans. Data show that the low-income population in the United States is not the only group with poor dietary quality. In 1996, the most recent year for which data are available, only 17% of Americans ate the recommended servings of fruit on any given day The major nutrition-related health problems of persons in the United States, including low-income individuals and families, result not from nutrient deficiencies but instead from the overconsumption of fat and other dietary components that contribute to obesity

Today, the prevalence of obesity and many associated chronic diseases is skyrocketing, and policies affecting food, nutrition, and diet have become matters of national concern. Poor nutrition and sedentary lifestyle threaten the nation's productivity, economic vitality, national security, and overall quality of life of its citizens. And the rising costs of healthcare underscore the need for a national agriculture policy that incorporates food safety and nutritional goals and programs directly into the policy framework Studies show that unhealthy eating and physical inactivity are responsible for 35% of premature deaths in the United States, or about 1,200 deaths every day. Furthermore, diet-related diseases lead to lost productivity and staggering healthcare costs from medical treatment and disability. According to the USDA, better nutrition could reduce health and other costs by at least $71 billion each year.

What type of policy could be incorporated into the next Farm Bill to encourage healthier dietary habits for Americans? To begin with, Congress should examine current agriculture policy and its effect on efforts to promote healthful diets Several recent articles have cited the incongruency of agriculture and nutrition policy in the United States and have proposed public policy options that would generate a food supply more consistent with the *US Dietary Guidelines* (see Schneeman, Collins, Young and Kantor).

These issues are not small and cannot all be solved in the next Farm Bill alone. But by acknowledging the issues, we can take incremental steps toward addressing them and identifying solutions. Ultimately, both farmers and consumers will benefit from farm policy that supports American agriculture *and* encourages the production and sale of healthful foods Additionally, agriculture policy that supports incentives to help Americans reach national health goals can be one of Congress' best strategies to reduce healthcare costs

Congress can implement policy to improve the nutritional quality of the diets of all Americans without abandoning the nation's commitment to ending hunger and food insecurity through food stamps or other food assistance programs The nutrition title of the next Farm Bill should address the diet and health needs of all Americans. The title serves an important purpose in reauthorizing food assistance programs, but it can do far more, and the economic health of the nation depends on it

With new understanding and appreciation of diet/health interactions, the next Farm Bill can take steps that help Americans make informed food choices for healthy lives, and even implement strategies for disease prevention and disease management through diet and exercise. The benefits of this approach will reverberate throughout the economy—from farms and ranches, small towns and big cities—and address the needs of all Americans. A successful food and fiber sector effectively links suppliers, producers, processors, distributors, marketers and consumers, and relies on all parts of the overall system working together in harmony.

Feeding normal infants: Rationale for recommendations

SAMUEL J FOMON, MD

While examining the history of infant nutrition in the 20th century (1), it is often possible to make reasonable guesses about why changes in recommendations occurred However, the reasons are rarely stated in a forthright manner Therefore, this article is an attempt to be unequivocal about the rationale for infant feeding recommendations appropriate for the 21st century. The recommendations are as follows:

- Every mother should be encouraged to breastfeed her infant—but not coerced to do so.
- Every infant should be given an injection of vitamin K as soon as feasible after birth.
- While in the hospital, every woman who breastfeeds her infant should be given instructions about breastfeeding.
- Follow-up approximately 48 hours after discharge from the hospital should be arranged for women who breastfeed.
- Every breastfed infant should receive a daily supplement of iron and vitamin D.
- Formula-fed infants should receive iron-fortified formulas
- Actions of caregivers should be conducive to establishing habits of eating in moderation
- Introduction of beikost (ie, foods other than breast milk or formula) should be deferred until the infant reaches the stage of develc pmental readiness for such feeding
- Beikos' items should be thoughtfully selected.
- Cow's milk should not be fed before age 1 year.

EVERY MOTHER SHOULD BE ENCOURAGED TO BREASTFEED HER INFANT

Although it has long been accepted that breastfeeding is essential for the health and development of infants in less-industrialized countries, infant nutrition experts throughout the world are now convinced that breastfeeding is superior to formula-feeding in industrialized countries as well (2-4) One must, of course, be cautious in interpreting data on outcome measures in which breastfed and formula-fed infants are compared because the factors leading some but not other women to breastfeed cannot be completely defined. The results of studies can be statistically adjusted for differences in educational and socioeconomic factors, for maternal and paternal habits (eg, smoking) and for a myriad of other factors that might confound the results, but one can never know whether all the important variables have been accounted for, or even if the assumptions underlying the statistical adjustments are correct. Nevertheless, the weight of evidence strongly suggests that—even in industrialized countries—certain diseases are less common in breastfed infants than in formula-fed infants (5) In addition, breastfed infants may receive some protection against development of allergic manifestations (6); breastfeeding may be more conducive than formula-feeding to establishing habits of eating in moderation; and many nutritional and nonnutritional components of human milk, including some that have not yet been extensively evaluated, may have beneficial effects that persist into adulthood (7-9).

The advantages and suspected advantages of breastfeeding should be explained to pregnant women However, health care professionals are merely consultants and the final decision to breastfeed or to formula-feed is the prerogative of the mother Coercion is inappropriate.

EVERY INFANT SHOULD BE GIVEN AN INJECTION OF VITAMIN K AS SOON AS POSSIBLE AFTER BIRTH

Vitamin K status is low at birth and falls within the first few days of life. In a minority of infants who do not receive vitamin K at

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This article is an edited version of Dr Fomon's Atwater Lecture, presented at the 2000 Food and Nutrition Conference and Exhibition in Denver, Colo

birth, the classic form of hemorrhagic disease of the newborn occurs during the first week of life, especially on days 2 to 4, generally manifested as bleeding from the unbilical cord, circumcision site, or gastrointestinal tract (10). Therefore, an injection of vitamin K soon after birth is desirable for all infants (11), and, fortunately, is almost uniformly practiced in hospitals in the United States Infants born at home and breastfed should be given a dose of vitamin K even if they have not experienced any bleeding manifestations during the first days of life. Because the intake of vitamin K is much less by breastfed than by formula-fed infants, vitamin K deficiency of the newborn is almost exclusively a disease of breastfed infants. Breastfed infants who do not receive vitamin K at birth and do not exhibit bleeding manifestations during the first week of life are at risk of bleeding subsequently, generally at age 3 to 6 weeks, and such bleeding is often intracranial and can result in death or serious neurologic sequellae (10)

WHILE IN THE HOSPITAL EVERY WOMAN WHO BREASTFEEDS HER INFANT SHOULD BE GIVEN INSTRUCTIONS ABOUT BREASTFEEDING

Most infants in the United States are discharged from the hospital on the second day after birth, a time when breastfeeding has not yet become well established. It is therefore important that hospitals, even those that participate in few births each year, ensure that at least 1 health professional is trained as a lactation consultant, and that before a woman is discharged from the hospital after delivery she is counseled on elementary aspects of breastfeeding, including positioning of the infant and techniques to ensure satisfactory "latching on." Mothers should be taught to listen for sounds that her infant is swallowing during feeding, to offer her breast at least every 4 hours, and to note the number of wet diapers

FOLLOW-UP APPROXIMATELY 48 HOURS AFTER DISCHARGE FROM THE HOSPITAL SHOULD BE ARRANGED FOR WOMEN WHO BREASTFEED

Except in the case of women who have successfully breastfed an infant previously, it is important that a designated health professional, preferably a lactation consultant, talk with the mother by phone or in person approximately 48 hours after the infant is discharged from the hospital. The most important questions concern the mother's impression of the infant's vigor when feeding and the number of wet diapers. If, by the fourth day of life, the mother reports fewer than 3 damp diapers in 24 hours the possibility of inadequate milk intake should be considered and further follow-up arranged for that day or the next day

This early follow-up is important for detecting failure to thrive and dehydration, most common at age 7 to 14 days (12-18). Some breastfed infants who consume inadequate amounts of milk appear fretful, whereas others—probably the majority—seem contented or lethargic (12,19)

EVERY BREASTFED INFANT SHOULD RECEIVE A DAILY SUPPLEMENT OF IRON AND VITAMIN D

Iron

Infants who are exclusively or predominantly breastfed are at risk of becoming iron-deficient during the latter part of the first year of life (20-27), generally by age 8 to 9 months (24-27) Although most breastfed infants also receive infant formulas (personal communication, J Boettcher, 1998, and A Ryan, 1998), there are no reports on the prevalence of iron deficiency in breastfed infants who also consume iron-fortified formulas.

From a public health standpoint, it seems desirable to prevent depletion of body stores of any essential nutrient, including iron. Further, the advantage of deferring iron supplementation of breastfed infants until age 4 to 6 months has not been demonstrated (28). Thus, although it is commonly believed that iron supplementation of breastfed infants is unnecessary *until age 6 months (29), it seems preferable to begin iron* supplementation during the early weeks of life Preparations providing, 1,500 IU vitamin A, 35 mg ascorbic acid, 400 IU vitamin D, and 10 mg iron in the form of ferrous sulfate per milliliter are available without prescription and such a preparation should be fed daily beginning in the early weeks of life A 0.5 ml dose of such a supplement will provide no less than 5 mg elemental iron (probably somewhat more because manufacturers regularly exceed label claims).

The estimated requirement for absorbed iron is 0.55 to 0.75 mg/day (28) and mean erythrocyte incorporation of iron from a dose of ferrous sulfate was found (30) to be 7.8% of intake even by infants as young as age 2 months, that is, 0.39 mg absorbed from a 5-mg dose Because erythrocyte incorporation by infants generally accounts for less than 50% of absorbed iron (31), absorption of iron from a daily supplement providing 5 mg iron is likely to provide more than the estimated requirement for absorbed iron

Once an infant has begun to accept beikost feeding readily (generally by age 5 to 6 months), regular feeding of soft-cooked red meat is recommended. Consumption of meat, fish, or poultry enhances absorption of nonheme iron and provides *iron in the form of heme. Because heme iron is absorbed intact* into intestinal mucosal cells, the heme iron is not affected by inhibitors of nonheme iron absorption in the diet Although meat, fish, and poultry all enhance absorption of nonheme iron from a meal, red meat (beef and lamb) and dark meat of poultry are preferable because of their greater concentrations of heme iron The iron content of red meat is generally 2 mg or more per 100 g (32), so that daily consumption of 50 g meat will provide about 1 mg iron, mostly in the form of heme, resulting in absorption of at least 0.25 mg iron (ie, 25% of intake)

Because they do not promote oxidative rancidity, the forms of iron used to fortify dry infant cereals in the United States have been insoluble iron salts or metallic iron powders of intermediate particle size. These iron sources are believed to be of low bioavailability (33-40) and should not be relied on to prevent iron deficiency. Dry infant cereals fortified with ferrous fumarate appear to be of good bioavailability, with erythrocyte incorporation of iron at about 3.8% of intake (40,41). If cereals as fed (ie, after dilution) provide 7 mg iron per 100 g, a 70-g serving will contain 4.9 mg iron and erythrocyte incorporation will be about 0 19 mg, possibly translating into 0.38 mg absorbed iron. A wet-pack cereal-fruit product fortified with ferrous sulfate has also been shown to result in relatively good erythrocyte incorporation of iron (40)

Vitamin D

Breastfed infants who do not receive supplements of vitamin D are at risk of vitamin D deficiency, and dark-skinned infants are at particular risk (42) Several studies in industrialized countries have demonstrated that vitamin D status, as judged by serum concentrations of 25-hydroxyvitamin D, is less satisfactory in breastfed than in formula-fed infants (43-47) By age 6 months, serum concentrations of 25-hydroxyvitamin D of in-

fants breastfed without a supplement of vitamin D may be as low as those commonly seen in persons with vitamin D-deficiency rickets (45-47), and it is evident that, in the absence of exposure to ultraviolet light, human milk provides insufficient amounts of vitamin D to prevent rickets in some infants. Thus, a daily supplement of vitamin D is recommended.

Infants' vitamin D requirement is unknown, but is certainly considerably less than the recommended dietary intake for adults, which, with few exceptions, has been accepted throughout the world as 400 IU/day (48-50). In preparations of vitamins A, C, and D plus iron, the actual vitamin D content is likely to be 500 IU (personal communication, RJ Merrit, 2000, and RA Burns, 2000) Therefore, a dose of supplement that provides 5 mg iron (label claim) will provide about 250 IU vitamin D, probably more than the requirement, and a breastfed infant's intake will be greater than this because of the contribution of vitamin D in human milk.

FORMULA-FED INFANTS SHOULD RECEIVE IRON-FORTIFIED FORMULAS

To avoid iron deficiency, formula-fed infants should receive iron-fortified formulas. Adverse effects of feeding iron-fortified formulas have not been demonstrated (51,52)

ACTIONS OF CAREGIVERS SHOULD BE CONDUCIVE TO ESTABLISHING THE HABIT OF EATING IN MODERATION

During the early weeks of life, the goal of providing adequate intake of energy and essential nutrients should be combined with efforts to establish sound eating habits, perhaps most importantly, the habit of eating in moderation. Establishing a habit of eating in moderation early in life has, in theory, a chance of decreasing the risk of obesity in adult life, and no harm is likely to result from efforts to achieve this goal. Thus, it does not seem necessary to delay a recommendation in this area. Breastfed infants have more control over the amount consumed at a feeding than formula-fed infants, so breastfeeding may, in itself, aid in establishing habits of eating in moderation. Nevertheless, the same attitudes of the caretakers are required whether the infant is breastfed or formula-fed.

To establish habits of eating in moderation, infants should be encouraged to discontinue eating at the earliest sign of willingness to stop All variations of forced feeding should be avoided. Furthermore, the desirability of extending the interval between feedings during the early months of life is questionable.

Throughout most of human history, infants were probably fed ad libitum, the infant nursing frequently throughout the 24-hour period with rather small amounts consumed at each feeding Such feeding practices are still observed in some nonindustrialized societies and may have notable metabolic advantages. A large number of studies were carried out in the 1960s and early 1970s (53) to explore the differences observed when the same diet was consumed in frequent small meals or in a few large meals In these studies, and in a more recent study of adults (54), small, frequent meals were shown to be associated with lower plasma insulin concentrations and with favorable changes in carbohydrate and lipid metabolism

Although the effects of feeding frequency in infancy have not been studied, there is little basis for believing that widely spaced feedings are nutritionally desirable Thus, it may not be in the infant's best interests to sleep through the night as early in life as possible, or to adapt as early as possible to a pattern of 3 feedings daily The effort to establish habits of eating in moderation applies first to breast or formula-feeding and later to the predominantly solid diet of children and adults.

INTRODUCTION OF BEIKOST SHOULD BE DEFERRED UNTIL THE INFANT REACHES A STAGE OF DEVELOPMENTAL READINESS

Infants' digestive capability does not preclude the introduction of beikost during the early months of life, and, except for infants with a strong family history of food allergy, it is doubtful that early introduction of beikost is an important contributor to development of allergic reactions. The major objection to the introduction of beikost before age 4 months is based on the possibility that it may interfere with establishing sound eating habits and may contribute to overfeeding. If an infant is to be encouraged to discontinue eating at the earliest sign of satiety, it must be possible for him to communicate in some way with the person who is feeding him. By 4 months of age, most infants are able to sit with support and have good neuromuscular control of the trunk and neck (55) The infant will be able to indicate desire for food by opening his or her mouth and leaning forward, and to indicate disinterest or satiety by leaning back and turning away Until an infant can express these reactions, feeding of beikost would seem to represent a type of forced feeding

BEIKOST ITEMS SHOULD BE THOUGHTFULLY SELECTED

It is generally practical and convenient to use infant cereal as the first beikost experience but, except in the case of infants with a strong family history of allergy, it is desirable to introduce soft-cooked red meats by age 5 to 6 months. This provides a source of high bioavailability iron for the infant and promotes the goal of feeding beikost, which is to begin the transition from a primarily liquid diet to a predominantly solid food diet Therefore, as infancy progresses, the variety of flavors and textures offered should gradually be increased.

The common practice of feeding fruit juices to infants during the early months of life has no nutritional basis and seems unfortunate in view of the frequency of adverse reactions (6) In the case of pear and apple juices, adverse reactions involving the gastrointestinal tract are probably due to poor absorption of fructose and sorbitol (56), but the basis for adverse reactions to citrus fruits is largely unknown. When teeth have erupted, feeding fruit juices and other sweetened liquids by bottle for extended periods of time increases the risk of dental caries (56) and should be discouraged.

COW'S MILK SHOULD NOT BE FED DURING THE FIRST YEAR OF LIFE

Feeding fresh cow's milk during the first year of life is undesirable because such feeding may be associated with development of iron deficiency (28) and because the renal solute load provided by cow's milk is undesirably high (57). It has long been recognized that ingestion of large quantities of cow's milk may result in extremely low intakes of other foods that contain more generous amounts of iron. In addition, there is considerable evidence that gastrointestinal blood loss may increase the requirement for absorbed iron and therefore contribute to development of iron deficiency (58,59) Finally, the high content of bovine proteins and calcium provided by cow's milk are potent inhibitors of iron absorption (28), and thus contribute to development of iron deficiency.

Although feeding whole cow's milk, with its higher potential renal solute load, does not interfere with maintenance of water

balance in normal infants in most situations, the margin of safety is greater with breastfeeding or feeding of infant formulas than with feeding of cow's milk (57) In a hot environment or during febrile illness, especially if associated with decreased fluid intake, infants are at greater risk of dehydration if fed cow's milk than if breastfed or formula fed.

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Self-regulation training enhances dietary self-efficacy and dietary fiber consumption

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ABSTRACT

Objective To evaluate the effectiveness of incorporating two self-regulation strategies (goal setting and self-monitoring) into a nutrition education class to enhance dietary fiber self-efficacy and foster a positive change in dietary fiber consumption

Design College students in an introductory nutrition class (n = 113) were randomly assigned to one of four treatment conditions: goal setting, self-monitoring, goal setting and self-monitoring, and no goal setting and no self-monitoring. Twenty-six college students from an introductory health class served as the control group.

Statistical analyses The main and interaction effects of goal setting and self-monitoring on postintervention variables were analyzed using analysis of covariance with baseline intake levels as the covariate Analysis of variance was used to examine differences in the mean changes between the groups Path analysis was conducted to analyze the causal linkage among the pretest and intervening variables to predict postintervention knowledge, self-efficacy, and fiber consumption

Results Goal setting had a significant main effect on dietary fiber self-efficacy and on dietary fiber consumption. Subjects who set goals scored 15% higher on the dietary fiber self-efficacy scale and consumed 91% more fiber than subjects who did not set goals Self-monitoring had no significant main effect on either dietary fiber self-efficacy or dietary fiber consumption. There was no significant interaction between goal setting and self-monitoring. Changes in dietary fiber scores differed between the groups. Increases in dietary fiber for the goal setting and self-monitoring group were significantly higher than the goal-setting, self-monitoring, no goal setting and no self-monitoring, and control groups. In addition, the goal setting only group had significantly greater increases in fiber intake than the self-monitoring, no goal setting and no self-monitoring, and control groups. Changes in self-efficacy scores were significantly different between the groups. The goal setting and goal setting and self-monitoring groups had significantly higher self-efficacy scores than the control group. Path analysis revealed that both goal setting and self-monitoring affected dietary fiber consumption through knowledge and dietary fiber self-efficacy, goal setting had a strong direct effect on fiber consumption, and postintervention knowledge affected fiber consumption only through self-efficacy.

Applications/conclusions Our findings suggest that dietary change requires active self-regulation of food intake. Combining goal setting and self-monitoring significantly enhances dietary behavior change This strategy can easily be incorporated into nutrition education or counseling programs to enhance dietary behavior change. *J Am Diet Assoc 2001,101 1006-1011*

One of the most important health goals of our nation is to improve the quality of nutrition to reduce risk factors for many degenerative diseases (1,2). One group that is easily reached in educational settings is college students Dietary assessment has shown that students consume a diet high in fat and sugar and low in fiber (3). These behaviors have been linked to increased risk for obesity, cardiovascular disease, and cancer (1,2) In addition, these young adults will soon become parents who select and purchase foods for their families. Providing effective dietary training to improve eating behaviors of this important population is a challenging task.

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Research shows that after taking an introductory nutrition class, undergraduate students display increased nutrition knowledge but little positive change in eating behaviors (4-8) Most researchers have concluded that knowledge is a necessary but insufficient condition for dietary change and proactive strategies such as self-regulation and behavioral training (eg, problem identification, goal setting, problem solving, self-monitoring, self-evaluation, and reinforcement) must be included (9-18).

Prior studies have investigated a variety of self-regulatory interventions for dietary behavior change in student populations ranging from elementary school to college (9-14,19-24) These interventions used different educational methods, making it difficult to determine the effectiveness of each method. To date, no attempt has been made to compare individual methods with one another (9-14,20-23). Also, interventions were performed on whole classes rather than on students randomly assigned to different conditions Contento et al made clear recommendations for nutrition education research based on the results of an extensive review of past studies. "Researchers should examine the differential contributions of the components of effective intervention. Most of the studies reviewed used a combination of strategies to produce effective outcomes. It will be valuable to know which components are most effective" (25, p 282)

SELF-REGULATION

Social cognitive theory provides a model for understanding dietary behavior change (26) According to the theory, self-regulation is an individual's ability to set specific and attainable goals, employ effective strategies for attaining the goal, and self-monitor to evaluate his or her success in attaining the goal. Self-regulation, includes three subprocessses self-observation, self-judgment, and self-reaction (26,27).

Another important concept in social cognitive theory is that an individual's behavior is mediated through self-efficacy expectations (28). The motivation to perform a specific behavior is driven by the individual's confidence that he or she can perform the actions necessary to produce the specific behavior. Therefore, an individual's belief in his or her ability to perform a behavior required to achieve a goal is a prerequisite for actual performance of self-regulatory strategies (29-34).

