

**Marketing to Kids Webinar Series**

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Heart and Stroke Foundation of BC & Yukon  
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# Food Dyes and Effects on Children: Problems & Solutions

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CENTER FOR SCIENCE IN THE PUBLIC INTEREST

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# Center for Science in the Public Interest

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- ❑ Independent science-based health advocacy NGO
  - ca. 900,000 subscribers in the US and Canada
  - No industry or government funding
  - No ads in our Nutrition Action Healthletter, the largest-circulation health newsletter in North America
- ❑ Offices in Ottawa and Washington DC
  - Bill Jeffery, Canadian National Coordinator of CSPI
- ❑ Issues: nutrition and health, food safety, alcohol policy, sound science
- ❑ We are not “anti-additive.” We rate most additives as safe. See <http://www.cspinet.org/reports/chemcuisine.htm>

# Food Dyes

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- Cosmetic, Not Nutrition/Health Function/Benefit
- Mask Absence of/Displace Colorful Fruits & Vegetables
- Behavioral, cancer, allergy concerns



## Food Dyes

A Rainbow of Risks



## Where are the Cherries & Berries in Tropicana Twister Cherry Berry Blast? \*

Ingredients: Filtered Water, High Fructose Corn Syrup, Apple and Grape Juice Concentrates, Citric Acid, Natural and Artificial Flavors, Ascorbic Acid (Vitamin C) and **Red 40**.

Contains 10% Juice.



\*Answer: on the label  
(not in the bottle)

# Dyes Permitted in Canada and the US

Canada	United States	Europe
<b>Allura Red</b>	✓ <b>FD&amp;C Red 40</b>	✓ <b>E129</b>
Erythrosine	✓ FD&C Red 3	✓ E127
Citrus Red 2 (restricted)	✓ Citrus Red 2 (restricted)	✗ E121
<b>Tartrazine</b>	✓ <b>FD&amp;C Yellow 5</b>	✓ <b>E102</b>
<b>Sunset Yellow FCF</b>	✓ <b>FD&amp;C Yellow 6</b>	✓ <b>E110</b>
Fast Green FCF	✓ FD&C Green 3	✗ E143
Brilliant Blue FCF	✓ FD&C Blue 1	✓ E133
Indigotine	✓ FD&C Blue 2	✓ E132

# Dyes Permitted in Canada but Not the US

<u>Canada</u>	<u>United States</u>	<u>Europe</u>
Amaranth	<b>X</b> FD&C Red 2 – banned in 1976 Possible carcinogen	<b>✓</b> E123
Ponceau SX	<b>X</b> FD&C Red 4 – banned in 1976 High levels damaged adrenal cortex of dogs Still allowed in externally applied drugs, cosmetics	<b>X</b> E125

# Evidence Linking Food Dyes and Adverse Behavior Continues to GROW

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- ❑ A majority of double-blind studies find that dyes affect behavior of some children
- ❑ Three separate meta-analyses support a link between food dyes and adverse behavior in sensitive children (Sonuga-Barke 2013, Nigg 2012, Schab 2004)
- ❑ A recent scientific review concludes “food colour elimination is a potentially valuable treatment approach for ADHD” (Stevenson, 2014)

# Some Notable Studies

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Weiss B, Williams JH, Margen S, et al. Behavioral responses to artificial food colors. *Science*. 1980;207:1487-8. **Demonstrated behavioral sensitivity in a controlled trial.**

Swanson JM, Kinsbourne M. Food dyes impair performance of hyperactive children on a laboratory learning test. *Science*. 1980;207:1485-7. **Larger doses, larger proportion reacting.**

Rowe KS, Rowe KJ. Synthetic food coloring and behavior: A **dose response** effect in a double-blind placebo-controlled, repeated-measures study. *J. Pediatr* 1994;125:691-8.



# Notable Studies: Southampton Studies

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Bateman B, Warner JO, Hutchinson E, et al. The effects of a double blind, placebo controlled, artificial food colourings and benzoate preservative challenge on hyperactivity in a **general population** sample of preschool children. *Archives of Disease in Childhood*. 2004;89:506-11.

McCann D, Barrett A, Cooper A et al. Food additives and hyperactive behaviour in 3-year-old and 8/9-year-old children **in the community**: a randomized, double-blinded, placebo-controlled trial. *Lancet*. 2007(Nov 3);370:1560-7.

# Notable studies: INCA study (Lancet)

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Pelsser L, Frankena K, et al. Effects of a restricted elimination diet on the behaviour of children with attention-deficit hyperactivity disorder (INCA study): a randomised controlled trial. *Lancet* 2011; 377(9764):494-503.

“Our study shows considerable effects of a restricted elimination diet in an unselected group of children with ADHD, with equal effects on ADHD and oppositional defiant disorder. Therefore, we think that **dietary intervention should be considered in all children with ADHD**, provided parents are willing to follow a diagnostic restricted elimination diet for a 5-week period, and provided expert supervision is available...”

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**EVEN BETTER: Don't allow substances harmful to children to be added to foods and marketed to children**



**102 mg** dyes in this meal (2 cups Kraft Macaroni & Cheese, 8 ounces of Crush Orange, small bag of Skittles. **30 mg** caused adverse reactions in some studies.

