

Analysis of Furan in Food

Kim M. Morehouse
Patricia J. Nyman
Timothy P. McNeal
Gracia A. Perfetti
FDA/CFSAN/OFAS/DCRER



Why Did the FDA Investigate?

- ✍ Investigated the possible formation of furan in apple juice by ionizing radiation
- ✍ Noted that heating the samples increased the amount of furan
- ✍ Pasteurized apple juice was found to contain furan, whereas homemade juice did not



Initial Survey of Foods for Furan

- ✍ Random sampling of heat treated products
 - Pasteurized, canned, bottled products
- ✍ Quick semi-quantitative determination



Chemical Analysis

- ✍ Static headspace sampling
- ✍ Gas chromatography with mass selective detection
- ✍ Quantitation
 - Stable isotope dilution and standard addition with known amounts of furan
 - Corrects for matrix effect during vapor phase partitioning
- ✍ In-house peer verified method
- ✍ Participating in round robin (in progress)



Sample Preparation

- ✍ Liquids: 10 g of sample
- ✍ Solids and semi-solids: 5 g of sample and 5 g of water
- ✍ Homogenization, on ice, for solid and semi-solid samples as needed
 - Blender
 - Tissue homogenizer
- ✍ Vortex samples to ensure adequate mixing of standards with the sample
- ✍ Limits of quantitation
 - Liquids: 2 ng/g
 - Solids: 5 ng/g



Food Survey

- ✍ Foods selected based on initial survey, literature reports, as well as the USDA food consumption data base
- ✍ For each food, analyzed two or three brands, and two lots per brand



Furan in Infant Formulas (ng/g)

✍ Powder*	n.d.-2
✍ Concentrate*	n.d.-15
✍ Ready to feed	n.d.-13

* Prepared according to label directions



Furan in Baby Foods (ng/g)

✎ Apple juice	2-8
✎ Applesauce	4-5
✎ Pears	4-6
✎ Bananas	15-30
✎ Chicken dinner	15-46
✎ Carrots	20-50
✎ Green beans	34-72
✎ Squash	38-57
✎ Garden vegetables	50-110
✎ Sweet potatoes	65-110



Furan in Adult Foods (ng/g)

✎ Bread	n.d.- <2
✎ Juices (various)	nd-4
✎ Peanut butter	6-8
✎ Coffee, instant, prepared	<2-7
✎ Coffee, fresh brewed	30-50
✎ Chicken broth	7-15
✎ Canned tuna	<5-7
✎ Canned meats	<5-40
✎ Canned vegetables	<5-40
✎ Pasta sauce and canned pasta	<5-40
✎ Baked beans and chili	35-120
✎ Soups	50-125

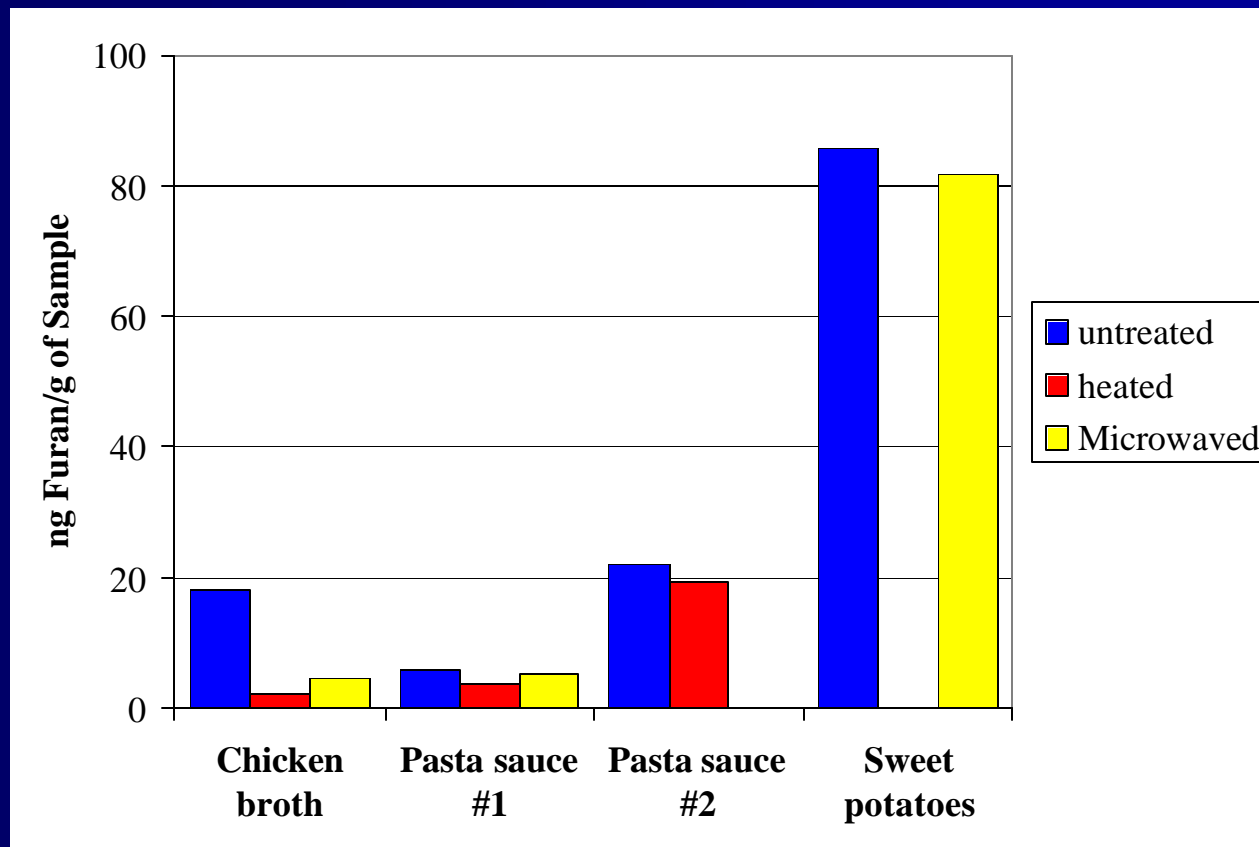


No Furan Detected

- ✍ Milk
- ✍ Margarine
- ✍ Mayonnaise
- ✍ Yogurt
- ✍ Sour cream
- ✍ Cottage cheese
- ✍ Pasteurized eggs
- ✍ Potato chips



Effect of Cooking on Furan Levels in Various Foods



Ongoing

- ✍ Analysis of more foods
 - Based on the USDA food consumption data base
 - Higher use foods
 - Foods reported in literature to contain furan
 - Continue to investigate the effects of heating on the concentration of furan



More Information

- ✍ Link to website for method:
<http://www.cfsan.fda.gov/~dms/furan.html>
- ✍ Link to website for foods analyzed:
<http://www.cfsan.fda.gov/~dms/furandat.html>