Unless self-efficacy is enhanced, subjects will fail to self-regulate. Therefore, setting attainable goals, self-monitoring, and self-reward are used to increase self-efficacy and improve motivation to initiate and maintain dietary change (31,35-37)

FIBER CONSUMPTION

Increased fiber consumption has been linked to the prevention of various degenerative diseases including cancer, cardiovascular disease, and diseases of the bowel (38-41) Other benefits of increasing fiber intake are reduced blood pressure, improved glycemic control in persons with diabetes, and increased satiety leading to improved weight loss and weight maintenance (40,42). Health care professionals strongly advocate increasing the consumption of dietary fiber. Studies indicate a need to increase dietary fiber intake from 7g to 13 g per day to 25 to 35 g per day (42-45). A nutrition class may be students' only exposure to nutrition education, so encouraging dietary change, in addition to increasing general nutrition knowledge, is an important goal.

The task of self-regulatory dietary fiber intake in a healthy population is a challenging one In fat reduction studies, subjects have increased motivation to monitor their intake since weight loss or blood cholesterol reduction are highly valued outcomes. However increasing dietary fiber consumption does not provide immediate visible benefits in the healthy population. Therefore, strategy training and self-efficacy enhancement must be the factors that motivate subjects to change their behaviors. Subjects who perceive the greatest self-efficacy in monitoring fiber goals are most likely to show the greatest behavior change and maintenance of change (30,34,46)

Our study evaluated the effectiveness of incorporating self-regulation strategies (goal setting and self-monitoring) into a nutrition education curriculum to promote and enhance dietary self-efficacy and foster a change in dietary fiber consumption Research has not specifically investigated the effect of goal setting and self-monitoring on dietary behavior change or its effect on self-efficacy to influence behavior change

METHODS

Procedure

Undergraduate students in an introductory nutrition education class participated in a study of dietary behavior change. Students in an introductory health class served as the control group. Students received the education component normally given in the respective class A knowledge pretest was administered to all students on the second day of class

In the second week of class, all students were trained in recording intake and given the assignment of keeping a 3-day food diary, which is a common assignment for both courses. Participants averaged total energy, fiber, and fat intake for their 3-day diet diaries using a pocket food data book (47) that includes over 30,000 foods. The diet diaries were submitted by week 4 of the course and examined by the author (RS) for transcription and computation errors. After submitting the food diaries, students completed a dietary fiber self-efficacy questionnaire.

Students in the nutrition course were then randomly assigned to 1 of 4 experimental groups: short-term goal setting only, self-monitoring only, short-term goal setting and self-monitoring, and no goal setting and no self-monitoring and trained in the intervention on the 7th week of class, after a lecture on dietary fiber (48).

The 4-week intervention took place between week 8 and week 12 of this 14-week course. Members of each group submitted appropriate forms at each class meeting (twice a week).

At week 13, students completed a 3-day food diary and fiber self-efficacy and knowledge questionnaires. The control group did not receive the nutrition education (knowledge) component or any interventions, but completed the pre- and postintervention diet diaries, knowledge, and self-efficacy questionnaires. Students were asked not to communicate with individuals in the other treatment groups about the project until after the study.

At the end of the study, students were debriefed. To account for possible contamination, a questionnaire was developed to examine students' practices during the intervention.

Instrument Development

The following instruments were developed for the study:

Dietary fiber self-efficacy questionnaire Dietary fiber self-efficacy is defined as confidence that one can perform the actions necessary to increase dietary fiber consumption Self-efficacy can be assessed by asking an individual to indicate whether or not he or she thinks he or she can perform a specific behavior at the present time and to indicate his or her confidence of success on a probability scale (28). A self-efficacy scale for dietary fiber intake was developed for this study. The scale contained items that examined students' confidence in following a diet ample in dietary fiber. The scale ranged from 0 to 100 points with 10 unit intervals; 0% for definitely cannot do it to 100% for definitely can do it. The following instructions were given to the participants: "Please rate your confidence that you can do the following.. (eg, 'read labels for fiber content, choose high fiber snacks such as whole grain pretzels, popcorn, fruits, and vegetables')." And, "Indicate your degree of confidence by circling the appropriate numbers." Test-retest reliability (2-week interval) was r=0.80, P<.05, and internal consistency was α=0.96.

Dietary fiber knowledge questionnaire A 25-item multiple choice instrument was developed to assess students' knowledge of fiber (ie, sources and clinical application of dietary fiber such as "The average intake of dietary fiber for Americans is approximately ____"). Test-retest reliability (2-week interval) was r=0 63, P<.05, and internal consistency was α=0.71. Content validity was assessed through a panel of nutrition experts.

Goal setting group Goal setting entails setting short-term goals Students in the goal-setting group were assigned the

Table
Means±standard deviations for pre- and poststudy fiber consumption, pre- and poststudy self-efficacy scores, pre- ar edge scores, and standard error of means for mean differences

Group	Dietary fiber (g)[a]			Dietary self-efficacy[b]			Knowledge[c]	
	Prestudy	Poststudy	Difference	Prestudy	Poststudy	Difference	Prestudy	Poststudy
	← mean±SD →		← mean±SEM →	← mean±SD →		← mean±SEM →	← mean±SD →	
(Group 1) Goal setting (n=29)	11 8±9 0	19 7±9 8*	+7 9±1 3	60 8±21 7	72 8±16 3*	+12 0±3 2	13 3±3 5	16 6±3 5*
(Group 2) Self-monitoring (n=29)	10 0±5 2	11 5±4 0	+1 5±1 0	57 3±15 6	63 6±15 1	+6 3±1 9	12 3±2 6	16 2±3 4*
(Group 3) Goal setting and self-monitoring (n=29)	13 0±8 2	24 3±10 2*	+11 4±1 5	63 0±18 7	71 9±17 8*	+8 9±2 3	12 6±3 4	17 0±2 6*
(Group 4) No goal setting and no self-monitoring (n=26)	9 9±4 8	11 5±5 8	+1 6±0 9	54 6±15 2	62 9±21 0	+8 3±2 8	11 9±3 7	15 1±4 7*
(Group 5) Control (n=26)	11 7±8 1	11 2±7 5	−0 5±0 6	59 7±16 0	58 6±16 7	−1 1±3 6	11 7±2 9	12 7±3 8

[a]Differences in post-study fiber intake for group 3 compared to groups 1, 2, 4, and 5, and differences in post fiber intake for group 1 com 4, 5, using Newman-Keuls post hoc comparisons
[b]Differences in post-study self-efficacy scores for groups 1 and 3 compared to group 5 using Newman-Keuls post hoc comparisons. Sc ranged from 21 0 to 100 The lower the score, the lower the self-efficacy
[c]Differences in post-study knowledge scores for groups 1-4 compared to group 5 using Newman-Keuls post hoc comparisons. Scores ran with the lowest possible score being 0 and the highest 25
*$P < 05$

task of setting goals for increasing their dietary fiber intake. After recording the short-term goal of increasing their daily fiber intake by 5 g for the first week, they proceeded to increase their fiber intake by 5 g per week until reaching their long-term goal of 25 g to 35 g of dietary fiber per day. Students recorded the written goals daily and submitted them twice a week at each class meeting.

Self-monitoring group Self-monitoring entails recording daily intake. The self-monitoring group recorded fiber intake daily on fiber monitoring forms that were submitted twice a week.

Goal setting and self-monitoring group Students in the goal setting and self-monitoring group set written goals for increasing their daily fiber intake by 5 g for the first week then increasing fiber intake by 5 g per week until they reached the goal of 25 g to 35 g per day. They completed the fiber monitoring forms on a daily basis and submitted them along with the written goals twice a week.

No goal setting and no self-monitoring group These students did not receive any training for increasing dietary fiber consumption. To give the appearance that they were in a viable treatment group, they were asked to monitor their daily activity levels and to submit the self-monitoring forms at each class meeting.

Control group Students from the same population with similar demographic profiles in a basic health class were selected for the control group.

The Brooklyn College Committee on the Rights and Welfare of Human Subjects and the CUNY Graduate Scho sity Center Committee on the Protection of Hu approved the study. No student declined to partic the opportunity to do so. No incentives were off

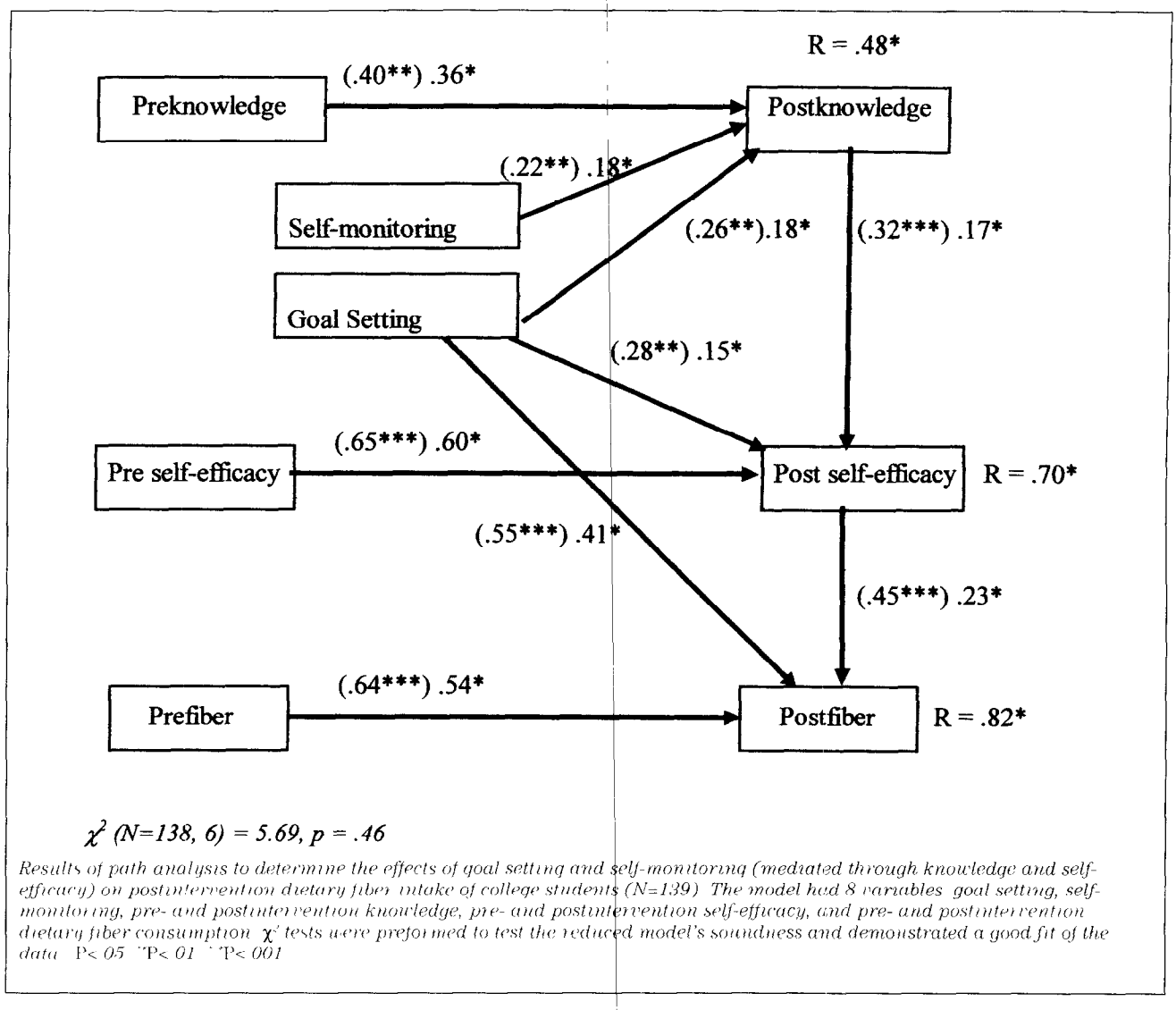
Data Analysis

Descriptive statistics included the means and sta tions of pre- and postintervention dietary fiber int diet analysis, and dietary fiber self-efficacy and fibe scores. ANOVA was used to examine differences changes between groups. Main and interaction ef setting and self-monitoring on postintervention va analyzed using ANCOVA with baseline intake h covariate. Path analysis was conducted to analyz links among the pretest and intervening variable postintervention knowledge, self-efficacy, and fibe tion.

RESULTS

Sample

One hundred thirty-nine students (72% female) p in the study. One hundred thirteen students (83 male) enrolled in an introductory nutrition class domly assigned to 1 of the 4 experimental condition the 4 groups included approximately 7 to 9 males an females. Twenty-six other students (17 female, 9 ma health class served as the control group. The mean ag males and females was 23±6.3 years. Fifty-nine perc students were white, 19% were African-American, Hispanic, and 11% were Asian.



*Results of path analysis to determine the effects of goal setting and self-monitoring (mediated through knowledge and self-efficacy) on postintervention dietary fiber intake of college students (N=139). The model had 8 variables: goal setting, self-monitoring, pre- and postintervention knowledge, pre- and postintervention self-efficacy, and pre- and postintervention dietary fiber consumption. χ^2 tests were performed to test the reduced model's soundness and demonstrated a good fit of the data. *P< .05 **P< .01 ***P< .001*

The means and standard deviations for pre- and postintervention dietary fiber intake, pre- and postintervention self-efficacy, and pre- and postintervention knowledge scores for the entire sample appear in the Table.

Dietary Fiber Intake

Subjects who set goals (the goal-setting group and the goal setting and self-monitoring group) had a mean fiber intake of 22 g compared to 11.5 g for subjects who did not set goals. Therefore, subjects who set goals consumed 91% more fiber than subjects who did not set goals.

ANOVA results for changes in dietary fiber intake showed significant differences between groups (F [4, 134]=16.54; P<.0001). Newman-Keuls post hoc comparisons revealed that increases in dietary fiber for the goal setting and self-monitoring group were significantly higher than those of the goal-setting, self-monitoring, no goal setting and no self-monitoring, and control groups. In addition, the goal setting only group had significantly greater increases in fiber intake than the self-monitoring, no goal setting and no self-monitoring, and control groups.

Goal setting had a significant main effect on postintervention dietary fiber consumption (F[1,108]=54.78, P<.001). Self-monitoring had no significant effect on postintervention fiber intake, and there was no significant interaction between goal setting and self-monitoring.

Dietary Fiber Self-efficacy

Subjects who set goals had a mean fiber self-efficacy score of 71.8 compared to 62.7 for the subjects who did not set goals. Therefore, subjects who set goals (the goal-setting group and the goal setting and self-monitoring group) scored 15% higher on the dietary fiber self-efficacy scale than subjects who did not set goals.

ANOVA results for changes in self-efficacy scores showed significant differences between the groups (F(4,134)=3.46, P=.01). Newman-Keuls post hoc comparisons revealed that the goal-setting group and goal setting and self-monitoring group were significantly different from the control group. Although the goal-setting group and the goal setting and self-monitoring group numerically surpassed the self-monitoring

and the no goal setting and no self-monitoring group, these differences did not reach statistical significance.

Goal setting had a significant main effect on changes in dietary fiber self-efficacy scores ($F(1,108)=54.78; P<.05$). Self-monitoring had no significant main effect on changes in dietary fiber self-efficacy, and there was no significant interaction between goal setting and self-monitoring.

Nutrition Knowledge

ANOVA outcomes for postintervention knowledge scores showed significant differences between groups ($F[4, 134]=5.97; P=.0002$). Newman-Keuls post hoc comparisons revealed that subjects in all 4 groups that received the nutrition education gained more knowledge than subjects in the control group.

Path Analysis

Path analysis was used to determine whether the effects of goal setting and self-monitoring on postintervention dietary fiber intake were mediated through the intervening variables knowledge and self-efficacy. This procedure was also used to control for the effects of the covariates, preintervention dietary fiber consumption, preintervention dietary fiber self-efficacy, and preintervention knowledge scores. The results of the path analysis are presented in the Figure.

There was a high correlation between goal setting and postintervention dietary fiber consumption. Postintervention dietary fiber self-efficacy scores were also highly correlated with postintervention dietary fiber consumption. Self-monitoring and postintervention knowledge scores were significantly correlated to poststudy fiber consumption, however, these correlations proved not to be significant once the effects of the other variables were statistically controlled.

Sixty-seven percent of the variance in poststudy fiber consumption was explained by pre-intervention fiber consumption, goal setting, and post-intervention dietary fiber self-efficacy. When the strong effects of preintervention fiber consumption were statistically controlled, goal setting and self-monitoring were found to effect post-intervention fiber consumption through knowledge and dietary fiber self-efficacy. In addition, goal setting had a significant direct effect on postintervention fiber consumption.

Forty-nine percent of the variance in postintervention dietary fiber self-efficacy was explained by preintervention dietary fiber self-efficacy, goal setting, and postintervention knowledge. When the strong effects of preintervention dietary fiber self-efficacy were statistically controlled, the direct contribution of goal setting on postintervention dietary fiber self-efficacy was moderate. The contribution of postintervention knowledge on postintervention dietary fiber self-efficacy also proved to be moderate.

Finally, 23% of the variance in postintervention knowledge scores was explained by goal setting, self-monitoring, and preintervention knowledge scores. When the strong effects of preintervention knowledge was statistically controlled, the direct contribution of goal setting and self-monitoring to postintervention knowledge was moderate.

DISCUSSION

The purpose of the study was to investigate the mediating role of nutrition education and dietary fiber self-efficacy on dietary fiber intake, and examine the effects of goal setting and self-monitoring on dietary fiber self-efficacy and dietary fiber intake. Both goal setting and self-monitoring proved to exert a significant indirect effect on postintervention fiber consumption mediated through postintervention knowledge and dietary fiber self-efficacy. In addition, goal setting had a direct effect on postintervention fiber self-efficacy and fiber consumption. In general, goal setting was more strongly associated with postintervention fiber consumption than was self-monitoring. Self-monitoring only contributed to the variance in postintervention knowledge. Students who only recorded their daily fiber intake without setting goals did not directly alter their behavior or their self-efficacy perceptions. However, the activity of self-recording may have made them more aware of the issue of dietary fiber, which helped them to retain knowledge and indirectly affected their behavior through self-efficacy perceptions. Students who set goals were also able to access dietary fiber knowledge acquired in class and effectively transform that knowledge through self-efficacy to improve fiber intake.

Why didn't the self-monitoring condition alone influence dietary fiber behavior change? Zimmerman (49) suggests that self-regulation consists of 3 subprocesses that must be present for change to occur. These subprocesses are self-observation, self-judgment, and self-reaction. All involve adoption of a specific goal and ongoing strategy adjustment for goal achievement. The data indicate that self-monitoring alone is not a powerful component for behavior change. It must be combined with goal setting to produce the desired effect.

An important objective of our study was to separate goal setting and self-monitoring from one another to see the relative contributions of each variable. The finding that self-monitoring alone did not directly contribute to behavior change supports the belief that persons who self-monitor must have a standard by which they can compare their performance to successfully achieve their goals (27). It is equally interesting that goal setting exerted a strong direct effect even when separated from self-monitoring. Despite the attempt to separate goal setting from self-monitoring, it was obvious that those who set goals did monitor their intake in some way, particularly mentally. The data indicate that the act of keeping written records further enhances self-regulation.

This study highlights the importance of self-efficacy as a mediator in the relationship between knowledge and behavior change. The effect of postintervention knowledge on fiber consumption occurred entirely though mediation of self-efficacy.

Our findings are consistent with the literature on self-regulation (18,31-33,50-51). A critical component of self-regulation is for persons to set attainable and short-term goals and monitor their behavior in order to achieve their goals (24,29,52). This suggests that before embarking on any behavior change activity a person must have a goal in mind. Self-monitoring alone does not have as strong an effect.

From these results it is clear that dietary change does not occur from knowledge alone. Setting specific goals and keeping written monitoring records are essential for achieving change (15,24,29,52). These strategies increase perceived self-efficacy and improve dietary behavior. There is clearly a need for more research on incorporating cognitive, behavioral, and motivational measures to provide a more complete picture of the determinants of dietary behavior change.

APPLICATIONS

- Dietary change requires active self-regulation of food intake, and a combination of goal-setting and self-monitoring has been shown to be an effective self-regulation strategy. Dietitians and nutrition professionals can use this finding to develop effective strategies for behavior change.
- Dietary self-management can be implemented with just 2 skill training classes: recording and evaluating initial dietary intake, and setting dietary goals and self-monitoring intake. These can easily be incorporated into nutrition education or counseling programs to enhance dietary behavior change

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Clinical and cost outcomes of medical nutrition for hypercholesterolemia: A controlled trial

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ABSTRACT

Objective To compare the results and cost-effectiveness of a cholesterol lowering protocol implemented by registered dietitians with cholesterol lowering advice by physicians.
Design Six month randomized controlled trial, cost-effectiveness analysis Subjects included 90 ambulatory care patients (60 men, 30 women), age range 21 to 65 years, with hypercholesterolemia and not taking hypolipidemic drugs. Patients were randomly assigned to receive medical nutrition therapy (MNT) from dietitians using a NCEP based lowering protocol or usual care (UC) from physicians. Outcome measures were plasma lipid profiles, dietary intake, weight, activity, patient satisfaction, and costs of MNT Changes from baseline for each variable of interest were compared between treatment groups using analysis of covariance controlling for baseline value of the variable and gender.
Results MNT achieved a 6% decrease in total and LDL cholesterol levels at 3 and 6 months compared with a 1% increase and a 2% decrease in both values at 3 and 6 months with UC ($P<.001$ and $P<.05$, respectively). Weight loss (1.9 vs 0 kg, $P<.001$) and dietary intake of saturated fat (7% of energy vs 10%, $P<.001$) were better in the MNT than the UC group The additional costs of MNT were $217 per patient to achieve a 6% reduction in cholesterol and $98 per patient to sustain the reduction. The cost-effectiveness ratio for MNT was $36 per 1% decrease in cholesterol and LDL level.
Applications/conclusions MNT from registered dietitians is a reasonable investment of resources because it results in significantly better lipid, diet, activity, weight, and patient satisfaction outcomes than UC. *J Am Diet Assoc 2001 101 1012-1016, 1021-1023*

Coronary heart disease (CHD) cos $50 and $100 billion per year for l lost wages The second Report o terol Education Program (NCEP tection, Evaluation and Treatment of H in Adults (Adult Treatment Panel II or therapy as the first line of treatment of l a recognized risk factor for CHD, and re therapy be reserved for patients who ar These guidelines for dietary treatme olemia are based on total blood choles terol levels and an assessment of oth factors (1). The NCEP guidelines sugge other involved health professionals" s Step I diet and that the involvement of or other qualified nutrition professional larly for intensive dietary therapy such The cost-effectiveness of this approach care setting has not been adequately e

The primary objective of this study w effectiveness of a cholesterol lowering by registered dietitians with the imple lowering advice by physicians in a clin Our hypothesis was that it would be dietitians than for physicians to imple ering protocol for volunteers with hyp

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METHODS

Volunteers

Based on our data we estimated that the standard deviation of the change from baseline in cholesterol was 0.49 mmol/L[1] With 30 volunteers in each treatment group there was an 80% chance of detecting a 33 mmol/L difference in the change from baseline, at a one sided $P=0.05$ significance level. We anticipated a 10% dropout rate; therefore, a minimum of 35 volunteers would need to be enrolled in each group.

