CEREALS 17

Introductory Brain Teaser for the Cereal Chemist—How Do We Categorize Processed and Ultraprocessed Foods?

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Part 1 of our two-part "teaser" for the upcoming interactive session at the AACC International Cereals 17 meeting in San Diego, CA (Tuesday, October 10, 10:30 a.m. to 12:10 p.m.) emphasized the spectrum of different definitions associated with processed foods and noted that these definitions are fundamentally rooted in consumer perceptions instead of official government food regulations (10). For example, the website SF Gate (part of the *San Francisco Chronicle*) (9) claims that processed food "usually refers to foods that are packaged in boxes, cans, or bags. These foods need to be processed extensively to be edible and are not found as is in nature. In addition to going through many complex processing steps, processed foods often contain additives, artificial flavorings, and other chemical ingredients."

Monteiro and colleagues working at the University of Sao Paulo in Brazil recently advanced the NOVA system concept (20). (Note, NOVA is not an acronym. It is the term used by the authors for the classification system.) This system categorizes formulations of several ingredients that, in addition to salt, sugar, oils, and fats, include food substances not used in culinary preparations, in particular, flavors, colors, sweeteners, emulsifiers, and other additives used to imitate the sensorial qualities of unprocessed or minimally processed foods and their culinary preparations or to disguise the undesirable qualities of a final food product.

To gain some insights into your perspectives on processed foods, we've created a short quiz. Can you name the common factor linking the foods in each of the following groups?

Group 1: Coffee; bottled water; vacuum-packed ready-to-serve vegetables; quinoa; wheat berries; raw onions; dehydrated onions; bagged romaine lettuce; garden lettuce; fresh or frozen meats; oatmeal; field oats; brown and wild rice; unshelled almonds; shelled almonds; fresh or frozen fruits or vegetables (nothing added); dried apricots; tofu; raw milk; pasteurized milk; plain yogurt; pot barley; powdered milk; juices without added sugars; granola made with cereals, nuts, and dried fruits (no added sugar; honey, or oil).

Group 2: Whole wheat flour; organic, unbleached, enriched all-purpose flour; raw honey in the comb; pasteurized honey; molasses; maple syrup; sugars; cold-pressed organic olive oil; olive oil with antioxidants; canola oil with antioxidants; lard; milled rice; whole grain pasta; enriched pasta; refined pasta; starches; salted butter; sweet butter; salt; vinegar; vinegar with added preservatives; spices.

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Group 3: Homemade whole wheat bread; unpackaged freshly made bread; canned vegetables and beans; fruits in syrup with antioxidants; salted, dried, or smoked meats, including those with nitrates and other preservatives; canned fish; home fried chicken with breading; natural cheeses; most items prepared at home with components from groups 1 and 2; beer; wine and hard cider.

Group 4: Commercial whole wheat bread (>5 ingredients); multigrain and nut breads with 4 g of fiber (>6 ingredients, no preservatives); bakery bread (>6 ingredients); Wonder bread (Flowers Foods); raisin bran (16 g of sugar); whole wheat flakes/freeze-dried berries (9 g of sugar); whey; gluten; lactose; processed meats with additives; frozen veggie burger; frozen bean–rice side dish; single cheese slices; multigrain wraps (7 g of fiber); nut/seed bars; apple cinnamon, whole grain cereal bars; chocolate bars with 70% cocoa; fiber bars; soda crackers; whole wheat crackers (low sodium); chocolate sandwich cookies; Twinkies (Hostess Brands); multigrain rolls; ice cream with no additives; cakes and pies; ice cream with many additives; canned chunky vegetable soups; frozen pasta meals; whole grain-blend rice dishes, boxed or frozen; sweet potato chips; reconstituted, reduced-fat potato chips; organic roasted almonds (touch of salt); pickles; ketchup; soy sauce; soft drinks; frozen veggie pizzas with whole wheat crust; frozen triple cheese pizza; triple meat pizza; Greek yogurt with honey; yogurts with fruit; frozen roasted chicken entrée (low sodium); infant formula; health or diet products; instant soups; savory snacks; margarines or spreads; milk drinks; juices with sugar added; distilled beverages.

"Eat minimally processed food and limit processed and, especially ultraprocessed food." This is the central tenet of the NOVA system proposed by Carlos Monteiro and colleagues—public health researchers in Brazil who suggest this is a strategy that can be used to combat the rise in obesity and attendant chronic diseases (19,21–23).

