

PRESS RELEASE

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**Rates of Neural Tube Defects in Ukraine
Highest in Chernobyl Impacted Regions**

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Recently, the Nuclear Energy Agency noted that in Ukraine the impact of the Chernobyl disaster is profound and that *“the concern of people for their own health is only overshadowed by the concern for the health of their children and grandchildren”*. During the past twenty years, this has been the heaviest burden imposed by the disaster. The dismissive term “radiophobia”, often used by international experts, is not appropriate in regards to the profound concerns in Ukraine about the Chernobyl threat to the genome of the population.

Following the Chernobyl disaster, it was determined that the areas most heavily contaminated by ionizing radiation lie principally in Northwest Ukraine. The distribution of the contamination is complex and contamination maps are very approximate.

Direct measurements taken from Ukrainian population showed that 65 percent of internal radiation was from Caesium (Cs-137) ingested with food. It was also established that levels of ionizing radiation accrued by rural populations were significantly higher than urban populations, mostly due to weaker control of sources of food. In a paper submitted by Dr. J. Neel, a world renown geneticist who pioneered many studies of the Hiroshima/Nagasaki bomb survivors and their children, he stated “if we had to do such studies over again, the most obvious change in the research design would be to include studies at the DNA level from the outset”. He also recommended that the frequency of congenital malformations, stillbirths, death rates of live born children, and growth and development of surviving children should be investigated.

In 1999, through a cooperative agreement with the USAID, we initiated the slow and complicated process of establishing BD surveillance systems in Ukraine. After the USAID component ended in 2005, BD surveillance continues by the OMNI-Net, an international not-for-profit Ukrainian organization. The OMNI-Net BD surveillance system began formal data collection in 2000 in the Northwest region of Ukraine (Rivne and Volyn oblasts). Nine raions (counties) of the Northwest region have been designated as impacted by Chernobyl, six are in Rivne and three are in the Volyn oblast.

In 2002, we noted elevated rates of spina bifida, anencephaly and encephaloceles, collectively referred to as neural tube defects (NTD). In 2004, we reported a prevalence of NTD in Northwest Ukraine of

21 per 10 000 live births, nearly 4 times what it would have been were the population consuming enough folic acid.

Data collected during 2002-2004 and preliminary data from 2005 confirmed ongoing epidemic rates of NTD in Ukraine. High prevalence rates persist in the Northwest and were also found in the Central and South regions of Ukraine. The lowest prevalence rate, 10.7 per 10 000 live births, was in the South region (Kherson oblast and the Autonomous Republic of Crimea). Nonetheless this rate is three times as high as in many other countries, including the U.S.

In partnership with the Ukrainian Academy of Medical Sciences, the Ministry of Health of Belarus and the WHO Regional Office for Europe, conferences were held in Minsk, Belarus and Rome, Italy concerned with "Folic acid: from research to public health practice". The participating experts calculated that folic acid flour fortification at the level 0.42 mg/100g flour would reduce annual NTD pregnancies in Ukraine from 884 to 460.

In 2006, there was sufficient data to permit analysis of NTD prevalence rates in raions designated as impacted and not impacted by Chernobyl. The raions impacted by Chernobyl belong to a region called Polissia where the NTD rates were the highest we found in Ukraine.

Population based BD surveillance systems, such as the OMNI-Net, are designed to promote the prevention and better care of children with malformations, mental subnormality and other developmental disabilities. In view that most BD are due to unknown causes, surveillance systems are also designed to promote research. One strategy, among others, is to monitor the occurrence of very rare malformations. In this regard, between 2000 and 2005 we noted five instances of conjoined twins in the Rivne oblast. Notably, one of the twins had spina bifida. For the period 2000-2005, there were 81 909 live births in the Rivne oblast. In an informal review of ten large BD surveillance systems, each monitoring at least one million pregnancies, none reported more than one instance of conjoined twins.

The noted high prevalence of NTD in Polissia most likely reflects dietary folate deficiencies, perhaps magnified by significant alcohol consumption. Whether low dose chronic ionizing radiation is an additional risk factor remains speculative.

Deficiencies of folate result in higher prevalence rates of NTD and other birth defects. Folate deficiencies are also associated with elevated plasma homocysteine, a risk factor for cardiovascular disease, and perhaps higher risks for breast cancer and colon cancer.

The impact of alcohol on a developing fetus often results in serious BD and mental subnormality. Our studies in Ukraine show that 10 percent of children in Ukrainian orphanages have BD suggestive of prenatal exposure to alcohol. Furthermore, alcohol also impairs folate absorption and chronic alcohol use decreases liver stores of folates.

The children of Ukraine bore the brunt of Chernobyl and continue to bear a heavy daily burden of BD because the Ukrainian government has not implemented mandatory folic acid fortification, as done by some other 40 countries of the world. The cost of each day of delay is the life of an infant. Regardless of future investigations, we urge Ukrainian authorities to immediately institute an intensive folic acid supplementation program in Polissia for all women of reproductive age.

Further molecular, genetic, folic acid, alcohol and epidemiologic studies by an international consortium are, in our view, essential. The results are likely to elucidate new facts important to the Ukrainian public and contribute to a better understanding of the complexities of the causes of BD.

Ukraine has, perhaps more than most countries, much to gain from an established and experienced BD surveillance system upholding international standards. The OMNI-Net BD surveillance system can

facilitate the immediate introduction of folic acid supplementation, rapidly show the impact of the introduction of flour fortified with folic acid and facilitate studies of low dose chronic ionizing radiation effects on human reproduction. In the final analysis, the resolution of the questions discussed, are bioethical by nature and for Ukrainian authorities to resolve.

We want to emphasize that this report reflects the high competence of Ukrainian professionals engaged by BD oblast surveillance systems. Furthermore, these achievements were also made possible by the constant support of public health care leaders, as well as the directors of medical facilities where OMNI-Centers are located.