Potential study candidates included 1,493 adults (identified through the Massachusetts General Hospital (MGH) Clinical Laboratory Information Center), age range 21 to 65 years, with total cholesterol levels greater than 5.2 mmol/L and less than 8.84 mmol/L After medical record review, 422 remained eligible after the following exclusion criteria were applied: presence of secondary medical conditions that can influence lipid levels (such as pregnancy, perimenopausal condition, diabetes, thyroid disease or renal failure); use of medications that influence lipid levels (such as hypolipidemic drugs, thiazide diuretics, beta blockers or estrogen therapy); hypertriglyceridemia (>4.52 mmol/L[2]), or nutrition counseling for hypercholesterolemia by a registered dietitian in the previous year Thirteen primary care physicians who agreed to participate in this study enrolled 90 of their patients as study volunteers (30 men and 15 women in each treatment group) between June 1996 and April 1997

Research Design

The 90 eligible study volunteers were randomly assigned, using a Permuted Block randomization to receive either medical nutrition therapy (MNT) from registered dietitians or usual care (UC) from physicians Volunteers randomized to MNT received cholesterol lowering nutritional counseling and treatment according to a NCEP-based cholesterol lowering protocol developed by the Ambulatory Nutrition Service at the Massachusetts General Hospital The protocol required volunteers with hypercholesterolemia to meet with registered dietitians for a minimum of 2 to 3 visits in a 2- to 3-month period. If lipids were not in the target range after initial treatment, volunteers had an additional 2 to 3 follow-up visits to provide a full 6-month diet intervention as recommended in the NCEP guidelines. The number of visits was based on an assessment of each volunteer's eating habits, lifestyle, capabilities and motivation for change. MNT volunteers also continued to receive usual care from their physicians

Volunteers randomly assigned to UC from physicians received the customary cholesterol-lowering advice from their healthcare provider in the ambulatory care setting, which did not include contact with a dietitian. During the 6-month intervention period, physicians and volunteers agreed not to use lipid-lowering drugs or seek additional dietary counseling or therapy. After the 6-month intervention period, hypolipidemic medications and additional dietary counseling could be added at the discretion of the volunteer's physician.

[1]To convert mmol/L cholesterol to mg/dL, multiply mmol/L by 38 7 to convert mg/dL cholesterol to mmol/L multiply mg/dL by 0 026. Cholesterol of 5 00 mmol/L=193 mg/dL

[2]To convert mmol/L triglycerides to mg/dL, multiply mmol/L by 88 6 To convert mg/dL triglycerides to mmol/L multiply mg/dl by 0 0113 Triglycerides of 1 80 mmol/L=159 mg/dL

Table 1
Baseline anthropometric and demographic characteristics

	Medical Nutrition Therapy group (n=45)		Usual Care group (n=45)	
	← mean±standard deviation →			
Age (y)	49±10		49±9	
BMI (kg/m2)	27±4		28±4	
	n	%	*n*	%
Male sex	30	67	30	67
Caucasian	42	93	44	96
Income >$40,000[a]	37	84	36	80
College graduate	37	82	30	67
Smoker	5	11	2	4

[a]Percent based on 37 out of 44 because 1 person in MNT did not report income

The entire cohort was evaluated again at 1 year, 6 months after the end of the study intervention

Outcome Measures

Body weight was measured (with the subject wearing a hospital gown and after fasting) and recorded to the nearest 0 1 kg. Height was measured with a wall-mounted stadiometer to the nearest 0.1 cm. Body mass index (BMI) was calculated.

Fasting (after at least 12 hours) plasma lipid profiles including total cholesterol, LDL cholesterol, HDL cholesterol, and triglycerides were measured (Hitachi 917 analyzer with reagents supplied by BMD/Roche Diagnostics, Indianapolis, Ind) at baseline, 3 months, 6 months, and 1 year for all volunteers LDL-cholesterol levels were determined using the Friedewald calculation (2) The total cholesterol assay is an enzymatic colorimetric assay using cholesterol esterase and cholesterol oxidase (3-5) and was calibrated against isotopic dilution/mass spectrometry The HDL-cholesterol assay is a homogenous enzymatic colorimetric assay (6,7) and has been calibrated against the Roche PTA (phosphotungstic acid) precipitation method (8,9) This standardization meets the requirements of the "HDL Cholesterol Method Evaluation Protocol for Manufacturers" of the US National Reference System for Cholesterol, CRMLN (Cholesterol Reference Method Laboratory Network), November 1994

Nutrition analysis of energy, total fat, saturated fat, polyunsaturated fat, monounsaturated fat, cholesterol, and fiber intake was performed at baseline, 3 months, 6 months, and 1 year based on random 24-hour recalls (Nutrition Data System [NDS], University of Minnesota, Minneapolis, Minn, NDS 2.91, Food Database version 12A, Nutrient version 2.7)(10)

Nutrition interviewers, masked to treatment assignment, conducted 24-hour recalls using the multiple pass interview methodology and a 2-dimensional food portion visual aid (10) After the baseline visit, the nutrition interviewers conducted 24-hour recalls either via telephone within 2 weeks prior to the follow-up visit or in person at the visit.

Study volunteers also reported via recall their total minutes of exercise per week and the number of visits and the time spent with their physician discussing their cholesterol level at each follow-up visit Time spent with the dietitian was assessed via nutrition clinic records and the office computer scheduling system. A patient satisfaction survey, adapted from the Diabetes Quality of Life measure for the Diabetes Control and Complications Trial, was administered at baseline

Table 2
Comparison of nutrient intake between treatment groups based on 24-hour recall

Diet	Baseline	3 month	6 month	1 year
N				
MNT[a]	45	45	44	42
UC[a]	45	43	43	44
	← mean± standard deviation →			
Kcal[a]				
MNT	1,987±841	1,554±544*	1,679±796	1,462±472††
UC	1,888±585	1,847±706	1,850±675	1,675±522†
% Fat				
MNT	32±12	24±8***	25±10**	26±10†
UC	31±11	30±10	29±10	28±9†
% Sat Fat[a]				
MNT	11±6	7±3***	7±4***	8±4††
UC	11±4	10±4	10±4	10±4
% MFA[a]				
MNT	12±5	9±4**	9±4**	10±4†
UC	12±5	11±5	11±4	10±4†
% PFA[a]				
MNT	6±4	5±3	7±4	5±3
UC	6±3	6±3	5±2	6±2
Cholesterol (mg)				
MNT	235±191	154±103	165±132*	166±154†
UC	242±229	189±120	239±199	179±123
Dietary fiber (g)				
MNT	16±9	20±12*	18±8	16±7
UC	18±10	16±7	16±6	19±9

Difference between treatment groups, using analysis of covariance controlling for baseline and gender *$P<$ 05, **$P<$ 01, ***$P<$ 001
Difference within treatment groups using paired *t* tests baseline versus 1 year †$P<$ 05, ††$P<$ 01, †††$P<$ 001
[a]MNT=medical nutrition therapy, UC=usual care, Kcal=kilocalories, PFA=polyunsaturated fatty acids, Sat fat=Saturated fatty acids, MFA=monounsaturated fatty acids

Table 3
Comparison of lipid levels, weight and activity between treatment groups[a]

	Baseline	3 month	6 month	1 year
N				
MNT[b]	45	45	44	43
UC[b]	45	44	44	44
	← mean±standard deviation →			
Chol[c] (mmol/L)				
MNT	6 19±0 73	5 77±0 70***	5 77±0 60*	5 98±0 70
UC	6 16±0 75	6 19±0 70	6 03±0 65	5 90±0 73††
LDL[c,d] (mmol/L)				
MNT	4 29±0 60	4 00±0 62*	3 98±0 55	4 00±0 57†
UC	4 24±0 68	4 21±0 68	4 13±0 60	3 90±0 68†††
HDL[c] (mmol/L)				
MNT	1 22±0 42	1 12±0 39**	1 14±0 36	1 30±0 47
UC	1 14±0 31	1 14±0 31	1 09±0 31	1 22±0 42
Triglycerides[e] (mmol/L)				
MNT	1 46±0 61	1 38±0 66*	1 47±0 73	1 54±0 86
UC	1 71±0 89	1 81±0 90	1 85±1 27	1 72±0 95
Weight (kg)				
MNT	79 6±15 4	77 7±15 4***	77 7±15 4***	78 2±15 4
UC	83 2±15 0	83 2±15 0	83 2±15 0	83 2±15 0
Activity[f] (min/wk)				
MNT	119±126	160±161*	144±130	148±102
UC	92±97	94±93	108±109	135±185

[a]Difference between treatment groups using analysis of covariance controlling for baseline and gender *$P<.05$, **$P<.01$, ***$P<.001$
Difference within treatment groups using paired t tests baseline vesus 1 year †$P<.05$, ††$P<.01$, †††$P<.001$
[b]MNT=medical nutrition therapy, UC=usual care
[c]To convert mmol/L cholesterol to mg/dL, multiply mmol/L by 38 7 To convert mg/dL cholesterol to mmol/L, multiply mg/dL by 0 026 Cholesterol of 5 00 mmol/L=193 mg/dL
[d]Number of subjects is reduced because of inability to calculate low-density lipoprotein cholesterol with triglycerides >4 52 mmol/L At 6 months n=43 for UC and MNT, at 1 year n=42 for MNT
[e]To convert mmol/L triglycerides to mg/dL, multiply mmol/L by 88 6 To convert mg/dL triglycerides to mmol/L multiply mg/dL by 0 0113 Triglycerides of 1 80 mmol/L=159 mg/dL
[f]Number of subjects is reduced due to missing value (at 3 months n=43 for UC)

Table 4
Volunteers' satisfaction[a]

	MNT (n=44)	UC (n=44)	P[c]
	← mean score at six months[b] →		
How satisfied are you with your ability to manage your cholesterol	2 2	3 1	< 001
How satisfied are you with the amount of time you spend exercising?	3 0	3 3	35
How satisfied are you with your knowledge about your cholesterol?	1 5	2 3	< 001
How satisfied are you with your doctor's/dietitian's understanding of your lifestyle and the way you eat?	1 4	2 6	< 001
How satisfied are you with your visits with the dietitian/doctor to discuss your cholesterol?	1 5	2 4	< 001
How satisfied are you with the amount of food you are currently eating?	1 8	2 8	< 001
How satisfied are you with the way you are currently eating?	1 9	2 8	< 001

[a]as adapted from the "Diabetes Quality of Life Measure" (11)
[b]Data obtained from rankings on Likert scale very satisfied=1 moderately satisfied=2, neither=3, moderately dissatisfied=4, very dissatified=5
[c]*P* value determined using the Wilcoxon test

and 6-month visits (11)

The additional cost of medical nutritional therapy was calculated according to the standard charges at the MGH using Transition Systems Inc, TSI, data from 1995 and changes in the consumer price index for medical care services for urban consumers between 1995 and 1997 TSI produces unit cost information from monthly analyses of each department's fixed and variable costs, staffing, and volume of services produced. The additional cost per percent decrease in mean cholesterol was calculated for MNT (12). The number of volunteers who required drug therapy after 6 months of MNT vs 6 months of UC was tallied and associated costs, based on wholesale costs (1997) of the actual drugs (13), dosages prescribed, and associated lab work ordered to monitor side effects (ie, SGOT, CPK) were compared. These costs do not include lipid panels or extra physicians' visits Lab costs were based on the 1997 MGH rate book.

Statistical analysis

Analysis of covariance controlling for baseline value of the variable and gender was used to assess group differences in the change in dietary intake and lipid levels at 3 months, 6 months, and 1 year Baseline comparisons were made using *t* tests for continuous variables and Fisher's exact test for categorical variables Within group changes were calculated using paired *t* tests. Pearson product moment correlations were computed to correlate dietary intake and clinical outcomes. The Wilcoxon test was used to compare differences in patient satisfaction between groups at baseline and 6 months. SAS was used for all of the analyses (SAS Institute, Inc, Cary, NC, SAS version 6 12) All inter-group comparisons were based on intention-to-treat analyses.

RESULTS

Of the 90 volunteers (60 men and 30 women) who enrolled in the study, 2 men (one in each group) dropped out after the 3-month visit. Table 1 presents baseline characteristics of volunteers who received MNT vs UC There were no significant differences between the two groups

Adherence to the Study Regimen and Nutrient Intake

During the 6-month study intervention, 98% of the MNT volunteers adhered to the study regimen, attending a minimum of 2 nutrition counseling sessions. One of the volunteers assigned to UC saw a dietitian for 1 session. None of the study volunteers was prescribed hypolipidemic drugs. After the 6-month study intervention period ended, 29% of the UC volunteers were prescribed hypolipidemic drugs (statins) (n=7) or received further dietary intervention (n=6) compared with none in the MNT group ($P< 001$).

At baseline, there were no significant differences in diet, assessed by 24 hour recall, between treatment groups (Table 2). At 3 and 6 months, the MNT group was more likely to meet the goals for NCEP Step 2 diets than the UC group and achieved lower fat intakes (24% vs 30% fat at 3 months, $P< 001$; and 25% vs 29% fat at 6 months, $P< 01$; 7% vs 10% saturated fat, $P< 001$). Compared with baseline, the MNT group sustained a 7% to 8% decrease in total fat intake and a 4% decrease in saturated fat intake at 3 months and 6 months; significant reductions from baseline in reported total fat ($P < 01$), saturated fat ($P < 01$), cholesterol ($P <.05$), and energy intake ($P<.001$) persisted at 1 year However, the differences in the changes between treatment groups were no longer

Continuing professional education questionnaire

After reading the continuing professional education article, "Clinical and cost outcomes of medical nutrition therapy for hypercholesterolemia: a controlled trial," please answer the following questions by indicating your responses on the self-assessment questionnaire form located on the next page.

Once the questionnaire has been mailed to and recorded by the ADA, you may fill out the Certificate of Completion on page 1019.

This activity has been approved for 1 hour of continuing professional education credit for registered dietitians and dietetic technicians, registered, by the Commission on Dietetic Registration. Answers to the continuing professional education questionnaire can be found on page 1116.

ADA members should cut out the completed form and return it, with a check for $18 each (nonmembers $25) to cover processing, to: American Dietetic Association, PO Box 97215, Chicago, IL 60678-7215.

Questionnaires must be returned within 1 year of their appearance in the *Journal* in order to be eligible for credit. Notification will not be sent if the hour is approved.

1. The annual cost from lost wages and medical treatment of CHD is between how many billion dollars:
A. 1-20
B. 50-100
C. 150-300
D. 500-900

2. The Adult Treatment Panel II targeted which of the following therapies as the first line of treatment of high blood cholesterol
A. diet
B. medication
C. exercise
D. psychotherapy

3. The primary objective of this study was to:
A. compare HDL cholesterol levels of volunteers from the Adult Treatment Panel II that are at high risk for coronary heart disease and receiving diet therapy with volunteers that are low risk for coronary heart disease and receiving drug therapy
B. determine the NCEP guidelines for physcians for the Step I diet
C. compare the cost effectiveness of a cholesterol lowering protocol implemented by Registered Dietitians with that of cholesterol lowering advice by physicians in a clinical ambulatory setting
D. determine the effect of the NCEP Step II diet on non-lipid CHD risk factors

Questions 4-6, please answer TRUE or FALSE:

4. Volunteers in the MNT group met with a dietitian a minimum of 2-3 visits over 2-3 months.
A. true
B. false

5. Volunteers in the MNT group also received customary levels of usual care from their physicians.
A. true
B. false

6. The entire cohort was evaluated again one year after the end of the study intervention.
A. true
B. false

7. Dietary intake data was collected using which of the following methodologies.
A. food frequency
B. daily food diary
C. diet history data
D. random 24-hour recall

8. Compared with baseline levels, the MNT group sustained what percentage decrease in saturated fat at six months:
A. 4
B. 7
C. 8
D. 10

9. What percentage of the MNT volunteers had lower total cholesterol levels at three months:
A. 14
B. 38
C. 43
D. 82

10. Change in percent of energy from saturated fat at three months was correlated with all but which of the following lipid levels.
A. serum cholesterol
B. triglycerides
C. LDL-cholesterol
D. HDL-cholesterol

11. Volunteers of the MNT group sustained significant reductions in which of the following lipid levels, compared with baseline levels, between six months and one year:
A. serum cholesterol
B. triglycerides
C. LDL-cholesterol
D. HDL-cholesterol

12. Dietitians spent an average of how many minutes per volunteer in the first three months.
A. 30
B. 60
C. 90
D. 140

13. The cost-effectiveness ratio of MNT was how many dollars per each one-percent of decrese in total and LDL-cholesterol levels:
A. 36
B. 72
C. 98
D. 217

14. This study suggests that dietitians who provide MNT use a more customized approach for cholesterol lowering than non-dietitians as indicated by:
A. beginning specific hypolipidemic therapies
B. the use of computerized nutrient analysis
C. the use of multiple counseling strategies
D. developing execise criteria

15. Which of the following studies had consistent findings to the present study, using the NCEP Step II diet and exercise program.
A. Cholesterol Lowering Intervention Program
B. Stefanick study
C. Henkin study
D. Sikand study

16. Lowering cholesterol levels by one percent is associated with what percent reduction in coronary heart disease:
A. 0-1
B. 2-3
C. 4-5
D. 6-7

17. Oster estimates that reducing saturated fat intake by one to three percent would yield an annual savings of between how many billion dollars
A. 0 4-1.2
B. 2.4-4.1
C. 5.2-8.1
D. 9 8-12.7

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3	A	B	C	D
4	A	B		
5	A	B		
6	A	B		
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D
11	A	B	C	D
12	A	B	C	D
13	A	B	C	D
14	A	B	C	D
15	A	B	C	D
16	A	B	C	D
17	A	B	C	D

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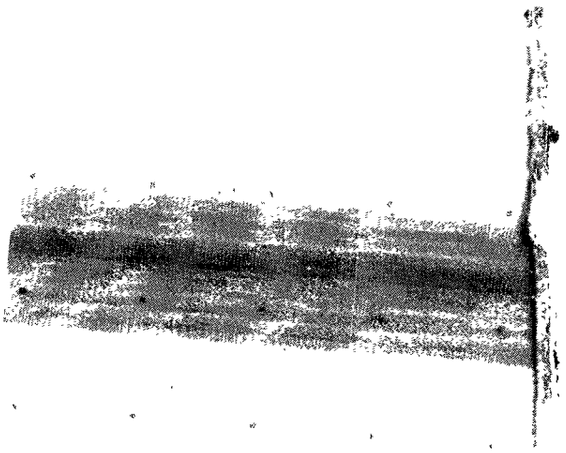

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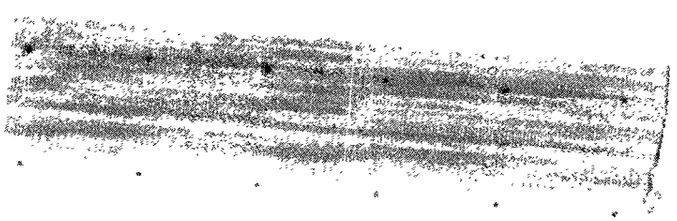

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significant at 1 year as the UC group also reported significant reductions in energy intake (P <.05) and total fat intake (P <.05) compared with baseline.

Serum Lipids, Weight, and Activity

At baseline, lipid levels, weight, BMI, and activity level were not significantly different for the MNT and UC groups (Table 3). The MNT group had a 6% decrease in serum total and LDL-cholesterol levels at 3 months and 6 months, whereas the UC group had no significant change in total or LDL-cholesterol levels (Table 3). The difference in the change in total cholesterol levels between the groups was significant at 3 months (P<.001) and at 6 months (P< 05). Moreover, 82% (n=37) of MNT volunteers vs 43% (n=19) of UC volunteers had lower total cholesterol levels at 3 months with 38% (n=17) of MNT volunteers vs 14% (n=6) of UC volunteers achieving at least a 10% reduction in total cholesterol levels at 3 months. Volunteers receiving MNT lost 1.9 kg at 3 months, which was sustained at 6 months compared with no weight loss in the UC group (P<.001) In addition, the MNT group reported higher activity levels (160 ± 161 min/wk) at 3 months compared with UC volunteers (94 ± 93 min/wk) (P< 05).

Weight reduction at 3 months was correlated with reductions in serum cholesterol (r= 0.38, P=.0002) and triglyceride levels (r=0.29, P=.005), and with increased activity (r=-0.29, P=.007) in the entire cohort. Change in percentage of energy from saturated fat at 3 months was correlated with reductions in serum cholesterol (r=0.52, P=.0001), LDL-cholesterol (r=0.50, P= 0001), and HDL-cholesterol levels (r=0.26, P=.02). Reduction in percentage of energy from total fat was associated with changes in weight, (r=0.21, P< 05), LDL (r=0.34, P=.001), and total cholesterol (r=0.33, P= 001).

At 1 year, the differences in the changes between treatment groups for serum lipids, weight, and activity were no longer significant. MNT volunteers received no additional interventions between 6 months and 1 year, but sustained significant reductions in LDL-cholesterol (P<.01) compared with baseline By comparison, 13 of 45 UC volunteers received additional drug or diet intervention between 6 months and 1 year and had significant reductions in total cholesterol (P< 01) and LDL cholesterol (P<.001).