The NOVA system was first adopted as part of the Brazilian Dietary Guidelines and subsequently was accepted by the Pan American Health Organization (part of FAO/WHO). To follow the system, the guidelines suggest that consumers avoid foods in group 3 defined as processed foods (PFs), as well as foods in group 4 defined as ultraprocessed foods (UPFs) and instead choose minimally processed foods (MPFs) cooked at home.

The foods listed in the four groups in the above quiz are grouped by the extent of processing, as defined by Monteiro and colleagues (19,21–23). As discussed in the previous article on definitions of processed foods, specific foods in any one category may have vast differences in the number of processing steps involved or use of complex technologies (10). Further, added criteria such as the

inclusion of many ingredients or added salt, sugar, or additives may place foods in groups 3 and 4, the PF and UPF categories.

This categorization scheme raises several concerns. Because processing complexity may or may not characterize a specific food in any of the categories and there are many definitions of processing (10), this could create confusion for consumers and professionals alike. Further, the lack of category standardization is problematic—even in various research reports testing the NOVA classification, where some researchers use three groups and others four. Additionally, there is inconsistent placement of certain foods in different groups.

Studies using food-intake databases for children and adults from a number of countries throughout the lifespan show that PFs and UPFs make up more than 60% of calories consumed and contribute most of the added sugar and salt in the diet (1–3, 7,11,12,15–17,22,25,26,29,31,33). However, the research presents a classic tautology, in that foods with added sugar and salt are deemed to be PFs or UPFs. Nevertheless, these studies show that the ingestion of PFs and UPFs is associated with increased risk of several negative health outcomes, including unhealthy lipid profiles in children (30) and coronary disease later in life (24). In addition, they are blamed for causing certain cancers and diabetes (35).

Other analyses, however, such as one that used the International Food Information Council (IFIC) food processing continuum, which has five categories, and the NHANES database, obtained different results for U.S. children (6) and adults (5). This analysis found that all processing levels contributed to nutrient intakes, and each processing level contributed nutrients to be encouraged and food components to be reduced. Further, the authors note (5,6) that processing level was a minor determinant of the nutrient contribution of individual foods to the diet. Furthermore, DASH (Dietary Approaches to Stop Hypertension), U.S. Department of Agriculture (USDA) MyPlate, and Mediterranean diets, which include a balanced mix of foods from all processing levels, as well as breads and grains in recommended amounts, are all associated with a number of positive health outcomes (14,18,32).

Proponents of the NOVA system claim that PFs and UPFs, especially, contribute to caloric density and mindless eating. They also posit that if people were to prepare foods from minimally processed ingredients they would eat less. However, no data have been collected to show that consumers and health professionals understand the scheme or can apply it in practice or that the scheme motivates greater consumption of fruits, vegetables, and whole grains and lower consumption of foods to limit. Additionally, there is great concern that consumers from all socioeconomic levels and abilities (physical and cognitive) have the time, skills, food availability, and resources to prepare safe and appealing foods with little salt or sugar (13,27,34).

It is possible that as a result of the NOVA scheme, consumers might either ignore dietary advice altogether or, in trying to comply, actually consume fewer fruits, vegetables, legumes, and whole grains. Further, by placing all ready-to-eat cereals, cereal bars, and most breads in the PF and UPF categories, there might be a decrease in consumption of the important nutrients that whole and fortified and enriched grain-based foods contribute to the diet (4,8).

Finally, there is a lack of published studies demonstrating that the NOVA scheme results in better diet selection and health outcomes than previously vetted schemes, such as MyPlate, DASH, or Mediterranean-style diets, which recommend a balanced mix of foods from all food groups and focus on the caloric and nu-

trient contributions of foods, not on the degree of processing. Associations between these vetted dietary patterns and lower body weights and better health outcomes have been shown, and these diets have also been shown to be in line with environmental sustainability (28).

The interactive session at the AACCI Cereals 17 meeting, Food Selection According to Food Processing: Fabulous or Flawed? will discuss the NOVA scheme—its advantages and flaws; concerns about its impact on the cereal grains industry and public health; communication needs and strategies for addressing the NOVA categorizations; the roles of members in government, industry, public health, and research in delineating research gaps; and other issues facing each sector.

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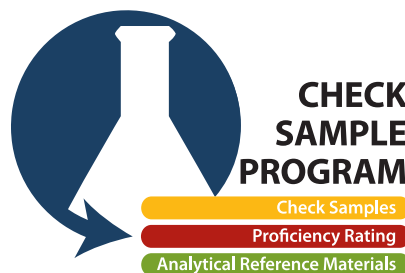
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