



# THE ROCKEFELLER UNIVERSITY HOSPITAL

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May 10, 2004

Commission for Environmental Cooperation  
of North America  
393, rue St-Jacques Ouest, bureau 200  
Montreal, Quebec  
Canada H2Y 1N9

Re: Draft "Taking Stock A Special Report on Children's Health in North America"

Dear Sir or Madam:

My Ph.D. is in clinical nutrition, and I am a registered dietitian, Co-Director of the Human Nutrition Program and Senior Research Associate at the Rockefeller University, Director of Clinical Nutrition at the Strang Cancer Prevention Center, Associate Professor of Nutrition in Medicine at Weill Medical College of Cornell University and Associate Scientist at the Hospital for Special Surgery in New York City. I am also director of the Zinc Information Nutrition Center at Rockefeller. As such, I have traveled around the world stressing the importance of adequate zinc intake to good health, especially in pregnant women, infants and children.

## **INTRODUCTION**

With this background, I write to you today to comment on the above-referenced draft ("Draft"). I am very concerned that the Draft fails to make any mention whatsoever of zinc's critical role in the development of the fetus and sound health in newborns and children. The Draft is so dangerously silent on this score that it even neglects to note that there is a U.S. Recommended Dietary Allowance ("RDA") for zinc for infants and children, and that the RDA for pregnant and nursing mothers is greater than the RDA for other women because of the needs of the fetus or child.

I fear that parents and other decision makers would read the Draft and decide to avoid taking zinc themselves or giving zinc to their children because, after all, the Draft calls zinc (and its compounds) the largest suspected neurotoxicant and the second-largest known or suspected developmental toxicant in North

America. The Draft, then, could actually increase zinc deficiency in sensitive populations, thus adding to what is a real public-health problem in infants and children. And zinc deficiency is a real problem:

“According to WHO data, in the developing countries approximately 206 million children under 5 years of age, representing 38% of young children from these areas, are zinc deficient.”<sup>1</sup>

Not only is zinc deficiency prevalent, but it also is a killer of children. It is estimated that a zinc supplementation program would annually save 459,000 lives in children under five years of age, 5% of the total deaths in that age group.<sup>2</sup> This hardly sounds like a top suspected neurotoxicant or developmental toxicant.

I urge you to avoid making a demonstrably terrible situation worse by needlessly frightening people about zinc. The Draft has the situation backwards.

### **ZINC IS ESSENTIAL TO SOUND HEALTH IN CHILDREN**

While the Draft is inexplicably silent on the point, for decades zinc has been recognized as essential to sound life in all people:

“During the past 40 years, zinc has emerged as a critical nutrient factor for growth, immune function, cognitive development, and normal functioning of the central nervous system.”<sup>3</sup>

In UNICEF’s 1998 *State of the World’s Children*, the specific importance of zinc nutrition to children was highlighted:

“Zinc is another micronutrient that has long been known to be essential for the growth and development of cells and for the functioning of the immune system. However, because zinc deficiency is extremely difficult to measure, little attention was paid until recently to the possibility that it might impair child health and development....

“Thus far, zinc and vitamin A are the two micronutrients that have proved to be the most closely linked with the proper functioning of the body’s front-line defences....

“At the same time, an adequate intake of zinc is now understood to be necessary in order for both vitamin A and iodine to do so many of their vital jobs.”<sup>4</sup>

Most recently, the International Zinc Nutrition Consultative Group, established by the United Nations University Food and Nutrition Programme and the International Union of Nutrition Sciences, issued a report entitled “Assessment of the Risk of Zinc Deficiency in Populations and Options for its Control” (“Report”) to the UN Standing Committee on Nutrition on March 23, 2004.<sup>5</sup> The Report stressed the essentiality of zinc:

“In summary, zinc is the most ubiquitous of all trace elements involved in human metabolism. Zinc participates in all major biochemical pathways and plays multiple roles in the perpetuation of genetic material, including transcription of DNA, translation of RNA, and ultimately cellular division.”<sup>6</sup>

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“Given the diverse array of biologic functions of zinc, it is not surprising that multiple physiologic and metabolic functions, such as physical growth, immuno-competence, reproductive function, and neuro-behavioral development are all affected by zinc status.”<sup>7</sup>

While these statements conclusively show the essentiality of zinc to children as a general proposition, I must refer whoever developed the Draft to specific conditions mentioned in the Draft (as allegedly of concern) where zinc supplementation has produced positive results for pregnant mothers and the fetus or children to further demonstrate the Draft’s total misapplication to zinc:

**Draft’s Concern**

**Zinc’s Role**

Low weight births (8)

