Regulatory Information Sheet

The Facts on Synthetic Color Safety

Colorcon takes its responsibility for consumer safety seriously. In addition to complying with the US Food and Drug Administration (FDA) regulations for certification of synthetic colors, the European requirements contained in European Directives and other international requirements, Colorcon, together with the color industry have sponsored many safety studies, the results of which have been evaluated by the FDA and international regulatory bodies, including the United Nations FAO/WHO Joint Expert Committee on Food Additives (JECFA) and the European Food Safety Authority (EFSA). These studies confirm the safety of synthetic colors, which have been approved for use in food, beverage, and other products in the U.S., the EU and elsewhere.

What types of studies have been done in the past?

Ongoing toxicology studies have been routinely conducted worldwide and reviewed by organizations such as the JECFA, FDA, and EFSA to assess the safety of synthetic food, drug and cosmetic colorants in various applications. Many articles have been written on assessing the safety of these colorants [1-6]. Scientific and public opinion varies on the true interpretation of safety, and these views have impacted the development of food and drug regulations around the world.

Though these colors maintain a strong safety record, a subset of consumers have voiced certain concerns about safety, hyperactivity and allergic sensitivity regarding some of the synthetic colors based primarily on unsubstantiated theories where some type of connection was thought to exist.

Although these theories were popularized in the 1970s, well-controlled studies conducted since then have produced no evidence that food and drug color additives, such as azo dyes, cause hyperactivity or learning disabilities in children. A Consensus Development Panel of the National Institutes of Health concluded in 1982 that there was no scientific evidence to support the claim that colorings or other food additives cause hyperactivity. The panel said that elimination diets should not be used universally to treat childhood hyperactivity, since there is no scientific evidence to predict which children may benefit [7].

FDA indicates on their website that reactions to color additives are rare: “for example, FD&C Yellow No. 5 may cause itching and hives in some people. This color additive is widely found in beverages, desserts, processed vegetables, drugs, makeup, and other products. FDA requires all products containing FD&C Yellow No. 5 to identify it on their labels so that consumers who are sensitive to the dye can avoid it. On medicine labels, this certified color additive is also identified by its uncertified name, Tartrazine” [8]. This allows a minor sensitive percentage of the population to avoid the color. As of May 8, 1993, the ingredient statements contained on US product labels must list all certified colors contained in the food products as a requirement of the Nutrition Labeling and Education Act of 1990 [9].

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Why are we still hearing concerns about synthetic colors and child hyperactivity in the media?

In the United States, a petition to the FDA was filed by the Center for Science in the Public Interest (CSPI) in 2007 requesting that the agency revoke the approval of eight FD&C food colors. CSPI based their request upon two published studies [10] that contend that a link exists between the intake of synthetic food colors and hyperactive behavior in children.

The scientific evidence does not support the CSPI petition to the FDA. Reviews of several hyperactivity/synthetic food color studies have been conducted by US experts and by international regulatory bodies, and they have all concluded that there is no correlation between the intake of synthetic food colors and hyperactivity among children.

In Europe, EFSA, the chief scientific review body for food products in the EU, reviewed the main study (McCann et al., 2007) upon which the CSPI bases their request. Limited evidence suggested that the two different mixtures of synthetic colors and sodium benzoate tested in the study had a small and statistically significant effect on children selected from the general population. They further indicated that the effects were not statistically significant for the two mixtures in both age groups. In addition since mixtures and not individual additives were tested, it was not possible to ascribe the observed effects to any individual compounds. Finally, they indicated that the clinical significance of any reported effects remains unclear. EFSA concluded that the study was not of sufficient significance to warrant a change to the regulatory status of the colors tested.

Unfortunately, even though the European safety experts in EFSA stated that there was no reason to change the regulatory status of these colors, due to media coverage in Europe about the McCann study (sometimes referred to as the Southampton Study), the European Commission decided to require that labels for food products include a statement saying that the synthetic colors which were studied (Sunset Yellow, Quinoline Yellow, Carmoisine, Allura Red, Tartrazine and Ponceau 4R) “may have an adverse effect on activity and attention in children.” This decision appears to be a political decision attributable to media exposure in the absence of the scientific basis for such labeling.

Regulators and legislators in the United States have not reacted in a similar way. In their initial response to the CSPI actions, the FDA indicated that the McCann study did not provide sufficient cause to change their conclusions that the FD&C colors are safe for the general population. Further the FDA supported the conclusions reached by EFSA in their review of the study. Consequently, the FDA has not changed their current guidance statement on any relationship between synthetic food colors and hyperactive behavior. In essence, this guidance statement indicates that there is no correlation between the intake of synthetic food colors and childhood hyperactivity [11].

The scientific data demonstrate that FD&C colors are safe for consumption. There is no justification to take any specific regulatory action to limit the use of these colors other than to label products to show the presence of the colors used which has already been required for years.

However, due to the outstanding CSPI Petition, FDA scheduled a meeting of their Food Advisory Committee (FAC) on March 30-31, 2011 to hear public testimony to gather further information concerning a possible link between synthetic colors and child hyperactivity. In the end, after upholding their view that there is no causal relationship between hyperactivity synthetic food colors, the FAC recommended that FDA conduct a rigorous exposure assessment of color additives and consider if additional safety studies may be warranted. FDA did complete this exposure assessment in 2015, which found that the estimated daily intakes (EDIs) of all colors were well under established acceptable daily intakes (ADIs) [12, 13].