First-ever Study on Amounts of Dyes in Brand-name Foods. (Stevens et al, *Clin Pediatr* 2015;54(4):309-321.)

# Meta-analyses

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- ❑ Sonuga-Barke 2013: of 6 non-drug treatments, only 2 produced statistically significant effects on ADHD when using the best probably blinded assessment. Artificial food color exclusion produced the largest effects, often in individuals selected for food sensitivities. “The artificial food color exclusion effects were similar in magnitude to those reported by Nigg et al.”
- ❑ Nigg 2012: a restriction diet reduced ADHD symptoms in ca. 1/3 of children w/ADHD. Estimated 8% of children with ADHD may have symptoms related to food dyes. In objective, computerized measures of attention, a significant effect was associated with FDA-approved food dyes, not explainable by publication bias. Findings “too substantial to dismiss”
- ❑ Schab, 2004: Studies “strongly suggest an association between ingestion of [synthetic food dyes] and hyperactivity.” Estimated that the magnitude of the effect of dyes is about 1/3 – 1/2 the deterioration in behavior that would occur if medications were withdrawn from children being treated for ADHD

# Limitations of the Research

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- ❑ Mostly Small Studies
- ❑ Dose (Mg vs. Mg/kg of body weight)
- ❑ Blinding
- ❑ Mixtures
- ❑ Timing between Exposure and Effects
- ❑ Measurement of Effects
  - How? Where? By Whom?

# Food Dyes & Behavior: Health Canada

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Health Canada notes that its “scientists reviewed the results of the UK study and agreed with the conclusions of the UK Committee on Toxicology that the results of this study are consistent with, and add weight to, previous published reports of behavioral changes occurring in children following consumption of particular food additives which included a number of azo food colours.” at <http://www.hc-sc.gc.ca/fn-an/consult/feb2010-food-aliments-col/draft-ebauche-eng.php>

# Food Dyes & Behavior: US FDA

“for certain susceptible children with ADHD and other problem behaviors, the data suggest that their condition may be exacerbated by exposure to a number of substances in food, including, but not limited to, artificial food colors”

“Exposure to food and food components, including artificial food colors and preservatives, may be associated with adverse behaviors, not necessarily related to hyperactivity, in certain susceptible children with ADHD and other problem behaviors, and possibly in susceptible children from the general population.” – FDA, 2010



# Food Dyes & Behavior: UK Food Stds Agency

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“If a child shows signs of hyperactivity or Attention Deficit Hyperactivity Disorder (ADHD), eliminating the colours\* considered in the Southampton study from their diet might have some beneficial effects on their behavior.”

“The Agency is encouraging manufacturers to work towards finding alternatives to these colours. Some manufacturers and retailers have already taken action to remove them.”

Website lists “products free from the colours associated with hyperactivity” (manufacturers, retailers, caterers)

\* Includes Yellow 5/Tartrazine, Yellow 6/Sunset Yellow FCF, Red 40 /Allura Red

# Risks of Food Dyes: Behavior

The label “may have an adverse effect on activity and attention in children” is required in Europe on foods containing any of the most-widely used colors (including **Yellow 5**, **Yellow 6**, and **Red 40**).



# If they can do it there .... why not here?

## McDonalds: **STRAWBERRY SUNDAE - TOPPING**

**US:** Strawberries, Sugar, Water, High Fructose Corn Syrup, Natural Strawberry Flavor with other Natural Flavors (Fruit Source), Citric Acid, Pectin, Sodium Benzoate (Preservative), Carob Bean Gum, **Red 40**, Calcium Chloride.

**Canada:** Strawberries, Sugar/Glucose-Fructose, Water, Natural Flavor, Citric Acid, Locust Bean Gum, Pectin, Potassium Sorbate, **Colour**, Calcium Chloride. [Colour is **Allura Red**]

**UK:** Strawberries (38%), Sugar, Glucose Syrup, Water, Gelling Agent (Pectin), Acidulant (Citric Acid).



# Costs of ADHD

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- ❑ 3-7% of school-aged children (DSM-IV-TR, 2000)
- ❑ 9.5% of children 4-17 years of age by parent reports (5.4 million in US) (CDC, 2010)
- ❑ 5-15% of Canadian school-aged children (Centre for ADD/ADHD Advocacy Canada, 2008)
- ❑ Rates increased an average of 5.5% per year from 2003-2007. (CDC, 2010)
- ❑ Most children with ADHD are likely not harmed by dyes
- ❑ Some children not diagnosed with ADHD are susceptible to dyes
- ❑ Estimated cost to society: \$36 - \$52.4 billion in US (in 2005 dollars, assuming 5% prevalence) (Pelham, 2007)

**Dyes contribute a modest, but entirely preventable, amount to the costs of ADHD**

# Linking Food Dyes and Adverse Behavior

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CSPI has received **over 2,000** first-hand accounts from parents, others of hyperactivity, attention problems, repetitive motions, aggression, even violence, linked to dyes