Zinc deficiency is associated with low birth weight<sup>8</sup>

Complications from pregnancy and labor (8)

Poor maternal zinc status associated with increased pre-eclampsia or hypertension, prolonged labor, atonic bleeding, preterm or very preterm delivery<sup>9</sup>

Preterm birth (8)

Low zinc levels in mother related to preterm or very preterm delivery

Infectious intestinal disease (8)

Zinc supplementation can prevent diarrhea, and can improve the outcome of acute and persistent diarrhea<sup>10</sup>

Pneumonia

Zinc supplementation can prevent episodes of pneumonia<sup>11</sup>

Respiratory infections (8-10)

Zinc supplementation significantly reduces the incidence of acute lower respiratory infection<sup>12</sup>

Death (6, 8, 9, 10)

Zinc supplementation for full-term, small-for-gestational-age infants reduced mortality by 68%.<sup>13</sup>

Finally, the Draft (8, 9) indicates many of the health problems of children are increased by malnutrition. While this is certainly correct, the Draft fails to note that malnourished children need more zinc than healthy children, “presumably due to prior zinc depletion, the need for zinc for tissue synthesis, problems of malabsorption due to changes in the intestinal tract, and possibly increased losses due to diarrhea.”<sup>14</sup>

In sum, the children’s health problems listed in the Draft would be improved by increased exposure to zinc – not the other way around.<sup>15</sup>

## CONCLUSION

The World Health Organization summed up the problems present in the Draft with respect to zinc:

“The essential nature of zinc, together with its relatively low toxicity in humans and the limited sources of human exposure, suggests that normal, healthy, non-occupationally exposed individuals are at potentially greater risk from the adverse effects associated with zinc deficiency than from adverse effects associated with normal environmental exposure to zinc.”<sup>16</sup>

Certainly for children -- particularly poor, malnourished children -- this is the case. In the interests of good science and good health, the Draft needs to be totally redone to highlight that the larger threat to children’s health is zinc deficiency, not exposure to zinc.

Sincerely,



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<sup>1</sup> Black, R.E., et al., 2002. The Emerging Roles of Zinc in Infant Nutrition, Development, and Infectious Diseases: Part 2, *Nutrition Today*, 37 (5): 196-97.

<sup>2</sup> Jones, G., et al., 2003. How Many Child Deaths Can We Prevent This Year?, *Lancet* 362: 67.

<sup>3</sup> Black, R.E., et al., 2001. The Emerging Roles of Zinc in Infant Nutrition, Development, and Infectious Diseases: Part 1, *Nutrition Today*, 36(6): 281. Dr. Black of Johns Hopkins University’s Bloomberg School of Public Health is a leading advocate of zinc intervention to prevent childhood disease. He is the same R.E. Black cited in the Draft’s References, although the Draft, surprisingly, fails to mention his advocacy of zinc.

<sup>4</sup> UNICEF, 1998. *State of the World’s Children*, 72-3.

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- <sup>5</sup> The Report is available at [www.izincg.ucdavis.edu/publications/FNBv25n1supp2zinc.pdf](http://www.izincg.ucdavis.edu/publications/FNBv25n1supp2zinc.pdf).
- <sup>6</sup> Report: S99.
- <sup>7</sup> Ibid: S101.
- <sup>8</sup> Goldenburg, L., et al., 1995. The Effect of Zinc Supplementation on Pregnancy Outcome, *JAMA*, 274: 463-68.
- <sup>9</sup> Black, et. al., op. cit. n.1: 200. Scholl, T.O., et. al., 1993. Low Zinc Intake During Pregnancy: Its Association with Preterm and Very Preterm Delivery, *Am J Epidemiol*, 137 (10): 1116, 1123.
- <sup>10</sup> Black, R.E. and Sazawal, S., 2001. Zinc and Childhood Infectious Disease Morbidity and Mortality, *Br J Nutr*, 85 (Suppl 2): S125, 128.
- <sup>11</sup> Ibid. Report: S97.
- <sup>12</sup> Black, et al., op. cit. n. 2: 84-5. Report:S102.
- <sup>13</sup> Sazawal, S., et al., 2001. Zinc Supplementation in Infants Born Small for Gestational Age Reduces Mortality: a Prospective, Randomized, Controlled Trial, *Pediatrics*, 108: 1280-86. Report: S97. Op. cit., n.2.
- <sup>14</sup> Report: S123.
- <sup>15</sup> The Report estimates that 20% of the Mexican population is at risk of inadequate zinc intake. Report: S193.
- <sup>16</sup> International Programme on Chemical Safety, 1996. *Environmental Health Criteria for Zinc* (PCS/EHC 96.51): 24.