What is being done to focus the discussion on the science?

The International Association of Color Manufacturers (IACM) and many other trade associations and companies which represent makers and users of synthetic colors in the food, drug and dietary supplement industries have come together to work collaboratively with others globally to combat potentially disastrous changes in international regulations, which are not based on good science, and to respond to the increasingly negative and nonfactual media stories that have been published around the world. Colorcon is a member of IACM and is actively involved in the leadership of activities related to synthetic colors.

Over the past several years, IACM has sponsored multiple studies further confirming the safety of synthetic colors to fill data gaps identified by regulatory bodies around the world. The outcomes of these studies have resulted in the maintenance of, or some cases, increases in the ADIs in certain jurisdictions. IACM has also sponsored an exposure assessment of synthetic color use in foods in the United States, which confirmed FDA's findings that the EDIs of all synthetic colors are well below the ADIs.

What else is happening in Europe related to the use of Synthetic Colors?

As part of an overall re-assessment of the safety of all food additives, EFSA's Panel on food additives and nutrient sources added to food (ANS) has re-evaluated all food colors including the six synthetic colors used in the Southampton study [14], three of which have been thoroughly evaluated by the U.S. FDA and can be certified as FD&C Colors in the United States. All of these synthetic colors are widely used by the global food, dietary supplement and pharmaceutical industry and have been the subject of safety reviews by JECFA. All have been assigned a numerical Acceptable Daily Intake (ADI) by JECFA, which establishes the number of milligrams of the color an individual can consume per kilogram of body weight every day without adverse effect.

For three colors – Allura Red AC (when certified by the US FDA, FD&C Red No. 40), Tartrazine (when certified by the US FDA, FD&C Yellow No. 5) and Carmoisine – the ANS Panel has concluded that no change in the acceptable daily intake (ADI) is warranted. This opinion provides further validation that these colors are safe for consumption.

The ANS Panel initially assigned a **temporary** ADI for Sunset Yellow of 1 mg/kg body weight (bw)/day (2.5 times below the previously established ADI) and requested a 28 day study to provide additional data to answer some of the questions they had from reviewing the published studies. IACM responded by sponsoring the requested 28 day study to answer the outstanding questions. As a result of the data developed during the IACM-sponsored study and a review of additional published literature, the ANS panel raised the ADI to 4 mg/kg bw/day) in line with the conclusions from the latest JECFA evaluation [15].

Based on safety data available to the ANS Panel in 2009, the ADI for Quinoline Yellow was reduced to 0.5 mg/kg body weight; however, this is inconsistent with the latest JECFA conclusions in 2016. The JECFA Committee established an ADI of 3 mg/kg bw/day [16]. It is also noteworthy that in the same meeting, JECFA maintained the ADI of Allura Red at 7 mg/kg bw/day and raised the ADI of Tartrazine (a related azo dye) from 7.5 to 10 mg/kg bw/day.

In 2009, the ANS Panel derived an ADI of 0.7 mg/kg bw/day for Ponceau 4R; however, JECFA again concluded in a later evaluation in 2011 that new data do not indicate a need to revise the existing ADI 4 mg/kg bw/day and that dietary exposure to Ponceau 4R does not present a health concern.

The ADIs for the six synthetic colors described above indicate that these colors can be consumed safely in foods at typical use levels.

What is the impact of safety concerns associated with aluminum on consumption of aluminum lakes?

JECFA lowered the Provisional Tolerable Weekly Intake (PTWI) for aluminum from all sources from 7 mg/kg bw to 1 mg/kg bw in June 2006, which was then raised to 2 mg/kg bw in 2008 after the consideration of additional information [17]. JECFA concluded that aluminum compounds may have the potential to affect reproductive and developing nervous systems. Some of the results which led to the reduction in the PTWI were based on soluble aluminum compounds. This may not be applicable to the insoluble forms. Further data may be used to re-evaluate establishing a higher PTWI for insoluble aluminum compounds in the future if appropriate.

Many organizations conducted studies on aluminum containing food additives and products to provide supporting data to justify a higher PTWI for aluminum long term. IACM conducted a bioavailability study for Allura Red (FD&C Red #40) Aluminum Lake which was submitted to JECFA as a response to their call for data. An analytical study was completed as well to bridge the study to all aluminum lakes. The Aluminum industry from the US, Canada, Europe and Japan conducted several additional studies for REACH which was also submitted to JECFA in late 2010. The results from these studies were considered when JECFA raised the PTWI from 1 to 2 mg/kg bw.

EFSA has reviewed the JECFA evaluation, and, as a result, adopted the initial JECFA PTWI into their opinion for use in Europe. EFSA established a Tolerable Weekly Intake (TWI) of 1 mg/kg bw/week in 2008 based on their evaluation. The results from the bioavailability study for Allura Red Aluminum Lake conducted by IACM were also supplied to EFSA to consider as part of their review. As a result of the EFSA review, the European Commission amended Regulation Number 1333/2008 in 2012 and established limits for aluminum contained in aluminum lakes in food or food supplement products [18].

The aluminum content in an aluminum lake will vary (typically from about 13 to 26%) depending on the particular dye strength grade of the lake and the manufacturing processes used to produce the lake. This must be taken into account when considering the aluminum limits established by the European Commission.

What is the path forward?

Colorcon is proactively working with IACM and other trade groups to ensure that regulations are developed within the context of complete scientific understanding and to support the continued broad use of safe synthetic colors.

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