Time Spent Counseling Volunteers

Dietitians providing MNT spent an average of 90 minutes (range 60 to 140 minutes) per volunteer in the first 3 months [mean=2 5 visits ± 0.5 (standard deviation)] and 30 minutes (1.5 visits ± 0 8) in the second 3 months. Time spent with the dietitian by month 3 was correlated with reductions in serum total cholesterol (r=-0.47, P= 001) and LDL-cholesterol (r=-0 39, P= 008), and with weight reduction (r=-0.34, P=.02). Because the average amount of time that primary care physicians spent discussing total cholesterol levels and diet therapy was similar in both treatment groups (1 to 2 minutes per volunteer between baseline and 3 months and between 3 and 6 months), we could not compare the costs of UC vs MNT. Therefore, only the incremental costs of MNT were calculated.

Cost Outcomes/Cost-Effectiveness

The calculated cost of dietitians' effort for 90 minutes per volunteer during the first 3 months was an average of $217 to achieve a 6% reduction in total and LDL-cholesterol levels and an extra 3% reduction in saturated fat intake. In the second 3 months, dietitians spent an average of 30 minutes per volunteer, at an average cost of $98, which sustained the decrease in total and LDL-cholesterol levels and the extra reduction in saturated fat intake. The cost-effectiveness ratio for MNT was $36 for each 1% decrease in total and LDL-cholesterol level and $72 for each extra 1% decrease in saturated fat intake

Dietitians need to convey that the impact of MNT on health outcomes may extend beyond the reduction of total cholesterol levels: the increased physical activity, decreased fat intake and greater weight loss may provide additional health benefits

Satisfaction

At baseline, there were no significant differences in satisfaction except that volunteers in MNT were more satisfied with the amount of food they were eating (MNT=2 4, UC=2.9, P=.03, 1=very satisfied, 5=very dissatisfied) At the 6-month evaluation, the MNT group reported significantly higher satisfaction levels with clinic visits, dietitian's vs physician's understanding of lifestyle and eating habits, their knowledge about cholesterol, ability to manage cholesterol levels, and eating habits than the UC group (Table 4).

Cost of Lipid-Lowering Drugs

The average cost associated with lipid-lowering drugs for the 7 UC volunteers was $443.93 per person over 6 months. The average reduction in cholesterol was 14 14%, resulting in an average cost of $31.40 for each 1% reduction of total cholesterol for a 6-month period.

DISCUSSION

The MNT group had a 6% decrease in total and LDL-cholesterol levels at month 3 compared with the UC group, which had no reduction in total cholesterol or LDL levels. More than one third of the MNT group showed a more than 10% decrease in total cholesterol levels at month 3 The changes in total cholesterol levels were significantly greater in the MNT volunteers at 3 months and at 6 months compared with UC volunteers

In addition to reducing total cholesterol levels by 6%, the MNT group lost more weight (1 9 vs 0 kg) at 3 and 6 months and

reported more activity at 3 months compared with the UC group At baseline, fat and cholesterol intake were similar to a Step 1 NCEP diet and less than the average American diet (14), with 31% to 32% fat, 11% saturated fat, and 235 to 242 mg cholesterol The MNT group met the NCEP Step 2 recommended diet guidelines at 3 months and 6 months, whereas the UC group was more likely to maintain a diet consistent with Step 1 criteria of NCEP. The MNT group achieved and sustained an 8% decrease in total fat (from 32% to 24%) and a 4% decrease in saturated fat intake (from 11% to 7%), which was statistically significant at both 3 and 6 months To achieve the MNT results, dietitians spent an average of 90 minutes per volunteer during the first 3 months and 30 minutes in the next 3 months of therapy This contrasts with the average of 1 to 2 minutes per volunteer spent by the physicians in providing cholesterol-lowering advice.

Volunteers assigned to MNT were counseled with individualized approaches evidenced by the use of as many as 5 different strategies These included. verbal advice, brochures, handwritten instructions, preprinted materials, and recipes At least 3 to 5 different counseling strategies were used with 80% of MNT volunteers, compared with 4% of UC volunteers, suggesting that dietitians who provide MNT use a more customized approach for cholesterol lowering.

Although physicians and dietitians were not masked to study assignment, the staff collecting outcome data, ie GCRC (General Clinical Research Center) staff weighing the volunteers and collecting the diet recalls, and the staff performing laboratory measures, were masked to treatment assignment. Moreover, while the physicians could have preferentially begun specific hypolipidemic therapies on one group vs another, they had all agreed to and refrained from doing so during the first 6 months, so any potential bias introduced through their unmasking was trivial at most.

The results of our study can be compared with the results of other published studies At 6 months, the 6% decrease in total cholesterol levels is comparable to the 5.3% mean decrease recently reported in a review of randomized trials of dieting advice to lower blood cholesterol levels in free-living subjects (15). Our results also parallel, in at least some respects, a randomized trial (comparing MNT by dietitians with UC provided by nurses and physicians) in which MNT resulted in a greater decrease in total cholesterol levels: 10% (from 6.97 to 6.27 mmol/L) compared with a 7% decrease with UC (16). The greater decrease in total cholesterol levels in this study may be partially explained by the higher baseline cholesterol levels compared to the current study (17).

The results of the Cholesterol Lowering Intervention Program (CLIP) (18), a randomized study designed to develop and evaluate approaches for physicians to implement the NCEP STEP 1 guidelines, also support our results. CLIP examined whether office assisted and nutrition center models would be more effective in lowering serum cholesterol than UC, which served as the control After 2 months, serum cholesterol levels declined by 2.2% with Usual Care Model, by 4.6% in the Office Assisted Model; and by 7.8% in the Nutrition Center Model, similar in magnitude to the 6% decrease in our study.

Our results are also consistent with the findings of Stefanick et al (19), who reported an 8% and 3% decrease in total and saturated fat, respectively, after a NCEP Step 2 diet and exercise program Lipid responses to diet and exercise were also similar to our study The time spent with dietitians who advised changes in diet and exercise in the Stefanick study, was greater than in our study, including one individual session, 8 one-hour group sessions, and 6 to 8 monthly contacts for diet counseling thereafter via mail, phone, group or private meeting. In addition, volunteers received 6 weeks of 1-hour exercise sessions 3 times per week and a 7- to 8-month maintenance phase during which participants could attend exercise sessions 3 times per week with a goal of 10 miles of brisk walking per week.

In our study, the 12-month data, approximately 6 months after MNT sessions were completed, showed no significant differences in the changes from baseline between treatment groups in diet, exercise, or lipid outcomes A study by Henkin et al also showed a similar trend, but they found that both dietitian and physician groups lost half of the beneficial effects on LDL-cholesterol levels at one year compared with 3 months (20). In our study, however, the 1-year results were largely a function of improvement in lipid levels in the UC group, rather than worsening status in the MNT group Almost one third of the UC group was given either hypolipidemic medications (n=7) or had joined formal diet programs (such as Weight Watchers) or sought out a dietitian (n=6). By comparison, none of the MNT volunteers were prescribed hypolipidemic agents or further dietary intervention.

Because volunteers in the UC group were less satisfied with their ability to manage their cholesterol levels at 6 months, this might explain the extra attention to diet, hypolipidemic medications and cholesterol lowering that subsequently occurred in this group.

Although we could not directly compare the costs of UC vs MNT, we examined the costs and potential clinical benefits of ongoing MNT The additional average cost of MNT per volunteer was $217 in the first 3 months for 2.5 visits and $98 in the second 3-month period for 1 5 visits, which sustained the 6% decrease in total cholesterol. The cost-effectiveness ratio for MNT was $36 per 1% decrease in total cholesterol and LDL levels. Sikand et al (21) demonstrated a 13% lowering in total cholesterol levels (from 7.06 to 6.14 mmol/L) using MNT and calculated the average cost to be $165 for 3 visits (144 minutes) over a 7-week period. This contrasts with the calculated annualized cost of statin therapy, including monitoring, of $2,648.59. For each dollar spent on MNT, a cost savings of $4 28 was noted.

Sikand also reported that "after dietitian intervention, only 15 of 30 eligible patients required antihyperlipidemic medications, which led to an annual cost savings of $27,449 or $638.35 per patient" (22). MNT also produced and sustained an extra 3% reduction in saturated fat intake. The ongoing cost of $98 per 3-month period to sustain reductions in saturated fat intake and total cholesterol and LDL levels appears to be worth the benefits when one compares an annualized cost of MNT of $511 to the $2,648 59 annual cost of statin therapy

The potential clinical benefits of ongoing MNT can be examined from several perspectives. First, every 1% reduction in total cholesterol levels is associated with a 2% to 3% reduction in coronary heart disease (23). Second, Oster and Thompson (24) estimate that reducing saturated fat intake by one to three percentage points would reduce CHD incidence by 32,000 to 99,700 events and yield combined savings in medical expenditures and lost earnings ranging $4.1 to $12.7 billion over 10 years (estimates in 1993 US dollars). Finally, MNT not only helps reduce lipid levels but also encourages lifestyle modifica-

tions that result in weight loss, reduction in fat intake, and increases in activity levels. Medications are only effective at lipid lowering.

APPLICATIONS

Dietitians can use these research results with physicians, third party payers, and decision makers in health systems to substantiate the effectiveness of MNT in reducing fat intake and decreasing cholesterol levels compared with physicians' advice in the usual care setting. Dietitians need to convey that the impact of MNT on health outcomes may extend beyond the reduction of total cholesterol levels: the increased physical activity, decreased fat intake and greater weight loss may provide additional health benefits (25,26). Moreover, the greater patient satisfaction that occurred with MNT provides evidence that the quality of the counseling process is also important. The significant improvement in all of these outcomes provides evidence that MNT is a reasonable investment of healthcare resources and supports our recommendation that NCEP dietary guidelines should be implemented by registered dietitians as much as possible and in an ongoing manner to achieve and sustain maximum health benefits

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This study was supported by a research grant to Linda M Delahanty from the American Dietetic Association Foundation and the EP Charlton Charitable Foundation Also supported by the Massachusetts General Hospital General Clinical Research Center (MGH GCRC) (M01RR01066)

The authors thank Mason Freeman, MD, for expert advice and MGH GCRC staff Ellen J Anderson, MS, RD; Jane Hubbard, MS, RD; Deborah Cioffi, and nursing staff Vicki Turbini and Kathleen Egan, for their assistance in data collection

The authors also thank the MGH Ambulatory Nutrition Service dietitians (Catie Hanley, MS, RD, Mary McGehee, MS, RD; Lois Kiley, MS, RD) for implementation of the intervention, the MGH Dietetic Interns for assistance in recruitment and data collection, Elina Levina, BS, for data entry, and Mary Pirkey, MGH Department of Nutrition and Food Service, for her time and preparation of the manuscript

Dietary fat reduction strategies used by a group of adults aged 50 years and older

RAYANE ABUSABHA, PhD, RD, KUANG-HUA HSIEH, PhD, CHERYL ACHTERBERG, PhD

ABSTRACT

Objective To investigate the fat-reduction strategies used by a group of older adults who successfully made and maintained positive dietary changes for 5 years or longer
Design Participants completed 2 copies of a self-administered food frequency questionnaire: The first copy assessed diet before they began making changes and the second copy assessed diet after initiation of healthful dietary changes Positive food changes were identified from the food frequency questionnaires. During in-person interviews, participants placed food changes onto a time line according to the nearest estimated date of initiation of the change.
Subjects Participants were 65 free-living older adults (aged >50 years) who had maintained substantial changes to decrease fat intake in their diet for at least 5 years
Statistical analyses performed Quantitative and qualitative data were used to identify the fat-reduction strategies and to confirm and validate the fat-reduction strategy model. Confirmatory factor analysis was performed to confirm the new model The Kuder-Richardson-20 reliability coefficient (kr) was used to determine internal consistency of the scales developed for the study.
Results The majority of participants decreased their fat intake gradually, at different time points in their lives, and over a long period of time (5 to 43 years) Mean percent energy intake from fat decreased from 44.3±5.9% before dietary improvement to 25.9±7.1% at the time of the study The final model consisted of 5 fat-reduction strategies with 63 food changes. The strategies were: increase summer fruits (4 items; kr=0.66), increase vegetables and grains (14 items; kr=0.79), decrease recreational foods (14 items; kr=0 76), decrease cooking fat (20 items; kr=0 86), and use fat-modified foods (11 items, kr=0.80).
Applications/conclusions Dietetics professionals should base their advice on the dietary strategies used by consumers rather than hypothetical premises such as food or nutrient groupings. Nutrition education interventions will have better chances for success if they are based on a set of customized programs that guide appropriate consumer segments through a series of small, comfortable, and sustainable dietary changes over a prolonged period of time.
J Am Diet Assoc 2001;101 1024-1030

Epidemiological, clinical, and animal studies suggest that the adoption of diets low in fat and high in fiber are essential for decreasing the risk of chronic diseases such as heart disease and cancer (1-4). Indeed, a major objective of the Healthy People 2010 initiative (5) is to reduce Americans' average fat intake to 30% or less of total energy. For most Americans (6), this means making considerable dietary changes

Many interventions have been conducted to help consumers decrease their fat intake (7-13) When short-term success is considered, participants in most interventions have not been able to reach desired goals, like reaching fat intake of <30% of energy (9,12). In addition, with only individual exceptions (12), these interventions are generally unsuccessful in achieving long-term maintenance of the desired dietary behavior (9-14) Devising successful and inexpensive dietary interventions is a challenge yet to be met, and it is evident that dietary change strategies that are effective for promoting the adoption and maintenance of desirable dietary behavior need to be discovered (9,15).

The wide ranges in dietary fat intake reports by different population groups (6) and the decline in fat intake during the past decades (1,6,16) indicate that there are persons who have successfully followed dietary recommendations and consume healthful diets In-depth studies of the case histories of successful changers may provide dietetics professionals with dietary change strategies that could then be included and tested in nutrition education interventions designed to help other consumers make dietary changes. Therefore, the purpose of this project was to investigate the strategies used by a group of older adults (>50 years old) who made and maintained positive dietary changes for 5 years or longer.

METHODS

This research was a retrospective study that assessed dietary behavior change patterns using a combination of qualitative and quantitative methods. The research methods and proce-

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dures were previously tested for validity and reliability, and used in a different population (15,17). All procedures were approved by a Committee for the Protection of Human Subjects at The Pennsylvania State University, University Park

Recruitment and Subject Selection

Participants were recruited through radio and television announcements and newspaper advertisements. To be eligible, participants had to have lived in the United States for the past 5 years, be aged 50 years or older, and believe they had been making substantial dietary changes to decrease fat in their diet for at least 5 years. A telephone screening interview was administered to all interested persons to ascertain study eligibility. Participants were offered a monetary reward for completion of the study.

Data Collection

Eligible participants were mailed a packet of questionnaires that asked about demographic information, food preferences before and after diet improvement began, major life events that occurred in the past 15 years (assessed using the PERI Life Events Scale [18]), information on general motivation for change, and other relevant questions including some regarding exercise habits and alcohol consumption Two identical copies of a food frequency questionnaire (FFQ) (19) were also included in the mailed packets. The FFQ was designed specifically to assess usual fat consumption. On 1 copy (post FFQ) participants assessed current food consumption patterns, that is, after initiation of healthful dietary changes On the second copy (pre FFQ), participants assessed their food consumption patterns before the initiation of dietary improvement efforts. Participants were asked to set a date when they believed they began making dietary changes to decrease fat intake. This date was used as the reference point for recalling past diet.

The FFQs were used to determine what positive food changes were undertaken by participants to decrease fat intake in their diet, and to confirm whether the changes reported resulted in an actual decrease in fat intake Only positive, sustained dietary changes resulting in decreased fat intake were investigated. In addition to behaviors to decrease fat intake, behaviors to increase fruit, vegetable, and grain intake were also examined, as these behaviors have also been recognized as strategies used to decrease dietary fat intake (15,20) A food change was considered to be positive if it moved in a favorable direction at least 2 frequency categories from pre to post FFQ. The frequency categories were: <1 time per month/never, 2 to 3 times per month, 1 to 2 times per week, 3 to 4 times per week, 5 to 6 times per week, once a day, and >2 times per day. Therefore, a decrease in intake of hot dogs by 3 frequency categories (eg, from 3 to 4 times per week to <1 time per month/never), and an increase in intake of broccoli by 2 frequency categories (eg, from 2 to 3 times per month to 3 to 4 times per week) were both considered positive changes. Movement of at least 2 frequency categories was used to decrease the likelihood of response error

After a participant returned the questionnaire packet, positive food changes were identified from the pre and post FFQs. A long (eg, several feet) paper time line was then prepared by recording, on the left-hand side, all the positive food changes derived from the FFQs. Next, a horizontal line was drawn, indicating the number of years the participant reported making dietary changes. Equal amounts of space were left for each change year, and each month was labeled appropriately. Fi-

Table 1
Characteristics of older adults (N=65) who successfully decreased dietary fat intake

Characteristic	n	%
Age (years)		
50-59	31	48
60-69	20	31
70-79	10	15
80-89	4	6
Gender		
Female	39	60
Male	26	40
Adults in household		
Living alone	20	31
Living with a partner/other adult	37	57
Living with children	8	12
Ethnicity		
White	63	97
African-American	2	3
Highest education level attained		
High school or less	8	12
Graduated college/some college	26	40
Completed graduate school	31	48
Occupation		
Retired	28	43
Professional occupation	16	25
Service occupation	12	18
Housewife	9	14
Number of previous attempts to improve diet		
Never	17	26
Once or twice	25	39
Many times	23	35
Primary reason for making dietary changes		
Improving personal health	35	54
Combination of improving personal health and reducing own weight	21	32
Improving health of partner	6	9
Reducing own weight	3	5
	Mean±SD	**Range**
Age by gender		
Female	62 8±9 1	50-88
Male	62 5±8 3	52-84

SD=standard deviation

Table 2
Characteristics of dietary patterns of older adults (N=65) who were successful at decreasing their fat intake

Variable	Mean±SD	Range
Percent energy from fat		
Before dietary improvement	44 3±5 9	28 2-55 8
Current diet, after improvement	25 9±7 1	7 0-42 3
Change	18 4±8 0	3-43
Number of years decreasing fat intake	17 1±8 6	5-43
Number of food changes made per person	40 9±11 8	18-66
Number of change clusters per person	16 5±9 9	1-50
Number of food changes made per cluster	10 4±8 6	1-50

SD=standard deviation

nally, major life events as reported on the PERI Life Events Scale were entered above the horizontal line to correspond with when they occurred. After construction of the time lines, all FFQs were mailed to the Fred Hutchinson Cancer Research Center, Seattle, Wash, for analysis.

In-person Interviews

After all survey forms were returned and the time lines were constructed, in-person interviews were scheduled. The audiotaped interviews provided qualitative data to describe changes and the context in which the changes occurred. During the interview, the participant and the interviewer worked together to fill in the time line with additional pertinent life events used as cues for deeper recall These life events were often associated with specific dietary changes in terms of timing, if not causation Positive food changes from the left-hand side of the timeline were added at the nearest estimated date of their initiation. As each dietary change was placed on the time line, the interviewer probed to determine additional information pertaining to the reason(s) why the participant made that particular dietary change, or group of changes, at that specific point in time Dietary changes made at the same time and for the same reason were so marked and referred to as change clusters. Participants were encouraged to review and correct their initial food frequency responses during the interview whenever they deemed necessary

DATA ANALYSIS

The data analysis used in this research is unique in that qualitative data were used to identify fat-reduction strategies and to confirm and validate the fat-reduction strategy model. All audio tapes were transcribed and reviewed by the investigators Descriptive statistics were run and Pearson correlation coefficients were calculated to detect relationships among dietary pattern variables (eg, change clusters, change in percent energy from fat) Using the pre and post FFQs, a data set of the sustained positive food changes was created. Factor analysis (21) was performed to confirm the structure previously established by Keenan et al (15); modify the structure using findings from previous research (20,22) and from the qualitative interview data, if necessary, and confirm the new modified structure. The confirmatory factor analysis and the correlation matrixes calculated to estimate the fit of the model to the data were run in LISREL (version 7.16, 1989, Scientific Software, Mooresville, Ind). The Kuder-Richardson-20 reliability coefficient was used to determine internal consistency for scales developed by confirmatory factor analysis. Nutrient analysis of the FFQs to determine dietary fat decrease was performed by means of the Nutrient Data System (release 2.4, 1992, Nutrition Coordinating Center, University of Minnesota, Minneapolis) at the Fred Hutchinson Cancer Research Center

Assessment of Fit of the Model

In a confirmatory factor analysis model where specific hypotheses are being tested, several criteria need to be met to establish goodness-of-fit. the goodness-of-fit χ^2 should be less than twice the degrees of freedom, the goodness-of-fit index should be >0 9 (23), the root-mean-square residual should be <0.1, all factor loadings should be significant at the 0.05 level (presented by T values >2), factor intercorrelations should be low to moderate, and modification indexes should be low (for this study we aimed for modification indices <10) (21). A high modification index for an item exhibited on a factor suggests that the item is loading high on that factor For example, if tofu was placed in the decrease cooking fat strategy, but exhibited a high modification index on the increase vegetable strategy, tofu might have fit better in the vegetable factor.

RESULTS

Of the 125 persons who responded to the advertisements, 78 met study criteria and were mailed the survey packets. Of all eligible participants, 13 (8 women and 5 men; mean age 61 8±7 3 years) failed to return the survey packets and withdrew from the study. The remaining 65 persons completed the study The sample consisted of more women than men (60% vs 40%) Participants were generally well educated and mostly white (Table 1).

FFQ analyses indicated that all participants had decreased their fat intake by >5% of total energy. Mean percent energy intake from fat decreased from 44.3±5.9% before dietary improvement efforts to 25 9±7.1% for current diet (Table 2). The length of time participants reported adopting dietary changes to decrease fat intake ranged from 5 to 43 years. Participants made changes in clusters averaging 10 foods per cluster. Only 1 participant reported adopting all her food changes (n=50) at 1 time point (ie, in 1 cluster). The other 64 made dietary changes at different time points (ie, in at least 3 or more clusters).

