Collaborative Comments on Link Between Food Color Additives and Behavior – Submitted by INND, FIHRI, GAP, IATP, TRANSCEND and AAIDD

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RE: Link Between Consumption of Synthetic Color Additives in Food and Adverse Effects on Behavior

FD &C Yellow 6 and FD & C Yellow 5 have both been linked to hyperactivity in children by McCann et al who published the results of his study in the Lancet in 2007 (1). As a result of McCann's findings the United Kingdom has asked manufacturers to voluntarily ban the use of these food colors in food products (2). These and other food colors may be produced with mercury cell hydrogen chloride and are allowed to contain up to 1 ppm mercury (3, 4). Because mercury inhibits cysteine ligands in the metal clearing metallothionein (MT) proteins that normally bind with metal ions such as copper and zinc (5), consumption of mercury containing substances over time by sensitive individuals may induce MT malfunction (6). Such a malfunction may lead to severe zinc deficiency creating conditions of oxidative stress in the brain that impair learning (6, 7). Many children with ADHD are zinc deficient (8, 9). Ward et al found that consumption of FD &C 6 and FD &C 5 food color additives led to a significant reduction in blood and urine zinc levels in hyperactive children (10, 11). The mercury content in these food colors may be responsible for the observed deficiency in zinc that can occur over time in hyperactive children who consume these food color additives (6). As mercury displaces zinc in the MT molecule, copper may reach toxic levels compromising MT functioning in autistic children (6). Three peer reviewed papers published in 2009 report findings that support the link between low-dose mercury exposure and MT dysfunction and an association with Autism Spectrum Disorders (12, 13, 14). MT is an important protein in the immune system and required to clear metals from the body (7, 15, 16). The consumption of food colors that contain inorganic mercury and lead to zinc loss can upset MT functioning (6). Autistic children are often found to be zinc deficient and exhibit MT dysfunction (12, 13, 14, 17). Zinc deficiency along with oxidative stress predisposes the brain by disruption of the blood-brain barrier in rats and when they consume zinc depleting food chemicals there is a reduction in neuronal plasticity and learning (18). Furthermore, pre-natal zinc deficiency has pronounced effects on postnatal MT metabolism in rats which can persist into adulthood (19). Consumption of any food ingredient containing mercury or leading to zinc loss is detrimental to neurodevelopment in children (6).

We urge FDA to follow the United Kingdom's lead and provide consumers with the information they need to make informed choices about the consumption of food colors and their effect on child behavior and brain function. We also recommend the FDA remove mercury cell chlor-alkali products from the GRAS food additive list. If you have any questions, please feel free to contact any one of us.

Respectfully Submitted,

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4. **United States Code of Federal Regulations** [http:/ / ecfr.gpoaccess.gov/ cgi/ t/ text/ text-idx?c=ecfr&sid=1070b19eb50e562 daa872cfa1755aa09&rgn=div5&view=tex t&node=21:1.0.1.1.27&idno=21#21:1.0.1.1.27.1.31.9]
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