“After my daughter ingests dyes she suffers from hyperactivity, defiance, violence, inability to focus on me or instructions, feeling like somebody else is telling her what to do or somebody else is taking over her body (her words on the last part)” – SD

# Other Risks of Food Dyes

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**Cancer** – Red 3/erythrosine, Yellow 5/tartrazine, Yellow 6/Sunset Yellow FCF, Red 40/allura red, Caramel

Red 3 – carcinogenic, banned from cosmetics, externally applied drugs, and lakes in the US

Yellow 5, Yellow 6 – benzidine, 4-amino-biphenyl (US ROC: “known to be a human carcinogen”)

Red 40 – *p*-cresidine (US ROC: “reasonably anticipated to be a human carcinogen”)

Caramel (ammoniated) – 4-methyl-imidazole (IARC: “possibly carcinogenic to humans”)

**Allergic reactions** – Blue 1/brilliant blue FCF, Red 40/allura red, Yellow 5/tartrazine, Yellow 6/sunset yellow FCF; annatto, carmine, cochineal

# Food Dyes – Solutions

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**#1:** Ban most food dyes (section B.16.100 of the *Food and Drug Regulations*)

Require **prominent** warning notices for dyes (interim solution)

Require front label disclosure of *any* added coloring

Urge manufacturers, restaurants, retailers, caterers, and consumers to not use artificial food colors.

Urge provincial governments and local school authorities to include a ban of artificial food dyes in their nutrition policies and school foodservice contracts



# Health Canada Proposed Changes to Food Color Labelling Regulations

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Proposal: Require food colors to be identified on labels by their common name and/or numerical identifier.

“These changes are being proposed due to reports of potential adverse health effects associated with the consumption of certain food colours, as well as requests by consumers that more information be made available when making food selections.”

Feb. 2010: HC invites comments on proposal. > 130 responses.

June 2011: HC publishes review of comments received

Next Steps: “Health Canada will continue to take these comments under consideration when updating its proposal .... The relevant proposed regulatory changes will be developed and published for consultation in Part I of the *Canada Gazette*.”



# Solutions: Health Canada Response

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**#1:** Ban most food dyes: “Although specific areas of study relevant to behavioral effects and allergenicity are under review, the general toxicological data is supportive of safety, whether the food colours are natural or synthetic, that are permitted for use in Canada ....”

Require **prominent** warning notices for dyes (interim solution): “Health Canada is not currently considering warning labels ...”

Require front label disclosure of *any* added coloring

Urge manufacturers, restaurants, retailers, caterers, and consumers to not use artificial food colors.

Urge provincial governments and local school authorities to include a ban of artificial food dyes in their nutrition policies and school foodservice contracts

# Policy Considerations: Precaution

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- “the absence of full scientific certainty shall not be used as a reason for postponing decisions where there is a risk of **serious or irreversible harm.**” –A Framework for the Application of Precaution in Science-based Decision Making about Risk, 2003, Government of Canada (Privy Council Office, supports the Prime Minister and Cabinet).
- “.... it was considered appropriate to apply a precautionary approach when characterizing risk to human health” [from BPA] – Canada Gazette Part II, Vol. 144, No. 21, October 13, 2010, pages 1810

# Food Labelling Modernization Initiative

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## Objectives:

- Improve access to information about food labelling to increase awareness, to help consumers to make informed decisions about the food they buy for themselves and their families
- Protect Canadians ....
- Respond more effectively to consumer, industry, and government needs ....

# Change.org Petition to Mars: Stop Using Artificial Dyes

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# Change.org Petition to Crayola: Stop Telling Kids to “Color Their Mouth”

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# True Colors



Rainbow Grab-n-Go  
Salads from Kalispell  
Public Schools in  
Montana

# More information at [www.cspinet.org](http://www.cspinet.org)

The screenshot shows the website [www.cspinet.org/fooddyes/](http://www.cspinet.org/fooddyes/). The header features the CSPI logo and the tagline "Transforming the American diet". Navigation links include "About Us", "Food Day", "Nutrition", "Food Safety", "More!", and "Contact". A sidebar on the left offers options to "Report your experiences" regarding food dyes and to "Join us on Social Media" via Facebook and Twitter. The main content area is titled "Food Dyes" and includes a photo of a child eating a donut. Below the photo, it promotes a new report titled "Food Dyes: A Rainbow of Risks" and lists several articles in the "IN THIS SECTION" category, such as "Diet, ADHD & Behavior: A Quarter Century Review" and "FDA Petition to ban food dyes".

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**Food Dyes**  
Read CSPI's [new report](#), "Food Dyes: A Rainbow of Risks," to learn more.

**Food Dyes**

**IN THIS SECTION**

- [Diet, ADHD & Behavior: A Quarter Century Review \(updated 2009\) »](#)
- [Fact Sheet on Food Dyes »](#)
- [FDA Petition to ban food dyes \(June 2008\) »](#)
- [FDA Petition to require front of label disclosure of artificial colorings \(Dec 2011\) »](#)
- [Food Dyes: A Rainbow of Risks, June 2010»](#)

A new petition on Change.org asks Mars, the maker of



# QUESTIONS?

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