Correlation analyses indicated no relationships between gender and the total number of food changes made, the total number of change clusters, and the change in percent energy from fat. Similarly, significant differences in age were not observed in this sample. The total number of food changes adopted was significantly correlated with change in percent energy from fat (r=0.62; P< 01). Thus, the more food changes a participant made the higher the decrease in his or her total fat intake.

From the FFQs, 129 food changes to decrease fat intake were identified. However, qualitative analysis indicated that certain food changes should not be used. For example, the food items grouped under "shellfish" (shrimp, lobster, crab, and oysters) were viewed differently depending on the participant. Many participants believed these foods were part of a healthful diet and increased their intake, whereas others indicated these foods were high in cholesterol and eliminated them from their diet. Other food changes deleted due to similar inconsistencies included consumption of dark fish, white breads and bagels, cereals, and milk.

After removal of uninterpretable items, 120 potential food changes remained. Of those, 23 were removed from analysis because they were adopted by <15% of the sample Examples include increase corn, increase baked potatoes, and decrease lunch meat Finally, increase spaghetti with tomato sauce was also removed from analysis because it correlated highly with decrease spaghetti with meat sauce.

The remaining 96 food changes were used in the factor analysis to identify the fat-reduction strategies used by this sample. A fat-reduction strategy consisted of food changes that were likely to have been adopted by a group of people, regardless of time For example, if the food changes increase broccoli and increase cabbage belonged to the same fat-reduction strategy, then a person who increased her broccoli intake is very likely to have increased her cabbage intake at some point in time

First, the fat-reduction strategies model previously established by Keenan et al (15) in a relatively younger group of adults (N=145), aged 30 to 55 years, was forced into a confirmatory factor analysis in the current sample. The maximum likelihood estimate for the forced model would not converge to

yield a unique solution. Thus, that model was not appropriate for use with our sample and a modified model needed to be established.

Knowledge from previous research (15,20,22) and information gained from the qualitative review of time lines and audio tapes were used to guide the construction of the new model. Eight strategies were tried in the confirmatory factor analysis model: increase fruit, increase vegetables, increase high-fiber foods (eg, beans and apricots), increase nutrient-specific foods (eg, tofu and bananas), decrease fried foods, decrease recreational foods, use fat-modified foods, and decrease cooking fat.

Inclusion of the 96 food changes in a single model was too large for the number of participants in this investigation. Therefore, the 8 identified strategies were first tested 1 at a time using reliabilities to examine the degree of internal consistency of the scales. Three strategies (increase high-fiber foods, increase nutrient-specific foods, and decrease fried foods) had low reliabilities (<0.6) (ie, they did not measure the same concept) and were removed from further analysis. Reliability analysis was performed on each of the 5 remaining scales and the food items' total correlations (the individual food change correlated with the total correlation of the other food changes in the strategy) were obtained (data not shown).

Again, because the number of cases was too small for the number of food changes, only 3 food changes from each of the 5 strategies were included in the confirmatory factor analysis. The 3 food changes chosen from each strategy were those that had the highest item correlation obtained from the reliability analysis. This model, which consisted of 5 strategies and 15 food changes, was designated as the general model. The general model provided an acceptable fit of the data and met all the goodness-of-fit criteria. The overall goodness-of-fit χ^2 was 71.52 (df=80; P=.74), the goodness-of-fit index was 0.90, the root-mean-square residual was 0.08, and all the item loadings were significant at the 0.05 level (T values>2) (Table 3). In addition, except for a moderate intercorrelation (r=0.58) between use of fat-modified foods and decrease cooking fat strategies, all other fat-reduction strategies intercorrelations were <0.4. All food changes had modification indexes <8 and the majority (89%) were <5. The general model met all the fit criteria and appeared to be tenable.

Once the general model was established, we used information from the qualitative data to test all the food changes on their appropriate strategies. The food changes were added 1 at a time to the general model and tested for significance. A food change was dropped from the model for 1 of the following 3 reasons: if it was not significant and had low modification indexes on all the other strategies (eg, eggs), if it was significant, but exhibited a high modification index on 1 or several other strategies (eg, tofu); and if it was not significant, exhibited a high modification index on 1 or several other strategies, yet remained not significant after it was tried on each of the other strategies on which it exhibited high loadings (eg, baked/broiled chicken). Once all the significant food changes within 1 fat-reduction strategy were identified, we proceeded to test the remaining food changes on the next strategy. Using this systematic procedure, a total of 63 food changes were classified and 33 remained unclassified.

For the remaining 33 food changes, an exploratory factor analysis was performed to detect any fat-reduction strategies that may have been missed using the qualitative data. No new strategies were identified. Therefore, the unclassified food changes were not incorporated into the confirmatory factor analysis model.

Table 3
Confirmatory factor analysis of fat-reduction strategies by adults aged ≥50 years (N=65) general model, single-factor tests, and internal consistency of scales

Factors	*T* values[a]	
	General model	Single-factor test
Decrease/change recreational foods (n=14, reliability coefficient=0.76)[b]		
Decrease cookies	4.37	3.47
Decrease chocolate candy	3.32	4.15
Decrease coleslaw	3.25	5.55
Increase low-fat cookies		3.47
Increase low-fat frozen desserts		3.47
Decrease pancakes, waffles		3.27
Decrease ice cream		3.10
Decrease pudding, custard		2.88
Decrease chips and crackers		2.79
Increase low-fat pizza		2.79
Decrease pies		2.66
Decrease chili with meat and beans		2.54
Decrease doughnuts, cakes		2.20
Increase low-fat cakes, pastries		2.11
Use fat-modified foods (n=11, reliability coefficient=0.80)		
Use low-fat dressing	7.34	7.85
Use low-fat mayonnaise	5.36	5.21
Use low-fat spreads[c] after cooking vegetables	4.78	5.74
Use low-fat spreads[c] on bread		4.66
Remove skin off chicken		4.33
Decrease spreads[c] on vegetables, grains		3.89
Trim fat off beef		3.53
Change cooking fat		3.25
Use low-fat spreads[c] when cooking vegetables		2.85
Use low-fat sour cream		2.69
Drink low-fat milk		2.09
Increase vegetables and grains (n=14, reliability coefficient=0.79)		
Increase sweet potatoes	5.24	5.66
Increase summer squash	4.16	4.50
Increase cooked greens	4.04	5.50
Increase broccoli		4.20
Decrease salad dressing		4.18
Increase winter squash		4.13
Increase beans		2.92
Increase vegetable soups		2.89
Increase rice, grains, noodles		2.82
Increase mixed salads		2.60
Increase onions, leeks		2.57
Increase bean soups		2.55
Increase cauliflower, cabbage		2.43
Increase red peppers, red chilies		2.24
Increase summer fruits (n=4, reliability coefficient=0.66)		
Increase cantaloupes	4.29	6.05
Increase watermelon	2.98	3.22
Increase peaches, nectarines, plums	2.77	2.77
Increase other melons, honeydew		3.89
Decrease cooking fat (n=20, reliability coefficient=0.86)		
Decrease noodles with cream sauce	5.24	4.79
Decrease spreads on bread[c]	4.60	4.93
Decrease beef, pork or lamb	4.42	5.19
Decrease ground meat		4.97
Decrease cream soups		4.16
Change to light popcorn[d]		4.00
Decrease noodles with meat sauce		3.95
Decrease meat casseroles		3.90
Change to plain tuna[c]		3.87
Decrease meat sandwiches		3.61
Decrease mayonnaise-based salads		3.54

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Table 3 (cont'd)
Confirmatory factor analysis of fat-reduction strategies by adults aged ≥50 years (N=65) general model, single-factor tests, and internal consistency of scales

Factors	*T* values[a]	
	General model	Single-factor test
Decrease butter on popcorn		3 52
Decrease French fries		3 49
Decrease cheese, including in cooking		3 46
Change from dark to light chicken meat		3 44
Decrease cottage, ricotta cheese		3 25
Decrease pizza		3 05
Decrease meat gravies		3 02
Decrease biscuits, muffins		2 77
Decrease fried chicken		2 53

[a]General model χ^2=71 52 (df=80, *P*= 74), *T* values between 2 0 and 2 65 are significant at 05 level, *T* values >2 65 are significant at 01 level
[b]Food listed is representative of several similar foods grouped together on the food frequency questionnaire
[c]Spread=butter, margarine, oil, or other fat such as sour cream
[d]Includes microwave "lite" or popcorn popped without oil
[e]Refers to plain tuna vs tuna salad with mayonnaise or in a casserole

The final model consisted of 5 fat-reduction strategies with 63 food changes (Table 3) These strategies were· increase summer fruits, increase vegetables and grains, decrease recreational foods, decrease cooking fat, and use fat-modified foods Scales consisting of all the food changes that loaded significantly on their corresponding strategy were constructed. Scales demonstrated good internal consistency with reliability coefficients ranging from 0.66 (4 food items) to 0.86 (20 food items)

DISCUSSION

Several limitations of this study should be recognized The small sample size limits the generalizability of the data and may have masked additional findings With a larger sample, there would have been a greater possibility of categorizing most of the 33 unclassified food changes For example, qualitative data strongly suggested that many participants consumed certain foods mainly because they were rich in specific nutrients, as if these foods were pills. Tofu was consumed because of its high phytoestrogen content and bananas because of their high potassium content. Quite possibly, each of these food changes may make up a fat-reduction strategy on its own. On the other hand, they could all belong to 1 strategy we labeled the nutrient-specific strategy The small sample size made it difficult to test either of these hypotheses.

Another limitation is that the research was based on self-reported, retrospective recall of diet. Using self-reported dietary accounts introduces potential errors in the data. Some of these errors include participants' failure to recall all foods consumed and participants' desire to please the interviewer, which may lead them to exaggerate the use or non-use of certain food items. These errors of self-report are not only limited to FFQs, but are true for all dietary assessment methods, including 24-hour recalls. Assessment of retrospective food intake via semi-quantitative FFQs provides a reasonable estimation of food change trends (24-27). Although retrospective recall may be appropriate as a preliminary step in developing hypotheses about dietary patterns of older adults, future research should follow persons who are in the process of making dietary changes Dietary data could then be collected using well-controlled, multiple 24-hour dietary recalls (28,29) to confirm the identified strategies

The majority of participants in this study were white, highly educated, and came from middle- to upper-socioeconomic groups, which limits extrapolation of the findings to the general population The characteristics of this sample are consistent with previous research reporting that most dietary changers in the United States are white and more economically and more educationally advantaged (17,30-34). These findings also agree with the Diffusion of Innovations theory developed by Rogers (35), who contends that innovators, or early adopters, are those who "buy-in" first when new ideas or technologies are introduced into society. According to Rogers, early adopters make up a small percentage of the population (<15%) and are usually highly educated and more economically advantaged. This may be a pattern being observed with the adoption of low-fat diets—the groups studied thus far are mainly the early adopters.

Keeping in mind the limitations of this research, several conclusions can be drawn First, the majority of older adults in our sample decreased their fat intake gradually, at different time points in their lives, and over a long period of time. Second, while making dietary changes, these older adults followed a different pattern than that established by Keenan et al (15). Third, older adults seem to make dietary changes using specific fat-reduction strategies.

The data confirm that dietary change is complex, dynamic, and does not happen overnight. Approximately two-thirds of participants indicated that they have unsuccessfully attempted to improve their diets on at least 1 other occasion. Qualitative data suggest that these previous attempts were not failures, but small successes. Every time a participant tried to change his or her diet, for example as a result of joining a weight loss program, a number of dietary changes were adopted, several of which were maintained, contributing to the overall lower-fat diet In the majority of cases, dietary changes were made gradually and took a number of years and many clusters (an average of 16 clusters/person) before the goal was achieved. In fact, most participants reported that they were still in the process of making positive dietary changes.

The data also suggest that older adults' dietary behavior is different from their younger counterparts, especially in men. Whereas studies of successful changers in younger adults have reported difficulties in recruiting younger men (15,30,34), this was not the case when recruiting older men We found that older men were as eager to participate and as interested in nutrition and changing their dietary behavior as were older women. Future research should take into consideration the effect of age when studying men's dietary behavior

Age differences were also found in the way the fat-reduction strategies were classified. Keenan et al (15) identified 9 dietary fat-reduction strategies (in a group aged 30 to 55 years). Only 5 strategies were identified in our study The 5 strategies were made up of certain food changes that were similar to those described by Keenan and colleagues (15), whereas other food changes emerged as different by comparison. These age differences need to be confirmed using a larger sample that is more distinctly different in age, and a more prospective approach to studying dietary patterns If distinct age or life stage differences are established, nutrition educators would need to take age into account when developing future interventions.

Dietetics professionals are trained to give advice based on different meal patterns, specific food groups, specific nutrients, or adherence to a prescribed dietary regimen (36-38) Our study

suggests that older adults may use different food groupings than what is traditionally advised The food changes were not grouped based on a set meal pattern or on a specific regimen, rather they were grouped into strategies that may fit best within the domains proposed by Kristal et al (20). Kristal and colleagues (20) validated a diet behavior questionnaire for selecting diets low in fat in a group of 99 highly educated, white women aged 40 to 59 years. The questionnaire was based on anthropological theory of dietary change (39) and was developed to assess 4 broad behavioral domains (modification, substitution, replacement, and exclusion). Five scales (or strategies) were identified that corresponded to the hypothesized domains: modification of high-fat foods (eg, take skin off chicken), substitution of high-fat foods with specially manufactured lower-fat foods, replacement of high-fat foods with low-fat alternatives (eg, increase fruits and vegetables), avoid fat as seasoning, and avoid meat. Avoid fat as seasoning and avoid meat both belong to the same domain of exclusion of high-fat items. In our study, older adults used all of the strategies described by Kristal et al (20), but other new strategies emerged as well.

One new strategy, decrease recreational foods, also emerged in previous work (15) It includes food changes that aim at decreasing foods often consumed during social occasions such as parties or picnics (Table 3). The decrease recreational foods strategy may represent a third dimension of the exclusion domain proposed by Kristal et al (20)

Decrease cooking fat was another strategy identified in this group of older adults. Prewitt and colleagues (22) used the diet behavior questionnaire developed by Kristal et al (20) in 235 African-American men and women (mean age 48 years) to measure dimensions of dietary fat behavior. The investigators found that the avoidance domain split into 2 strategies. the avoidance of fat as seasoning and the avoidance of high-fat food preparation Our findings support those result and confirm the importance of "decrease cooking fat" as a dietary fat behavior Keenan and colleagues (15) also identified a decrease cooking fat strategy in their sample.

Another notable difference is that, in our sample, fruits and vegetables were 2 distinct food categories. Whereas dietetics professionals often group fruits and vegetables together, such as in the 5-A-Day for Better Health message (37), our results, as well as previous research (15,40), indicate that fruits and vegetables represent different constructs. Fruits are more likely to be consumed in raw form, individually as a snack; in contrast, vegetables are usually consumed as part of a meal (often cooked), in a mixed dish, or in a sandwich In short, fruits and vegetables are conceived of and used differently by consumers and should be separated when providing dietary advice

APPLICATIONS

- Helping consumers successfully adopt and maintain new dietary patterns is a challenge faced regularly by dietetics professionals. It may be more appropriate for dietetics professionals to move away from providing dietary advice based on hypothetical premises, such as those based on food or nutrient groupings, and use the dietary strategies practiced by consumers. For example, nutrition educators should separate fruits and vegetables when providing dietary advice or planning educational interventions.
- Dietetics professionals should be aware that a short intervention, such as a 1-hour dietary counseling session or reading a brochure, will not achieve substantial reductions in a person's dietary fat intake Most persons need many more visits than currently allotted and repeated exposure to positive nutrition messages over a prolonged period of time to achieve desired dietary goals.
- Research is needed to confirm our dietary fat-reduction strategies prospectively and to determine the age differences in dietary behavior, especially in men.

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This research was funded by National Institutes of Health, National Cancer Institute grant No CA-70971-01

QUESTION OF THE MONTH

Is there any research to prove that a macrobiotic diet can prevent or cure cancer?

The standard macrobiotic diet is similar to a strict vegetarian diet; all meat and dairy products are excluded and replaced with many soy-based products Other items typically included in a vegetarian diet, such as citrus fruits and some vegetables, are often limited or excluded. Supplemental foods such as white meat fish, seasonal fruits, nuts, and seeds may be included two to three times a week. Vitamin and mineral supplementation is discouraged. Specialized cooking techniques and lifestyle changes are encouraged. In addition, special teas are the only beverage allowed, and are to be consumed only when thirsty. Depending on the type of cancer, the part of the body affected, and the climate in which the individuals live, the diet may vary and other foods may be limited or allowed in greater quantities

The Standard Macrobiotic Diet Ranges
- 50% to 60% Whole grains
- 25% to 30% Vegetables
- 5% to 10% Soups
- 5% to 10% Beans and sea vegetables

Nutrition and Health Concerns with Macrobiotic Diet
- Protein deficiency
- Vitamin B12 deficiency
- Calcium deficiency
- Potential for dehydration
- Strong emotional burden placed on the individual and family

Efficacy
- The diet is currently being investigated for its potential cancer preventative effects.
- Soy products contain genistein, a potential cancer preventative agent
- Antioxidants are under investigation for preventative effects as well as therapeutic effects
- Many of the lifestyle changes are consistent with overall disease preventative recommendations
- There is no scientific evidence indicating this diet, used alone or as an adjunct to conventional therapy, cures cancer

To learn more about relevant and current clinical research studies provided by the U S. National Institutes of Health visit *http // clinicaltrials gov/.*

This issue is addressed in the ADA publication The Clinical Guide to Oncology Nutrition This handbook was written and developed by ADA's Oncology Nutrition dietetic practice group, Paula Davis McCallum, MS, RD, and Christine Gail Polisena,MS, MBA, RD, editors

This article was written by Eleese Cunningham, RD and Wendy Marcason, RD of the ADA Knowledge Center, Chicago, Ill ADA members can contact the Knowledge Center by sending an e-mail to knowledge@eatright org

Measurement characteristics of 2 different self-monitoring tools used in a dietary intervention study

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ABSTRACT

Objective To examine the measurement characteristics of 2 self-monitoring tools, a food diary and fat scan, used in the dietary intervention of the Women's Health Trial Feasibility in Minority Populations study.

Design Comparison of fat intake reported on the self-monitoring tools to a criterion measure of fat intake, specifically the mean of a food frequency questionnaire and a 4-day food record. The main outcome measures were differences in fat grams and correlations between each of the self-monitoring tools and the criterion measure.

Subjects/setting Six-month postrandomization data from 313 women aged 50 to 79 years who participated in the intervention group of the Women's Health Trial: Feasibility in Minority Populations study.

Results Both self-monitoring tools underestimated fat intake compared to the criterion measure, the food diary by 9 g and the fat scan by 6 g The self-monitoring instruments were better than chance at detecting a low-fat dietary pattern, however, and did not differ from each other in their ability to do so.

Applications/conclusions The self-monitoring tools were modestly precise as measures of fat intake, but neither was sufficiently accurate to be reliable as a sole assessment of dietary adherence. Dietetics professionals are encouraged to assess the measurement properties of self-monitoring tools to use them appropriately in supporting dietary changes *J Am Diet Assoc 2001,101 1031-1040*

Self-monitoring is often a component of dietary interventions because it effectively promotes dietary change (1-5). Self-monitoring can positively affect eating behavior through a number of mechanisms First, simply recording dietary intake can help persons become more aware of their food choices and other eating behavior. Second, when the records are analyzed in relation to dietary goals (eg, fat intake, fruit and vegetable intake), they can provide feedback both to the person keeping the record and to the dietitians or other health professionals supporting the person making changes.

Because using detailed self-monitoring instruments like food records can be burdensome, brief self-monitoring instruments have been developed The general advantages of these brief instruments include self-scoring, which promotes self-efficacy, and decreased costs associated with coding and data analysis.

A potential disadvantage, however, lies in the the measurement characteristics of brief self-monitoring instruments compared to more comprehensive instruments. This is a legitimate concern because inaccurate assessments of intake could lead

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MEAL	AMOUNT	FOODS AND BEVERAGES		FAT GRAMS

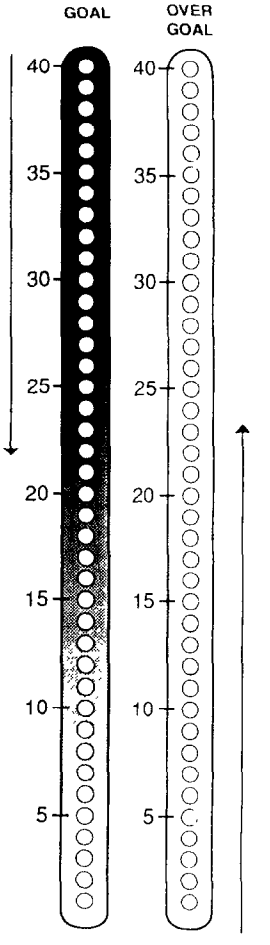


FIG 1 The food diary self-monitoring tool used in the Women's Health Trial Feasibility in Minority Populations study

to false assumptions of dietary adherence. Yet, there are few published reports examining the measurement characteristics of self-monitoring tools (6,7)

The Women's Health Trial: Feasibility Study in Minority Populations (WHT·FSMP), a randomized trial among African-American, Hispanic, and white postmenopausal women in the United States (8), offered an opportunity to investigate 2 very different approaches to self-monitoring: a food diary and much briefer fat scan. Participants in the WHT FSMP intervention group used self-monitoring tools to assess and evaluate their dietary change to a low-fat eating pattern (≤20% of total energy from fat) The intervention was modeled after the Women's Health Trial conducted from 1984 to 1988 and was based on social learning, cognitive-behavioral, and self-control theories (9). From these theories, several behavior strategies were identified, including self-management, skills training, social support, and relapse prevention, the details of which are described elsewhere (3). The purpose of the investigation reported here was to assess the measurement characteristics of the 2 dietary self-monitoring tools in comparison to a criterion measure based on more comprehensive dietary assessment instruments, specifically 4-day food records and a food frequency questionnaire (FFQ) In comparison to the criterion measure, we wanted to know if the self-monitoring tools under- or overestimated fat intake, ranked subjects precisely from low to high fat intake, and accurately detected a low fat intake (≤20% of total energy from fat)

METHODS

This investigation used data from the WHT:FSMP, a multicenter randomized controlled clinical trial conducted from 1991 to 1995 Collaborators included 3 clinical centers (Emory University, Atlanta, Ga, the University of Alabama at Birmingham, and the University of Miami, Miami, Fla), a coordinating center (the Fred Hutchinson Cancer Research Center, Seattle, Wash), and 2 National Institutes of Health (the National Cancer Institute, Washington, DC, and the National Heart, Lung, and Blood Institute, Washington, DC) The WHT:FSMP studied the effectiveness of a specific dietary intervention in promoting a low-fat dietary pattern among 2,208 African-American, Hispanic, white, and low socioeconomic status postmenopausal women aged 50 to 79 years. Sixty percent of the WHT:FSMP participants were randomized into a low-fat intervention group and 40% to a usual intake control group. Data were collected at clinic visits at baseline and 6, 12, and 18 months post-randomization Each woman in the intervention group was given a personalized study fat gram goal based primarily on energy intake as estimated by her baseline FFQ and her height Self-efficacy and self-management were strong behavioral themes within the intervention, which consisted of regular group sessions led by a nutritionist. Participants received dietary and behavior-change instruction and learned to self-manage their dietary intake Self-monitoring was one of the self-management techniques employed. Details of the design, baseline, and main outcomes of the WHT:FSMP have been published (8,10).

