Primary Prevention of Neural Tube Defects in Europe through Wheat Flour Fortification

Neural tube defects (NTDs) affect in an estimated 4500 pregnancies in the European Union (EU) and 320,000 newborns worldwide on an annual basis. EUROCAT, a network of registries that provides surveillance for congenital anomalies in Europe, is a reputable source of NTD data in the region. Using 2006-2010 data from European countries that report live births, fetal deaths and terminations, an estimated 76% of NTD-affected pregnancies were aborted. Termination of pregnancy must not be relied upon as a prevention method for NTDs. Rather, primary prevention in the form of folic acid supplementation and flour fortification should be prioritized.

- *An estimated 4500 pregnancies in the European Union are affected by neural tube defects every year.*
- *38-50% of pregnancies in Europe are unplanned.*
- *Fortifying flour with folic acid reduces the birth prevalence of neural tube defects by an average of 46%.*

Folate (vitamin B9) plays a critical role in cell division and in DNA synthesis and methylation. While everyone needs folate, sufficient folate is essential during early pregnancy when embryonic development occurs rapidly. Though the genetic and environmental factors leading to the formation of an NTD are not fully understood, numerous studies have shown that folic acid, the form of folate in supplements and fortified flour, significantly decreases the risk of NTDs when taken appropriately. The World Health Organization (WHO) recommends 400 micrograms of folic acid per day during the periconceptional period (two months prior to conception and during the first trimester).

Women need optimum folate stores at the time of conception because the neural tube closes around the 28th day of pregnancy. Given that most women are not aware of their pregnancy by this time, folic acid supplementation will only benefit those who plan their pregnancies and/or take supplements on a daily basis. Unfortunately, an estimated 38-50% of pregnancies in Europe are unplanned and habitual supplementation is not commonplace.

Flour Fortification As Prevention

One viable option for ensuring women of child-bearing age do obtain this vital nutrient prior to pregnancy is to simply fortify flour with low amounts of folic acid during the wheat milling process. While supplementation can significantly decrease NTD risk at an individual level, a national flour fortification program provides a population-wide impact. Supplementation requires a behavior change, but flour fortification provides necessary nutrients to populations as they follow their normal dietary customs. According to one meta-analysis, countries that utilize this public health initiative indicated the birth

prevalence of NTDs had dropped by an average of 46% with a range from 31-78%.

Flour fortification is highly feasible in Europe given that bread is easily accessible and consumed in abundance, the milling industry is technologically advanced and countries have experience monitoring food quality and safety. Mandatory flour fortification is preferable to a voluntary strategy because it maximizes the public health impact and is more easily controlled. The European Union Regulation No 1925/2006 states that mandatory fortification using specified vitamins and minerals is permitted for “certain ordinary foods” to address public health concerns. Fortification costs approximately 0.16€ per person per year depending on the vitamins and minerals included in the flour. This additional cost can be passed on to the consumer by marginally increasing the cost of wheat flour and flour-based products, such as bread. Occasionally, flour milling companies offer to absorb the cost as part of their corporate social responsibility initiatives, or governments financially support flour fortification programs to help curb the economic effects of undernutrition.

Flour fortification is recognized by renowned entities, such as the WHO, the Centers for Disease Control and Prevention, UNICEF and the Copenhagen Consensus Center. As of July 2013, 73 countries around the world had legislation to fortify at least one type of commonly consumed wheat flour with folic acid. Countries in Europe need to act on this opportunity. The Flour Fortification Initiative and the International Federation for Spina Bifida and Hydrocephalus are two entities that encourage country leaders from the public, private and civic sectors to collectively pursue flour fortification as a primary prevention strategy for NTDs. For more information about planning for, implementing and monitoring a flour fortification program, please visit www.ffinetwork.org. Further details about NTD prevention and advocating for those affected by NTDs can be viewed at www.ifglobal.org.

Additional Resources:

1. Bitzer J, von Stenglin A, Bannemerschult R. Women’s awareness and periconceptional use of folic acid: data from a large European survey. Int J Women’s Health 2013; 5:201-13.
2. Blencowe H, Cousens S, Modell B et al. Folic acid to reduce neonatal mortality from neural tube disorders. Intl J Epidemiol 2010;39:i110-i121.
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4. Pachón H, Kancherla V, Handforth B, Tyler V, Bauwens L. Folic acid fortification of wheat flour: A cost-effective public health intervention to prevent birth defects in Europe. Nutr Bull 2013; 308:201-9.
5. Viñas BR, Barba LR, Ngo J et al. Projected Prevalence of Inadequate Nutrient Intakes in Europe. Ann Nutr Metab 2011;59:84-95
6. Yi Y, Lindemann M, Colligs A, Snowball C. Economic burden of neural tube defects and impact of prevention with folic acid: a literature review. Eur J Pediatr 2011;170(11):1391-1400.