Data Set Selection

Data for this analysis were restricted to African-American and white intervention WHT:FSMP participants who were in the Atlanta or Birmingham areas; had begun the intervention within 6 months of randomization and been exposed to at least 3 months of the intervention, and had submitted at least 1 food diary or fat scan, and an FFQ and 4-day food record at the 6-month clinic visit. We used 6-month rather than 12- or 18-month clinic visit data to maximize the number of observations. Because of when the study ended, all participants were eligible for the 6-month clinic visit whereas only 67% were eligible for the 12-month visit and 24% for the 18-month visit (10). We restricted the data set to African-American and white participants at 2 of the 3 clinical centers because many participants at the third clinical center began the intervention after 6 months of being randomized As a final criterion, we excluded FFQ data from participants who reported consuming fewer than 600 kcal (n = 36) or more than 5,000 kcal (n = 1) because this suggested that participants did not complete the forms in a reliable manner. To see if these restrictions changed the representativeness of the sample, we compared the sociodemographic characteristics of participants from this study sample to a group of intervention participants who met the criteria for this analysis except that they had been exposed to the intervention protocol for less than 3 months

Self-monitoring Tools

Participants were taught first how to self-monitor (and score) their fat gram intake using food diaries After women had used the food diaries for 2 months, they were introduced to the fat scan, which is a simpler method for monitoring fat gram intake Participants were asked to self-monitor by food diary or fat scan for at least 3 days per month including 1 weekend day.

All participants completed an FFQ and a 4-day food record at baseline and every 6 months. All FFQs were analyzed. However, to reduce costs, only food records for a 50% randomly selected cohort were analyzed

The WHT·FSMP coordinating center, in collaboration with the nutritionists from the 3 clinical sites, developed the food diary and fat counter Sample pages from the food diary are shown in Figure 1 and from the fat scan in Figure 2. For each food diary, participants were instructed to record everything they ate or drank for 3 alternating days They used the WHT:FSMP fat counter to look up the grams of fat contained in the recorded foods and beverages. Participants tallied a fat gram score by summing the fat grams for all the foods consumed during each day. The fat counter contained approximately 800 foods, including regional and ethnic foods, listed by food group and alphabetically. Each food item had a corresponding fat gram value based on a common serving size. The fat gram values were taken from the Nutrient Data System (version 2.3, 1991, Nutrition Coordinating Center, University of Minnesota, Minneapolis), which was also used to analyze the FFQs and 4-day food records (11). To simplify the self-monitoring process, fat grams for food servings were rounded to whole numbers. To encourage fruit and vegetable consumption, all fruit and vegetable servings with ≤1 g fat were listed as containing no fat.

The fat scan was a simpler method of monitoring dietary intake and was developed specifically for the WHT:FSMP. It was modeled after the tool developed for another feasibility study of the Women's Health Trial (12) and modified to incorporate more ethnic foods The fat scan booklet we used listed 250 foods (by food groups) and provided the fat grams in a common serving of the food These fat gram values were listed in 3 columns for ease in recording 3 days' intake. Participants recorded intake from 3 alternating days. For each day of self-monitoring, participants circled the fat grams corresponding to the foods consumed and then summed down the column to

FOOD ITEM FATS, OILS, & SAUCES	Day 1 FAT GRAMS				Day 2 FAT GRAMS				Day 3 FAT GRAMS			
Butter 1 tsp												
regular	4	4	4	4	4	4	4	4	4	4	4	4
whipped	3	3	3	3	3	3	3	3	3	3	3	3
Butter Buds 1 tsp	0	0	0	0	0	0	0	0	0	0	0	0
Gravy with whole milk 1/4 cup	6	6	6	6	6	6	6	6	6	6	6	6
Lard or Salt Pork 1 Tb	13	13	13	13	13	13	13	13	13	13	13	13
Margarine 1 tsp												
diet	2	2	2	2	2	2	2	2	2	2	2	2
whipped or spread	3	3	3	3	3	3	3	3	3	3	3	3
regular	4	4	4	4	4	4	4	4	4	4	4	4
Mayonnaise 1 Tb												
fat free	0	0	0	0	0	0	0	0	0	0	0	0
low fat	4	4	4	4	4	4	4	4	4	4	4	4
regular	11	11	11	11	11	11	11	11	11	11	11	11
Mayonnaise-Type (Miracle Whip®) 1 Tb												
fat free	0	0	0	0	0	0	0	0	0	0	0	0
low fat	5	5	5	5	5	5	5	5	5	5	5	5
regular	7	7	7	7	7	7	7	7	7	7	7	7
Oils all veg 1 Tb	14	14	14	14	14	14	14	14	14	14	14	14
1 tsp	5	5	5	5	5	5	5	5	5	5	5	5
Salads 1/2 cup												
coleslaw/potato	15	15	15	15	15	15	15	15	15	15	15	15
macaroni	13	13	13	13	13	13	13	13	13	13	13	13
Salad Dressing 1 Tb												
clear	7	7	7	7	7	7	7	7	7	7	7	7
creamy	6	6	6	6	6	6	6	6	6	6	6	6
low-calorie, clear or creamy	1	1	1	1	1	1	1	1	1	1	1	1
Shortening 1 Tb	13	13	13	13	13	13	13	13	13	13	13	13
Sauces 1 Tb												
barbeque, chili sauce	0	0	0	0	0	0	0	0	0	0	0	0
cheese	3	3	3	3	3	3	3	3	3	3	3	3
hollandaise, commercial	4	4	4	4	4	4	4	4	4	4	4	4
Fried Foods:												
deep fried chicken, 1 piece	20	20	20	20	20	20	20	20	20	20	20	20
deep fried fish, 1 piece (3 oz)	15	15	15	15	15	15	15	15	15	15	15	15
french fries, 1 med sv (32 fries)	18	18	18	18	18	18	18	18	18	18	18	18
deep fried vegetables, 1/2 cup squash, plantain	6	6	6	6	6	6	6	6	6	6	6	6
Other _____												
	TOTAL				TOTAL				TOTAL			

FATS, OILS, AND SAUCES

Food Group	DAY 1 FAT GRAMS	DAY 2 FAT GRAMS	DAY 3 FAT GRAMS
Breads, cereals and grain products			
Dairy products			
Fast foods			
Fats, oils, and sauces			
Fruits, nuts, vegetables and soups			
Meat, poultry, fish			
Mixed dishes			
Sweets and desserts			
Total Fat	+	+	+
			Grand Total divided by 3 = Fat Score

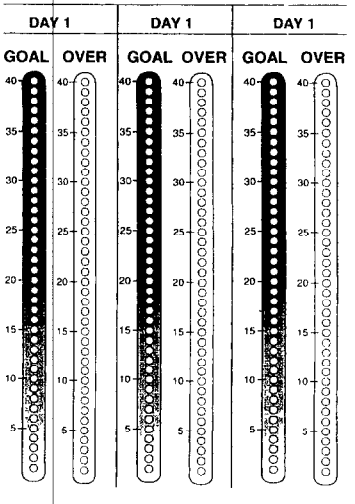


FIG 2 The fat scan self-monitoring tool used in the Women's Health Trial Feasibility in Minority Populations study

tally a fat gram score for the day. Participants were given instructions on how to adjust for differences in serving sizes and for foods not contained in the fat scan booklet.

Comprehensive Dietary Assessment Instruments

Two comprehensive dietary assessment instruments were used to monitor study progress. an FFQ and a 4-day food record. FFQs are the primary measure of dietary intake in epidemiological studies like the WHT·FSMPbecause of their practicality, cost, and ability to capture long-term intake (13). The FFQ we used was developed specifically to assess fat intake and changes in fat intake, and to incorporate regionally and culturally appropriate foods. It included 100 food item questions, 19 introductory questions addressing fat modifications of common foods, and 4 summary questions addressing servings of food groups to refine nutrient estimates from the food item questions. The time period for all questions was the past 3 months The correlation coefficient for percent energy from fat was 0.55 between the 6-month FFQ and the 6-month 4-day food record (14) Additional details regarding the FFQ, including its validity and reliability, are also reported (14).

Participants were instructed to keep 4-day food records by recording detailed information on food and beverage intakes on 4 alternating days, including 1 weekend day. Certified staff reviewed the food records for completeness at the clinical centers and queried study participants for clarifications as needed Specially trained staff at the coordinating center coded food records using the Nutrient Data System (version 2.6, 1994, Nutrition Coordinating Center, University of Minnesota, Minneapolis). The University of Minnesota Nutrition Coordinating Center independently coded a 5% random sample of food records for quality control

STATISTICAL ANALYSIS

We averaged participants' estimated fat intake from the first 6-month FFQ and 4-day food record as our criterion measure for comparison to the self-monitoring instruments Using the mean of 2 or more different measures of an exposure is an effective method of decreasing measurement error (15) The 4-day food record and FFQ each measure usual diet, yet because the methods of assessment are quite different we can assume that at least some of the bias and error in the measures are also different. Thus, the mean of these 2 measures gives a more reliable estimate of true usual intake, because it reduces the proportion of random error in the total variance of the measure

We computed a mean fat gram score for each participant from the 2 self-monitoring tools completed between 3 and 6 months after starting the intervention. Thus, the mean fat gram scores reflected up to a 3-month period, similar to the time period of the criterion measure Waiting 3 months after the start of the intervention allowed participants to become familiar with the tools and to adopt the low-fat eating pattern.

To determine if self-monitoring tools under- or overestimated fat intake (ie, were biased), we subtracted fat grams measured by self-monitoring tools from those from the criterion measure We used correlations and linear regression to assess how well the self-monitoring tools ranked subjects from low to high fat intake (ie, precision) in comparison to the criterion measure. Specifically, we calculated correlation coefficients between the self-monitoring tools and criterion measure Regression models were used to predict "true" fat intake (the criterion measure) using the self-monitoring tools (the independent variables)

Table 1
Characteristics of the participants from Women's Health Trial Feasibility in Minority Populations Intervention group who were included or excluded from this study sample

Characteristic	Included in study sample (n=313)		Excluded from study sample (n=433)	
	n	%	n	%
Race/ethnicity				
African-American	112	35 8	170	39 3
White	201	64 2	263	60 7
Age (yrs)				
50-59	161	51 4	259	59 8
60-69	117	37 4	141	32 6
70-79	35	11 2	33	7 6
Mean±SD	60 7±6 8		59 4±6 3	
Years of education				
<12	43	13 7	37	8 5
12	56	17 9	68	15 7
13-15	104	33 2	167	38 6
≥16	110	35 1	155	35 8
Unknown	0	0	6	1 4

Table 2
Fat gram intakes from food diary and fat scan compared to criterion measure among participants in the Women's Health Trial Feasibility Study in Minority Populations after ≥3 months of dietary intervention

Mean fat gram goals and intakes	Participants who completed 1 or both of the self-monitoring tools		Participants who completed both self-monitoring tools	
	Food diary (n=164)	Fat scan (n=214)	Food diary (n=65)	Fat scan (n=65)
	← mean±standard deviation →			
Study-assigned fat gram goal	32 3±3 6	32 3±3 7	32 2±3 6	32 3±3 6
Criterion measure of fat intake[a]	36 8±13 5	36 6±13 7	36 5±13 3	36 5±13 3
Self-monitoring tool measure of fat intake				
Food diary	27 6±8 8		28 5±9 5	
Fat Scan		30 8±13 6		33 2±16 9
Criterion measure minus self-monitoring tool	9 2±11 8*[b]	5 8±14 9*[b]	8 0±6 1*[b,c]	3 4±18 1*[c]

[a]Estimated as the average of the means from a food frequency questionnaire and a 4-day food record
[b]*T* test, bias≠0
[c]Paired *t* test for difference between the food diary and fat scan
*$P < 05$

Table 3
Food diary and fat scan reports compared to criterion measure of percentage energy from fat, estimated as mean of a food frequency questionnaire and a 4-day food record, among participants in the Women's Health Trial Feasibility Study in Minority Populations after ≥3 months of dietary intervention

	Participants who completed at least 1 self-monitoring tool		Participants who completed both self-monitoring tools		95% confidence interval
	Food diary (n=164)	Fat scan (n=214)	Food diary (n=65)	Fat scan (n=65)	
Correlation coefficient	0 43*	0 41*	0 57*	0 45*	(−0 08, 0 31)
β-coefficient	0 28*	0 19*	0 35*	0 16*	(0 02, 0 37)*[a]
Area under receiver operator-characteristic curve	0 70*	0 73*	0 80*	0 83*	(−0 14, 0 08)

[a]Food diary compared to fat scan
*$P < 05$

Receiver operating characteristic (ROC) curves (16) were computed to test the ability of the self-monitoring tools to detect a low-fat eating pattern. We used each person's mean fat gram score (from the food diary or the fat scan) to calculate the percentage of her study fat gram goal achieved. We used this self-monitoring measure to predict whether women were meeting the trial's dietary goal: ≤20% of total energy from fat, as estimated by the criterion measure ROC curves plot true positive rates (the proportion of women correctly classified as being in the low-fat group by the self-monitoring tool according to the criterion measur) on the y-axis. False positive rates (the proportion of women incorrectly classified as being in the low-fat group by the self-monitoring tool according to the criterion measure) are plotted on the x-axis From the ROC plot, the area under the curve is calculated to provide a summary statistic, which can be tested for statistical significance. The area under a curve can range from 0 0 to 1 0 The closer the area is to 1.0, the better the self-monitoring tools detected a low-fat eating pattern. An area under the curve greater than 0.5 indicates that the discriminative ability of the self-monitoring tool was greater than chance, whereas an area of 0.5 or less indicates that the discriminative ability was no better than chance

For all the analyses described above, we present statistics (means, correlation coefficients, β coefficients, and ROC curves) for the entire study sample. However, to test whether the measurement characteristics differed between the food diary and fat scan, we needed to limit the sample to subjects who completed both self-monitoring tools, so we could compute paired tests. For each of these tests, we present the confidence interval around the difference test. Confidence intervals that do not include zero are statistically significant ($P<.05$) Because the distributions of fat intake estimates were non-normal, we used bootstrap methods to calculate confidence intervals for the correlations, β coefficients, and the ROC curves. Bootstrap methods approximate the population distribution of these statistics from a single sample and allow for significance testing (17)

RESULTS

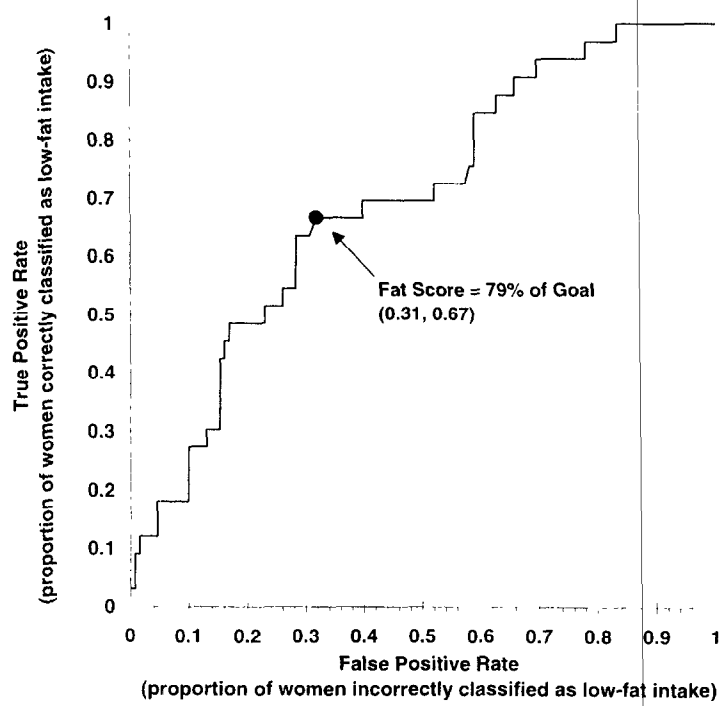
Three hundred thirteen African-American and white WHT·FSMP participants met all the inclusion criteria for this analysis. Of these, 164 completed food diaries and 214 completed fat scans. Sixty-five participants (21%) completed both self-monitoring tools. The sociodemographic characteristics of the study sample did not differ from a referent group (Table 1)

Table 2 shows the means for the study assigned fat gram goal, fat grams reported from the FFQ/4-day food record mean, and fat grams from each of the self-monitoring tools The mean fat gram scores for the food diaries were based on 1 (37%), 2 (36%), or 3 or more (27%) diaries per participant The mean fat gram scores for the fat scan were based on 1 (39%), 2 (43%), or 3 or more (18%) scans per participant. The food diary and fat scan underestimated fat intake by 9 g and 6 g, respectively. Based on participants completing both tools, the bias was significantly larger for the food diary than the fat scan.

Table 3 gives measures of the precision of the self-monitoring tools in relation to the criterion measure: the FFQ/4-day food record mean The correlation coefficients between the food diary and fat scan and the criterion measure were both about 0 4, indicating only moderate precision. Among participants completing both self-monitoring tools, the correlation coefficients were higher for the food diary than the fat scan, although not significantly higher. However, the regression coefficients for diaries and scans were significantly different from each other ($P<.05$), indicating that the diary was more precise than the fat scan.

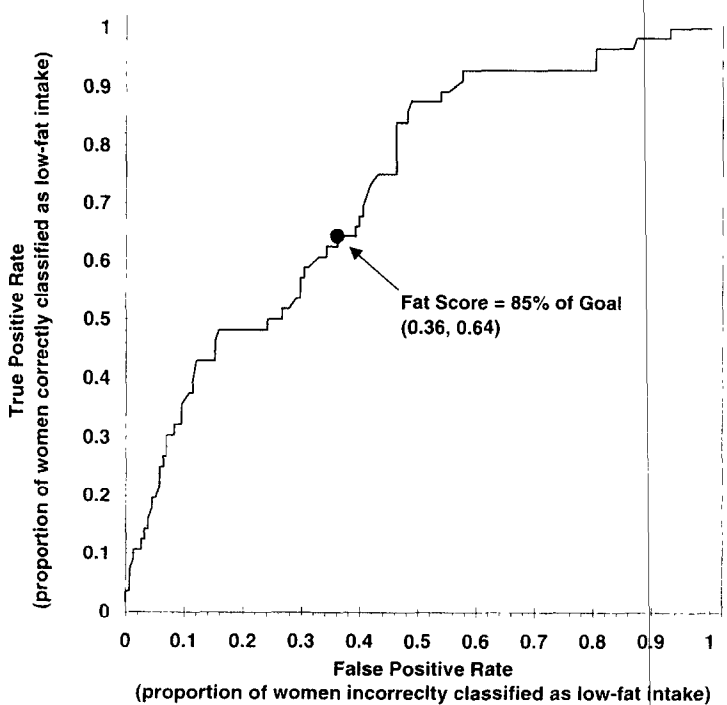
The area under the ROC curves was greater than 0.5 for the food diary and fat scan, indicating that the self-monitoring instruments were significantly better than chance at detecting a low-fat (≤20% of total energy from fat) dietary pattern (Table 3) However, the food diary and fat scan did not differ significantly from each other in their ability to detect a low-fat dietary pattern To interpret these results, we plotted the information on graphs (Figures 3 and 4) The midpoint on both curve represents participants whose fat gram intakes (from the self-monitoring tools) were less than their study fat gram goals. Specifically, for the food diary (Figure 3), the fat gram score was 79% of the study gram goal, that is, 21% lower than goal. The true positive rate at that point was 0.67, which means that 67% of women with fat gram goals equal to 79% of the study fat gram goal were correctly classified as following a low-fat dietary pattern as determined by the FFQ/food record mean However, the false positive rate at that point was 0 31, which means that 31% of participants with fat gram scores at 79% of the study fat gram goal were classified as consuming a low-fat dietary pattern even though their "true" intake was >20% energy from fat. The midpoint for the fat scan (Figure 4) had similar true and false positive rates A good self-monitoring tool will have a curve that reaches the upper left-hand corner of the plot. Ideally one can pick a place on a ROC curve near the upper left where it "turns the corner," at which point the self-monitoring tool has both high true positive rates and low false positive rates. However, these self-monitoring curves are fairly flat and present no obvious, single cut point. This indicates that the self-monitoring tools were only moderately precise at categorizing women into a low-fat group, consistent with the evidence from the correlation coefficients and β coefficients.

To be useful, self-monitoring tools must be easy to use so participants will be willing to complete them consistently, and they must offer a general marker of adherence



Area under the curve = 0.70
n= 164

FIG 3 Receiver operator characteristic (ROC) curve illustrating the ability of food diaries to detect low-fat eating (≤20% of total energy from fat) compared to the mean of a food frequency questionnaire and 4-day food record



Area under the curve = 0.73
n= 214

FIG 4 Receiver operator characteristic (ROC) curve illustrating the ability of fat scans to detect low-fat eating (≤20% of total energy from fat) compared to the mean of a food frequency questionnaire and 4-day food record

DISCUSSION

The purpose of our study was to examine the measurement characteristics of 2 different self-monitoring tools used in a dietary intervention study. Both self-monitoring tools examined here, the food diary and the simpler fat scan, underestimated fat intake by 10% to 20% compared to the more comprehensive dietary assessment instruments (ie, the criterion measure). Fat intake measured by both tools correlated modestly with the criterion measure. Nonetheless, as indicated by the ROC curve analyses, both tools predicted fat intake significantly better than chance. Based on our findings, we conclude that neither of these self-monitoring instruments is sufficiently accurate to reliably assess dietary adherence to a specific fat intake goal.

Nonetheless, adherence to the intervention was positively and significantly correlated with self-monitoring (18). It is likely that precise measurement of nutrient intake is not necessary for self-monitoring to promote dietary adherence. Baker and Kirschenbaum (19) refer to the value of self-monitoring in heightening self-awareness, an early step in behavior change in weight loss. Streit and colleagues (20) reported that participants in the Freedom from Fat program found that self-monitoring, even if precision was relaxed, helped them manage their eating habits. Thus, we support the use of either the food diary or fat scan as self-monitoring tools for dietary fat interventions despite their modest correlation with the criterion measure.

We found only 3 studies in the literature that compared simplified to more comprehensive dietary assessment instruments. Two studied self-monitoring tools (6,7) and 1 reported the measurement characteristics of a screening instrument (21). In the 2 self-monitoring studies, investigators compared an abbreviated manual scoring system to a computerized analysis from the same food records for saturated fat and cholesterol (6) or total fat (7), a design differing from ours. The correlation coefficients between the scores and computerized analyses were near 0.8 in both studies, nearly double what we found in ours. Whereas a simplified scoring system offers another approach to self-monitoring, the design difference precludes comparing the results of our study to these studies. In the third study, Neuhouser and coworkers (21) compared a 13-item diet screener to repeat 24-hour recalls and found the 2 instruments had a correlation coefficient of 0.5 for dietary fat, a correlation more similar to our findings.

There are several reasons why the food diary or fat scan would underestimate fat intake. First, by rounding the fat gram amounts to zero for fruits and vegetables, the tools likely systematically underestimated fat gram scores. Intervention participants consumed an average of 4 fruit and vegetable servings daily after receiving the intervention (10). Fruits and vegetables listed in the fat counter had, on average, between zero and 1 g fat per serving, with most having 0.2 g to 0.3 g fat each. Therefore rounding could have underestimated fat intake by 1 g to 4 g. Second, the self-monitoring tools did not have the rigorous quality assurance procedures that were applied to the more comprehensive dietary assessment instruments. The FFQs and 4-day food records were reviewed for missing food items, incorrect or missing portion sizes, and added fats. For the self-monitoring tools, the lack of careful review and probing by a nutritionist may have contributed to underreporting, misreporting, or incorrectly added fat gram scores. Finally, participants may be tempted to self-monitor on "best days," reflecting lower than usual intakes. An important point regarding underestimation is that it can lead to a false sense of adherence among participants and inadequate dietary compliance, which can erode the ability of a study to answer the scientific question. Researchers have a number of choices when faced with biased measures. For example, researchers may revise the tools, adjust the self-monitoring goal, or discuss with the participants how self-monitoring tools may differ from more comprehensive instruments to decrease a potentially false sense of adherence.

Finally, it is important to remember that the correlation coefficients between the self-monitoring tools and the more comprehensive measures were modest, although typical of results seen in dietary assessment studies (14,21,22). Therefore, care should be taken to avoid labeling a respondent as either compliant or noncompliant based solely on these brief instruments. As noted, self-monitoring is associated with dietary adherence and participants need to receive positive reinforcement just for keeping and scoring records. It is probably more useful to use self-monitoring tools to identify problem areas and work with participants to develop action plans. When faced with using self-monitoring tools as the sole feedback source for dietary adherence, it is critical to understand their measurement properties and how best to work with them.

Our study has limitations. The major limitation is that true dietary intake was unknown. We compared the measurement characteristics of the self-monitoring tools to 2 study monitoring instruments, a 4-day food record and an FFQ, each with its own sources of error. Further, even comprehensive dietary assessment methods usually underestimate intake when compared to a biological marker (23-27). Finally, this was a select sample of postmenopausal women who were motivated to participate in a dietary intervention trial. Therefore, these findings cannot be generalized to other populations.

APPLICATIONS

Self-monitoring of dietary intake is a powerful strategy for promoting dietary change. To be useful, self-monitoring tools must be easy to use so participants will be willing to complete them consistently, and they must offer a general marker of adherence.

- It is likely that brief tools will underestimate intake and are only moderately precise at ranking participants by dietary fat intake. By understanding the measurement characteristics of self-monitoring tools, they can be used to their greatest advantage. For example, between the 2 self-monitoring instruments assessed here, the more comprehensive tool (food diary) underestimated fat intake significantly more than the simpler tool (fat scan), but the diary was somewhat more precise in ranking subjects from low to high fat intake. Given that neither of the brief tools we examined was clearly superior to the other, it may be preferable to allow participants to choose whichever they prefer to encourage self-monitoring.
- It is equally important to understand the measurement characteristics of self-monitoring instruments beyond the research setting. Self-monitoring of dietary intake is an essential

strategy for promoting and maintaining dietary change. A considerable body of research confirms that keeping food records is a significant predictor of success in achieving weight loss (19,20,28-31) or other dietary changes (5,18,32,33). By understanding the measurement characteristics of simple self-monitoring instruments, dietetics professionals are better positioned to help clients interpret their monitoring relative to desired dietary changes.

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The Women's Health Trial Feasibility Study in Minority Populations was supported by contracts (N01-CN-25425, N01-CN-25426, N01-CN-25427, N01-CN-15343) from the National Cancer Institute and the National Heart, Lung, and Blood Institute.

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CD-ROM nutrient analysis database assists self-monitoring behavior of active duty Air Force personnel receiving nutrition counseling for weight loss

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ABSTRACT

This study observed the effect of using a computerized vs manual method of self-monitoring among Air Force personnel receiving nutrition counseling for weight loss. Subjects who enrolled during the first 2 weeks of the 4-week recruitment period completed food records for 6 weeks using a CD-ROM nutrient database (intervention group) whereas those who enrolled during the last 2 weeks used a food record booklet (comparison group). Of the 42 subjects (n = 23 intervention group and n = 19 comparison group), only 13 intervention and 11 comparison group subjects (57% of study enrollees) submitted at least 1 food record during the study and were included in the analysis, which included review of pre- and poststudy questionnaires, food records, and focus group data. There were no significant differences between the number of days per week documented or average number of items recorded daily. All 9 intervention as compared to 2 comparison group subjects who completed a poststudy questionnaire searched for lower-energy and lower-fat items and reported changing their dietary intake as a result. All intervention group subjects who participated in a focus group (n=6) had favorable comments about using the CD-ROM for monitoring and changing eating habits, indicating that it is a beneficial self-monitoring tool. Participants enjoyed the immediate dietary feedback, and computerized food records may be easier to interpret by nutrition counselors. A number of computerized nutrient databases are available to assist patients and consumers in managing nutritional concerns. *J Am Diet Assoc 2001,101 1041-1046*

Nutrition education is a method the US Air Force uses to reduce the prevalence of overweight in the active duty Air Force population. Recently, computer technology has become a viable means of providing nutrition information to educate and influence the public (1), and computer applications may be a feasible adjunct to traditional counseling for this group because many active duty members have computer access. However, few studies have been published regarding the effectiveness of computer applications in the area of weight management. Dennison et al (2) found clinically, but not statistically significant improvements in weight loss, energy intake, and fat intake in overweight, mostly blue-collar employees who used a computer CD-ROM in a worksite setting.

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An interesting use for the computer is to aid clients in self-monitoring, a strategy that involves systematic observation and recording of target behaviors (3). Self-monitoring has been described as 1 of the single most important predictors of successful weight loss (4-8), and is usually a primary focus in obesity treatment. A recent study (3) found that participants who consistently monitored all foods eaten lost more weight than those who inconsistently monitored. The authors proposed a target of self-monitoring all foods eaten on at least 75% of days for maximum weight loss. Another study (9) found that only 30% of participants in a weight-loss program used self-regulating techniques (such as monitoring exercise, food intake, and weekly weighing), although they perceived "calorie counting" as useful. The authors suggested a need for better techniques and innovative methods to help participants in self-monitoring.

One promising tool, the DietMate handheld microcomputer (Personal Improvement Computer Systems, Inc, Reston, Va), includes nutrition and exercise components as well as behavioral principles of goal setting, self-monitoring, stimulus control, feedback, and shaping. Preliminary results (10) document weight loss and improved clinical outcomes as a result of using the device. More studies exploring the use of technology to enhance self-monitoring behavior are needed.

The purpose of this study was to examine the affect of a computer-based nutrient analysis database on self-monitoring behavior of military personnel receiving nutrition counseling for weight loss. Three specific objectives of the study were to determine if participants who self-monitored using the CD-ROM recorded a greater number of days compared with those who recorded using a food record booklet, discover if participants who self-monitored using the CD-ROM more thoroughly recorded their food and beverage intake than those who used a food record booklet, and to gather qualitative information about participant attitudes and opinions toward self-monitoring using the computer.

METHODS

Subject Recruitment

The study procedures are outlined in Figure 1. All participants were active duty Air Force personnel serving at Lackland Air Force Base or Wilford Hall Medical Center (WHMC) in San Antonio, Texas. This study received approval from the Office of Clinical Investigation at WHMC and received exemption status from the Human Subjects Review Committee at Texas Woman's University, Denton.

Active duty Air Force personnel who attended a weight management class at the WHMC Outpatient Nutrition Clinic from February 11 through March 11, 1999, were recruited for participation in the study. The study was advertised through flyers and the base newspaper to enhance participation. Subjects were assigned to either the intervention group or the comparison group depending on date of study enrollment. Subjects were not informed of the different treatment methods. Subjects were grouped in this manner to avoid the research burden of teaching multiple CD-ROM classes (intervention group) and to streamline the enrollment process for WHMC staff. Study participant inclusion criteria were access to a Windows-based computer, >18 years of age, active duty military status, and ability to attend a CD-ROM orientation (if assigned to the intervention group).

Intervention Tools

The intervention tool used in this study, Executive Diet Helper (EDH) (1997, Ohio Distinctive Software, Inc Columbus, Ohio), is a multimedia nutrient database on CD-ROM that contains approximately 5,000 foods including fast foods, frozen dinners, and diet foods. The program allows users to enter and analyze food and meals for a variety of nutrients and add their own foods to the database. The program also recommends lower-energy substitute foods and provides a comparative analysis of those foods (ie, total energy; milligrams cholesterol, and grams carbohydrate, protein, and fat and the percentage of energy attributable to each).

Subjects were also requested to fill out questionnaires developed by the investigator and validated for content and readability by 5 graduate students in nutrition or food science. They were assessed to be at the Flesch-Kincaid 7th-grade reading level. The prestudy questionnaire included demographic and computer usage information. The poststudy questionnaire included questions pertaining to attitudes and opinions on self-monitoring and was completed upon submission of the final food record booklet or printouts.

Weight Management Class

The weight management program consisted of one 90-minute class that reviewed weight loss principles, US Dietary Guidelines for Americans, the Food Guide Pyramid, food portion sizes (using food models), basic behavior modification techniques for weight loss, and exercise information. Food and activity documentation using food record forms was emphasized and reviewed. At the end of the weight management class session, the instructor (a diet therapy technician) used a prepared script to invite study participation. Participants completed the prestudy questionnaire followed by a 24-hour dietary recall.

Comparison group members were then provided study instructions, a food record booklet for the initial week of the study, and an energy, fat, and cholesterol counter (11) to aid in self-monitoring. The investigator performed nutrient analysis on 24-hour dietary recalls using the EDH CD-ROM, and individual reports including handwritten suggestions for improving food choices and enhancing completeness of documentation were sent to participants within 2 weeks of attending the weight management class.

Intervention group participants attended a 90-minute orientation session within 2 weeks of attending the weight management class. Each participant received a copy of the EDH CD-ROM with instructions for installation and use. Participants completed a sample printout using their 24-hour recall and were taught how to interpret resulting energy and nutrient values. Each participant received envelopes, instructions, and dates (weekly for 6 weeks) for returning printouts to the nutrition clinic. To enhance return rate, small incentives were given weekly to all participants who submitted food records.

Focus Group Sessions for the Intervention Group

During the EDH CD-ROM orientation, intervention group members were invited to attend a 2-hour poststudy focus group session. The purpose of the focus group was to acquire additional qualitative data regarding self-monitoring using the EDH CD-ROM. Eight questions developed by the investigator were reviewed by 5 nutrition and food science graduate students for content and comprehension (Figure 2). During the focus group session, participants were asked to respond in turn

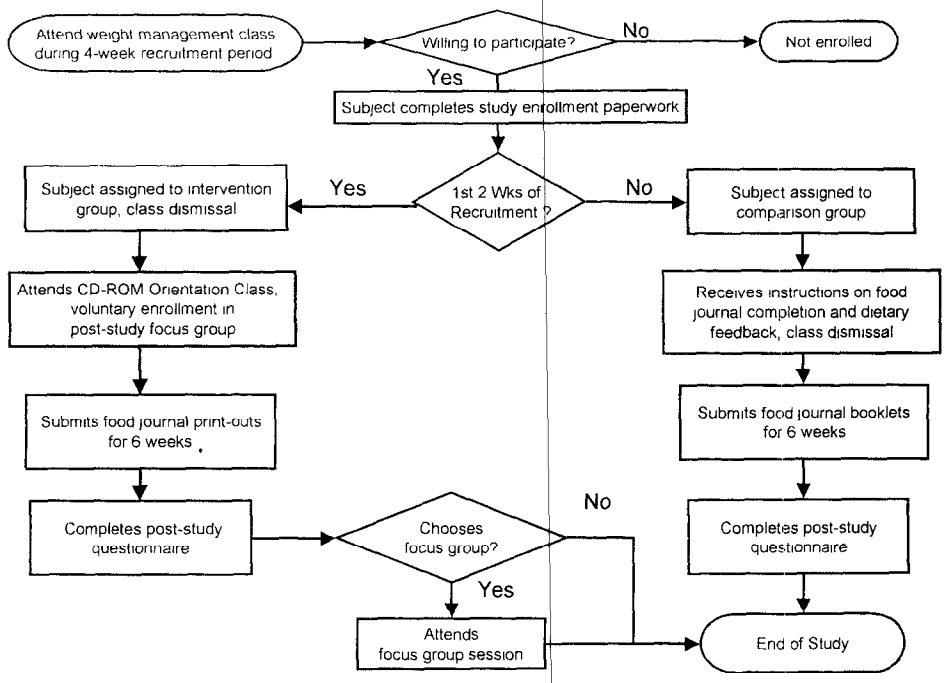

FIG 1 CD-ROM-based nutrient analysis database self-monitoring study protocol

to each question read aloud by the investigator. The session was audiotaped and then transcribed and analyzed using Hyper Research for Windows (version 1.5, 1994, ResearchWare, Inc, Randolph, Mass).

STATISTICAL ANALYSES

Self-monitoring outcomes included the number of days recorded and the quality of self-monitoring records. Between-group comparison of the percentage of study days recorded, median number of days per week recorded, and attrition rates were calculated using the Mann-Whitney *U* test. Quality of self-monitoring was defined as the average daily number of food and beverage items recorded and was compared between groups using the Mann-Whitney *U* test. Descriptive or categorical data from questionnaires were analyzed primarily using χ^2 and Fisher exact tests. The Mann-Whitney *U* test was used to compare the number of minutes spent recording each day between the two groups.

RESULTS

Participant Characteristics

Forty-two men and women (comparison group n = 19, intervention group n = 23) from 8 weight management classes completed the prestudy questionnaire. Those who submitted no food records during the study were considered dropouts and were excluded from data analysis. The number of dropouts (10 and 8 for the intervention and comparison groups, respectively) was not significant between groups Of prestudy dropouts (n=18), age and education were significant factors (using Fisher exact and χ^2 tests, respectively). Those who were younger and had no post-high school education were more likely to drop out (P=.001 and P= 007, respectively). There was no significant difference between the remaining 11 comparison and 13 intervention group participants for age, gender, military rank, or education

Food Record Completion Rates

Thirteen participants in the intervention and 11 participants in the comparison group completed food records during the study. Although not statistically significant, more intervention group participants submitted food records for all 6 weeks and recorded a greater number of study days. Sixty nine percent (n=9) of intervention and 46% (n=5) of comparison group subjects completed food records for all 6 weeks of the study. Similarly, 69% (n=9) of intervention and 46% (n=5) of comparison group subjects recorded on at least 75% of study days The median percentage of study days recorded by participants was 100% for intervention group (n=13) and 50% for comparison group participants (n=11) (see Table). Overall, there was no significant difference in the average number of days per week documented between the two groups (number of days recorded over number of weeks when records were submitted).

Finally, there was no significant difference in the average daily number of items recorded or time spent recording between groups (see Table). Only food items containing greater than 25 kcal were counted

Poststudy Questionnaire Results

After completing 6 weeks of the study, 9 participants in the intervention group and 5 participants in the comparison group filled out the poststudy questionnaire. Because of the small number of respondents, statistical data are not reported. All 9

In 2 words, about how successful were you in changing your eating habits for weight loss during this study? Would you say that you were "more successful," "less successful," "the same," or "not sure" as compared to previous efforts?

How, exactly, did this software add to your awareness or knowledge about your eating habits?

How, exactly, did this software help you to improve your food choices for weight loss?

What further assistance, if any, from a dietitian or diet therapist would have better helped you to understand or to change your eating habits while using this software?

What did you like most about this software?

What did you like least about this software?

If you could change one thing to make the software better, what would you change?

FIG 2 Questions presented to intervention group members to acquire additional qualitative data regarding self-monitoring

intervention vs 2 comparison group participants reported reviewing their printouts or food records at least once per week. Similarly, all 9 intervention group members reported changing their eating habits based on available information about their food choices compared with 1 comparison group participant.

DISCUSSION

This was the first study, to the researchers' knowledge, to observe the effect of implementing a new technology on self-monitoring behavior. Computer users tended to record a greater percentage of study days; however, perhaps the intervention group members were more "ready" to lose weight, responding to study flyers by signing up immediately for the first classes where they were assigned to the intervention group. If this was the case, these persons might have adhered equally well to manual self-monitoring. Random assignment of participants into groups would have avoided this potential bias. Finally, the additional face-to-face involvement with intervention group participants during the EDH CD-ROM orientation may have improved study adherence.

Attrition has been explored in weight-loss programs. Mattfeldt-Beman et al (9) found that older participants (> 50 years) were more likely to attend weight-loss program sessions. In this study, initial dropouts (who submitted no food records during the study) were younger and less educated (no post-high school education) than those who completed the study. Reasons for attrition and participation have been reviewed elsewhere (12,13). Cognitive-behavioral aspects of self-monitoring (including barriers) should be explored to determine characteristics of consistent self-monitors.

Interestingly, many participants misperceived the relationship between self-monitoring and weight loss. Four intervention participants and 1 comparison group participant incorrectly agreed with the statement "Self-monitoring is an effective way to lose weight even if I don't change my diet and exercise habits." Subjective review of food records for both groups revealed multiple high-fat food choices daily for many persons. This led researchers to question whether participants believed self-monitoring had a "magical" effect, replacing the adoption of healthful lifestyle changes for weight loss Boutelle and Kirschenbaum (3) caution that self-monitoring is not the causal agent in weight loss but may reflect general motivation such as commitment to losing weight, better coping skills, or other dispositional characteristics (5).

Computerized self-monitoring may improve quality of food record documentation. Energy and nutrient information were available for 100% of food items on printouts compared with often incomplete and ambiguous documentation of items for handwritten food records. For example, instead of "cake ..1 piece," the computer program forces the user to enter a specific portion size Moreover, the software often included detailed information such as the name brand and cooking method, which greatly assisted the nutrition counselor in interpreting items, energy, and nutrients consumed.

Focus Group Results and Additional Qualitative Data

Six of 9 participants scheduled attended the focus group session. Participants were enthusiastic about the software. The majority perceived that they were more successful changing eating habits using software compared to previous weight-loss efforts. Respondents stated that they enjoyed the software's immediate feedback in terms of auto-calculation of energy and

Table
Food record documentation by active duty Air Force personnel participating in self-monitoring for weight loss study

	Comparison group[a]			Intervention group[b]			P[c]
	n	Median	Range	n	Median	Range	
Percentage of study days recorded by participants (out of 42 possible study days)	11	50	12-100	13	100	17-100	264
Average number days per week recorded by participant	11	7 0	5 0-7 0	13	7 0	6 5-7 0	755
Average daily number of items recorded	11	7 8	4 8-13 3	13	8 2	4 0-12 8	664
Daily average number of minutes spent recording[d] (poststudy questionnaire)	5	12 5	4 0-15 0	9	11 0	5 0-20 0	682

[a]Group completing food journals using manual method
[b]Group completing food journals using CD-ROM nutrient database
[c]Calculated using Mann-Whitney *U* test Statistically significant at P= 05
[d]Data missing for 6 persons in the comparison and 4 persons in the intervention groups due to incomplete questionnaires

nutrients along with the substitutions list and that they consequently adjusted their food intake throughout the day. The majority believed that the software helped them to become more aware of their eating patterns, portion sizes, and the fat and energy content of specific foods. These comments were congruent with poststudy questionnaire responses indicating that significantly more intervention vs comparison group members improved their food choices.

A few members who self-monitored had previously received nutrition counseling and believed this helped them use the information presented in the class. They also believed assistance from a registered dietitian or diet therapist would have been helpful for providing low-fat and low-energy options Two participants desired more customized assistance, nutritional assessment, and additional reinforcement for dietary changes One person in particular was unsuccessful until a diet therapy specialist identified areas for improvement and suggested more healthful food choices and behavior modification techniques

Participants praised the ease and quickness of the software Some focus group respondents indicated that the database was limited, although poststudy questionnaire responses indicated that the database was adequate and contained most of the food items they ate Participants added a mean of 12.5±10.73 items to the database. Some commercial software or Internet-based databases may contain more extensive nutrient databases. The majority of participants desired a simplified search key function rather than having to search for an item by category type (eg, dairy, meat). Some reported that search field syntax was overly sensitive. Others desired the software to track their energy and nutrient intake, weight, and exercise progress over time. The fact that these persons did not perceive the software to be labor- or time-intensive is interesting as there was no difference in the time spent recording between the 2 groups. In fact, 1 person stated, "It [recording using the computer] wasn't a pain like writing everything down manually and then having to look it up in a book.. If I had to do that [record] by hand, there's no way I'd be doing it " Furthermore, 5 intervention group members manually recorded items (pending computer data entry) from 2 to 7 days per week (n=3) Considering this, computerized self-monitoring may actually have required more labor and time than the manual method

The majority of comments and attitudes toward the software were positive. The group unanimously agreed that they would be willing to purchase the software for 6 to 7 times the actual cost (retail cost = $4 per CD-ROM)

CONCLUSION

Although quantitative aspects of self-monitoring were not statistically significant, this research generally supports the concept that the computer may be used to assist persons in successfully self-monitoring food intake for weight loss. Results of this study should not be inferred to the general population, however, due to education characteristics unique to this study group. The US Air Force population may be considered highly educated as all members must possess a minimum of a general equivalency or high school diploma before entering and most had college coursework. Also, participants in this study had computer access either at home or at their worksite, and 100% indicated a high level of experience and comfort with computers. In contrast, those in a lower socioeconomic situation may have limited access, experience, and comfort with computers Technology is a useful and promising tool that can aid dietetics professionals and their clients in reaching nutrition goals through self-monitoring. However, more studies are needed to determine the effectiveness of computer applications for weight loss and to examine cognitive-behavioral aspects of self-monitoring consistency

APPLICATIONS

Although this study examined use of a computerized nutrient database to self-monitor for weight loss, computer applications may be useful for clients managing a variety of nutrition concerns These may include persons with diabetes who monitor carbohydrate intake, patients with renal disease who monitor protein intake, or generally healthy women who track calcium intake. The Ohio distinctive software used for this study was inexpensive, widely available, and tracked total energy, protein, and carbohydrate. The software was also unusually simple to use, which may be an important factor to consider Three sophisticated Internet-based Web sites that contain more extensive nutrient databases and a wide variety of interactive tools to aid consumers in reaching nutrition goals

are Cyberdiet (www.cyberdiet.com), Dietsite (www.dietsite.com), and the Nutrient Analysis Tool (www.net.uiuc.edu). Access is free and both Web sites contain nutrition assessment tools that allow users to calculate energy needs, analyze recipes, and graph progress toward goals for weight, energy, and other nutrients.

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The authors thank the staff of the Wilford Hall Medical Center Nutrition Clinic for their enthusiastic hard work and dedication to this project.

The views expressed in this article do not reflect the official policy or position of the US Air Force, US Department of Defense, or the US Government

PRACTICE POINTS

Self-monitoring technology still requires the services of an RD

To help patients and clients avoid the misconception that nutrient analysis databases have a "magical effect" on weight loss, Kim Stote, MPH, RD, says nutritionists need to be clear about what exactly the function of that database is—to monitor calorie intake

Stote, who has first-hand experience using CD-ROM nutrient databases, such as the Executive Diet Helper (EDH), reminds her clients that altering diet and exercise habits are the real keys to achieving weight loss goals.

Before recommending self-monitoring technology to a patient, it is important to determine their computer skill level, according to Stote.

"The general population is becoming more up-to-date [with computer technology] and most schools are now teaching students basic computer skills so I think self-monitoring tools such as the EDH will continue to attract users."

While students are becoming more and more comfortable with computers, it may still be challenging to attract pre-teens and teenagers to participate in a detail-oriented, self-monitoring program—even if it is presented in the form of computer software

Stote suggests setting the CD-ROMs to popular music or presenting the information in the form of a video game to attract the attention of younger users.

Another way nutritionists are promoting self-monitoring technology—for all age groups—is by informing their clients of the availability of internet-based Web sites that contain extensive nutrient databases.

"These sites are generally quite beneficial to the client, as they are often free, and because they are on the Internet, they are very accessible But dietitians should remind users that the services of an RD are essential to help interpret and explain the results of both the nutrient databases and of the Web sites."

Stote also cautions users to be make sure that the Web sites they are using for self-monitoring clearly acknowledge their source for food and nutrient values information.

"Most of them will utilize the USDA as their source. But if that is not indicated clearly on the site's home page, I would be very wary of using that site."

As for the future of self-monitoring technology, Stote would like to see more computer applications geared towards specific populations such as pregnant mothers and athletes

"The USDA used to provide lists of nutrition-related software programs, but according to their Web site, they are no longer updating that list. I think it would be helpful to revive that listing and perhaps establish a rating system that would help nutritionists evaluate things like the program's ease of use and how they pertain to specific needs of the client "

This article was written by ***Tony Peregrin****, an Editor of the* Journal *in Chicago, Ill*

Program directors' opinions in regard to Didactic Program in Dietetics graduates' failure to secure placement in Supervised Practice Programs

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ABSTRACT

This study investigated program directors' perspectives on Didactic Progam in Dietetics graduates' inability to secure positions in Supervised Practice Programs. The sample included all 229 program directors listed in the Directory of Dietetics Programs 1997-98 Directors contacted by electronic mail or fax completed a 4-part survey instrument including 3 Likert scale sections exploring the effects of the situation and strategies suggested to lessen them The fourth part reported current practices. Response rate was 56%. Graduates' failure to secure Supervised Practice Program positions was found to be a significant or somewhat significant problem regardless of program size or affiliation. Strategies to increase the likelihood of Supervised Practice Program acceptance included work experience, application coaching, graduate coursework, and reapplication. We found that program directors have a high level of concern about their graduates' futures and are frustrated by their limited ability to improve the situation Helping graduates who do not secure Supervised Practice Program assignments identify career options is essential. *J Am Diet Assoc 2001,101 1047-1050*

Professional preparation for dietetics practice requires successful completion of both an academic (didactic) component and a supervised practice component. Although these components may be combined in coordinated programs, more usually they are completed through a Didactic Program in Dietetics (DPD) incorporated in a baccalaureate degree, followed by successful completion of a Supervised Practice Program (SPP), a dietetic internship, or a preprofessional practice program. Typically, 39% to 49% of DPD graduates do not complete their professional preparation by entering a SPP (1). An American Dietetic Association task force on dietetics education found that 48% of 1993 DPD graduates did not obtain SPP admission. Of these, 44% applied but were not matched and the remainder did not apply (2), despite the fact that 88% indicated that when they entered the program they had intended to pursue registration. Reports of results for spring applications between 1995 and 2000 showed that 34% to 47% of applicants to SPPs were not matched to positions (3-8). In the years 1995 to 1999, there was a 15.8% increase in the number of SPP graduates, but this number was more than offset by the 20.9% increase in the number of DPD graduates in the same time period (9)

Like all university faculty members, DPD educators are accountable both to society and to their students (10,11) They must address the academic needs of all their students, and ensure that their programs produce graduates who are prepared to perform adequately and ethically in their profession.

Increasingly, academic programs at colleges and universities are evaluated on the extent to which they prepare graduates for the workforce (12,13). Although there does not seem

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Table 1
Items on which there was consensus by directors of didactic programs in dietetics (N=128) regarding strategies for limiting the impact on students of being unable to secure internships

Items	% who marked "agree" or "strongly disagree"
Encourage to work and re-apply later	91
Provide supportive and empathetic advisement	79
Help students maintain their self-esteem	74
Encourage to do graduate work and re-apply later	73
Provide strong background in foodservice management	63
Provide cross-training	52

Table 2
Directors of didactic programs in dietetics' (DPD) (N=128) responses in regard to practices in their program

Practice	% reporting practice
Advising students with low grade point averages to consider change of major	76
Applying criteria other than grades to assess professional achievement	45
Requiring a certain grade point average for DPD admission	27
Requiring a certain grade point average for DPD retention	23
Limiting access to certain required classes	21
Offering special courses or experiences for non-internship-bound students	19

to be a critical shortage of dietitians (14,15), programs with graduates who are not able to enter their chosen profession may be considered as failing in the objective of workforce preparation.

Based on these considerations, a survey of DPD directors was conducted to determine their opinions about the effects of graduates being unable to secure SPP placements. The directors' ideas about what might be done about the situation, as well as the practices currently in use in their own programs were surveyed

METHODS

Instrument

Using casual comments made by DPD students and faculty over a period of time, a 4-part instrument was constructed. The first 3 sections asked respondents to indicate their opinions about the effects on the program and the graduates when all students are not able to secure SPP placement (12 items), efforts that would increase students' likelihood of securing SPPs (6 items), and ways to limit the negative effects of inability to secure a SPP (8 items) Questions in these 3 sections were answered using a 5-point Likert scale The final section asked respondents report relevant practices, such as admission and retention standards, actually being used by their program A single question asked the directors how common the problem of unplaced graduates was in their DPD and to rate the significance of the problem.

Content validity of the first 3 sections was assessed by requesting that a panel of experienced DPD educators examine the instrument to determine that the range of relevant perspectives and issues had been included. Following this review, some items were added and others rewritten

Throughout the instrument, the focus was on the director's perception of the effects on students/graduates and the DPD program itself, as opposed to effects on the profession. In the instrument the phrase "less-competitive students" was used to refer to students not likely to be successful in securing SPP placement. The instrument and the plan for its use were approved by the university's Institutional Review Board.

Sample and Survey Process

All 229 DPD directors listed in the *Directory of Dietetics Programs 1997-98* (16) were invited to participate in the study. The majority of contacts and responses were via electronic mail, backed-up by Fax or regular mail as needed. All initial contacts included an introductory letter, a copy of the survey, and instructions for return. Directors were assured that their responses would be confidential and were offered an opportunity to receive a summary of the findings. Two reminders and a small incentive prize were used to encourage response. This procedure produced 128 useable responses, a 56% response rate. Nonrespondents were compared to respondents in terms of size of their DPD program, geographic location, and state vs private support; none of these comparisons was significant.

Data Treatment

For this descriptive study, determination of frequencies was the primary data treatment. Cross-tabulations and χ^2 were used to compare responses to certain key items and to compare responses from large, medium, and small DPDs, as well as those from private and state institutions. Comments were recorded and reviewed to provide perspective for the findings. The frequency of similar comments was noted

FINDINGS

Effects on Students and Programs

The DPD directors who responded indicated that they found graduates' inability to secure SPP positions to be a very important or somewhat important problem (64%). Less than 10% reported that they found it to be a rare or nonexistent problem. There was no evidence that the extent of the problem was related to the size of the DPD, the number of SPPs in the program's state, or whether the DPD was located in a state-supported or private institution

The directors related that they strongly support of the rights of students to pursue the major and career of their choice. A strong majority (78% to 82%) agreed that limiting DPD admission/retention to students most likely to secure SPP placement would be an infringement of those rights and disagreed with the statement that only academically excellent students should enter the practice of dietetics. More than half, 56%, disagreed that it was irresponsible to allow less-competitive students to stay in the DPD Furthermore, the majority, 59%, indicated that having less-competitive students in dietetics classes enhanced the class by contributing a diversity of perspectives and prospects Responses about the effects on standards of academic performance caused by having weaker students in classes were mixed: 41% felt that this was true, 9% were uncertain, and 50% disagreed.

On the other hand, 55% of the responding directors did agree that less-competitive students (who are likely to be

unmatched to internships) are at risk of being unable to find employment closely related to their major shortly after graduation. The respondents were less certain that the long-term employment prospects were risky for these graduates, 43% agreeing, 23% being uncertain, and 34% disagreeing.

Directors also reported some concern about the effects of having unmatched students on the program itself, 66% agreeing that there is a potential threat to the reputation of the program. Only 30% agreed that having unmatched students would place the program in jeopardy with the school's administration, but 67% agreed that limiting DPD admission or retention to only those students likely to secure SPPs would jeopardize the program through resulting low enrollment.

STRATEGIES TO INCREASE LIKELIHOOD OF SECURING AN INTERNSHIP PLACEMENT

The majority (64% to 65%) of respondents agreed that requiring extensive work experience and coaching in the preparation of internship applications would be helpful in increasing the likelihood that students would securing SPP placement. Requiring maintenance of a certain grade point average (GPA) for retention in a DPD was supported by 59%, but only 29% agreed that it would be helpful to limit DPD admission to students with "strong" grades. The DPD directors also rejected the idea of designing a curriculum in which almost all students would succeed. Neither did they agree that if students understood early in their program what the qualities required for internship placement are, more students would be able to qualify.

Strategies to Limit Negative Effects for Unmatched Students

When considering how to help students who were unmatched to SPPs, directors gave the greatest support to the options of reapplying after working or attending graduate school (Table 1). Strategies to diversify the graduates's capabilities and thereby prepare them to qualify for more employment positions were also strongly supported, as were approaches that were sensitive to the student's stress.

Practices Currently Employed to Help Less-competitive Students

Of the 6 practices included in this section, there was widespread agreement with only 1: Advise students with low GPA to consider a change of major (Table 2). Approximately one-fourth of the respondents indicated that their programs limited DPD access either by having a GPA admission and/or retention requirement or by limiting access to certain required classes. When there was a GPA requirement, the mode was 2.5 on a 4 point scale.

DISCUSSION

In general, responses from the DPD directors showed a high level of concern about their students' futures and frustration about their limited ability to improve the placement situation. Although they endorsed advising less-competitive students to consider alternative majors, they were reluctant to force a change through grade-based restrictions. Comments frequently bemoaned the plight of the "B-average student"; these students were believed to have potential to become competent dietitians, but were unlikely to secure SPP placement. This perception is supported by the study of the 1993 cohort in which graduates who were successful in securing SPP placements had GPAs of 3.3, whereas unsuccessful applicants had an average GPA of 2.96 (2).

Some comments noted that many DPD students are not interested in dietetics practice, but intend to use their degree for other purposes. Although this may be true for some students, it is inconsistent with the survey of 1993 graduates (2), the overwhelming majority of whom indicated that their intent at time of entry to the DPD was to become a registered dietitian.

Comments clearly conveyed a sense that students with more practicum and other work experiences have an advantage in the competition for SPPs

Comments clearly conveyed a sense that students with more practicum and other work experiences have an advantage in the competition for SPPs. Yet, students whose GPAs place them at risk may not be able to spare the time for these enriching experiences and DPD programs often do not have the staff to provide the level of supervision needed.

Although there was some support for the recommendations to make sure students understand the qualities expected by SPPs and to coach applicants in preparing strong applications, unless these actions cause less-competitive students to withdraw from the DPD, the actions will not solve the problem. The potential of either strategy is limited to making a program's students more competitive than those from other programs. The strategies will not result in reducing the overall portion of DPD students who fail to secure SPPs nationally. Comments indicated awareness that these practices, as well as supportive advisement and attention to maintenance of self-esteem, were sound and recommended practices, but could not be expected to solve the problem of shortage of SPP openings.

The 1993 Task Force on Dietetics Education (2) recommended that DPD directors co-operate with SPPs to producing seamless programs wherein graduating DPD students would be guaranteed SPP access. This recommendation has not been embraced by either universities or SPPs. Given that most SPPs have far more applicants than openings, there is no incentive for them to limit their choices to the graduates of 1 or a few DPDs. Effective links can not be made without reducing the number of DPD graduates or increasing the capacity of SPPs or both.

Directors responding to our survey reported believing that limiting DPD admission to only the strongest students would result in such small numbers that the future of the program would be jeopardized. Clearly these directors are in a bind:

they have relatively large numbers of students interested in a dietetics major, their administrators pressure them to keep their enrollments up, yet they must deal with the high numbers of disappointed graduates who do not secure SPPs.

Some directors commented that unmatched graduates can work or attend graduate school and eventually secure a practice experience. This solution raises the qualifications expected for entry-level dietitians to include significant work experience and/or graduate study. In fact, this may already be happening; 52% of 1993 graduates who were successful in securing an SPP match had an average of at least 2 years experience in dietetics-related areas (2).

The comments of the responding directors suggest a sense that the numbers of dietitians being produced is a good match with employment demand, a conclusion supported in other observations (2,15,17). Yet the directors expressed a sense of a responsibility toward all their graduates and voiced concern for the immediate and long-term career prospects for those unable to achieve dietetic registration. Respondents were somewhat more optimistic that the unmatched graduates would find appropriate employment, suggesting such employment is available, but not particularly easy or quick to locate.

How does the situation of access to clinical experiences in dietetics compare to that in other health professions? Comparison is difficult because many other professions including nursing, occupational therapy, physical therapy, pharmacy, anesthesiologist assistant, and speech-language pathologist/audiologist, use a seamless model wherein students who make satisfactory progress through the academic portion are assured access to the practice experiences (18-20). The obvious exception is the preparation of physicians, where internships and residencies involve application following didactic preparation. In 2000, 25.3% of applicants to residencies were not placed (21). This rate of failed applications is similar to the 21% of dietetics graduates in the 1993 cohort who applied but were not matched (2). Data on the number of medical graduates who did not apply for residencies are not available, so comparison of the portion of successful applications between the 2 professions cannot be made.

APPLICATIONS

The findings of this survey illuminate the problem of SPP shortfall but do not provide clear solutions to the problem. An educator cannot focus solely on those students likely to be matched to practice programs and ignore those students who are not likely to do so. The educator's responsibility is to all students who have paid their tuition, maintained passing grades, and completed the requirements for their degree. How can the responsibility to them be fulfilled?

Neither responses to survey questions nor comments provided revealed new approaches. Very few respondents indicated that their programs did anything special to assist students unlikely to secure SPP placement. If the concern expressed by the educators is genuine, it needs to be accompanied by creative programming.

- Respondents agreed that when there are viable options, weaker students would be well-advised to change majors. Changing majors is an efficient alternative only if the change is made relatively early in the student's academic career and only if a suitable major is available. A nonninternship dietetics major only re-labels the problem.

- Employment options for graduates without dietetic registration require more time and effort to locate. It is essential that these options be more clearly delineated. The existing national systems of assessing and forecasting labor demands (14) have not proved very useful in this regard, they group together dietitians and related professionals and describe the "other" category too loosely to be helpful.

- Most programs track their graduates. Our findings suggest that it would be useful to intensify these tracking efforts, possibly through a joint effort of several programs. The booklet "Untangling the Nutrition Web in Career Development" provides an extensive list of nutrition-related positions (22). This list might provide a system for classifying the positions reported by graduates. Alternatively, the list might be used to screen and classify the position announcements in major newspapers.

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A longitudinal study of cognitive and affective behavior in a didactic program in dietetics: Implications for dietetics education

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In response to concerns that dietetics professionals were not adequately prepared for practice (1-3), the Commission on Accreditation for Dietetics Education was created to establish minimum requirements of foundation knowledge and skills for institutions that train entry-level dietitians. Subsequent research has shown that graduates of programs that comply with these competency standards are adequately prepared to enter the workforce (4) Dietetics curriculum development has been driven by identification of requisite practice skills and knowledge, rather than learning, cognitive, or affective behaviors (5,6). Duyff (7) expounds the benefits of a learner-centered approach, promoting lifelong learning as a key element in professional development. Lifelong learners develop from educational experiences that focus on motivation to learn, self-esteem, self-directed learning skills, conceptualization, and reflective thinking. Longitudinal studies of cognitive and affective behaviors have guided medical and nursing curriculum development (7-9). Despite this awareness (7,11), studies of dietetics students' cognitive and affective behaviors are virtually nonexistent. The purpose of this study was to examine these behaviors among students as they progress through a didactic program in dietetics to support their application to curriculum development

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METHODS

In 1995 and 1996, dietetics students enrolled in a fall semester profession orientation class were studied. Utilizing a pre/post longitudinal design, survey sets were administered in this course (baseline) and again 2 years later in an advanced nutrition class that required successful completion of several challenging courses (follow-up). Survey sets included the Cognitive Behavior Survey (CBS), Rosenberg Self-Esteem (SE) Scale, and Goal Analysis Questionnaire (GAQ). Time lapse between survey distribution and collection was 1 week for baseline and follow-up measurements. Identical survey sets were administered to novice and experienced business students at the same university and to novice and experienced dietetics students at 2 other universities to examine representativeness of the study sample Approval was obtained from the university Institutional Review Board for the Protection of Human Subjects.

Instruments

The CBS, a validated instrument, measures learning behavior, epistemological beliefs, and learning experience (12). Components of learning behavior include general cognitive processes (compiled into memorization, conceptualization, and reflection scales with scoring explained in Table 1); approaches to studying; and perception of the amount of material memorized, crammed, and remembered. The CBS characterizes learning experiences through open-ended questions and responses to 9 descriptors (listed in Table 2) constituting the Positive Learning Experience Scale (PLES)

The SE Scale (13) provides a global, self-reported measure of self-esteem. The GAQ consists of open-ended questions about professional and personal goals. Department faculty and graduate students assessed GAQ face validity.

Data Analysis

Quantitative data were analyzed using SPSS for Windows (version 7.5, 1996, SPSS Inc, Chicago Ill). The 1995 and 1996 cohorts were compared for unity using a general linear model of multivariate analysis. Mean changes were compared between the 2 cohorts using an independent t test to further verify unification into 1 sample Paired t tests assessed differences from baseline Planned comparisons between the study sample, business students, and other dietetic students assessed sample representativeness. Separate variance results or a $\log_{10}$ transformation were used when homogeneity of variance could not be assumed by the Levene test However, the transformed F statistic of the baseline PLES score was accepted due to the robust nature of ANOVA Relationships among cognitive learning processes (eg, memo-