***A stealth health approach to dietary fiber***

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To the Editor,

Average dietary fiber intakes have increased little in the past twenty years in many countries, including the USA [1]. Multi-million-dollar campaigns promoting fruits, vegetables, whole grains, and other foods high in fiber have delivered only small changes [2], and consumers have not changed from traditional staples to whole-grain options [3]. UK millers report that consumption of whole-wheat bread has actually declined over the past decade [personal communication with Dr. P. Shewry]. In the US, white flour, which is lower in fiber, accounts for nearly 40% of the fiber intake [4]. We believe that since motivating consumers to change food choices has proven difficult, changing food itself — a so-called “stealth health” approach — could be a useful strategy to increase fiber in the foods people choose to eat.

Socioeconomic status, education, accessibility, nutrition, tradition, ethnic and cultural preferences all inform food choice. But the most important food attributes are sensory — color, texture, and taste — and these can be influenced by food chemistry. Consumers recognize that whole wheat bread appears and tastes different than white bread.

Food science has the potential to deliver greater nutrients of concern in commonly eaten ingredients while preserving consumers’ food experiences. The enrichment and fortification of commonly ingested foods with vitamins and minerals known to be at risk in a population is a strategy governments use to address nutritional insufficiencies. With such a strategy consumers’ food experience remained unchanged and the inadequate nutrient intake was addressed. In the US, for example, iodine was added to salt to address goiter, and enriching and fortifying refined grains with B vitamins such as niacin eliminated the pellagra formerly endemic in southeastern states. The addition of folic acid to cereal grain products reduced spina bifida and birth defects in North America by nearly 50%. Since the addition of fiber can dramatically impact the texture and palatability of foods, the addition of fiber to foods creates challenges to the food scientist and the plant breeder not seen with previous enrichment or fortification.

Breeders are making exciting progress by selecting and crossing wheat with naturally (non-GMO) higher-than-average levels of different types of fiber, creating a palette of food applications and nutrition choices for millers and bakers. Wheat experts have compared cultivars and identified those that naturally deliver high levels of the major fiber component in the starchy endosperm of the grain. The endosperm is the part of the grain used to make refined (white) flour and its major fiber component is called arabinoxylan (AX) [5,6]. By selecting wheat genotypes with higher levels of AX, breeders can increase fiber levels in whole-grain foods and also increase the total fiber content in white flour by about 25% compared to currently popular cutivars resulting in up to 3 grams per day of additional fiber [7]. Future efforts to increase AX should deliver an increase of 50% in the total fiber content of white flour, with a corresponding effect on whole-grain products. Modern high yielding cultivars contain more AX than older types indicating that there is no significant yield drag (Lovegrove et al, 2020) and hence no effect on cost of production while evaluation of cultivars and breeding lines with high and low AX in the UK has shown similar performance to current commercially popular wheat cultivars when producing the most common grain food in America: white bread

Several research programs are also breeding cultivars with increased amylose [8,9], a component of starch which is resistant to digestion in the small intestine in processed foods and therefore contributes to the fiber fraction. High amylose wheat cultivars are already commercially available and some breads and other grain-based foods are found in some markets [11].

More research is needed. More nutritional research is needed to determine the phsiological roles of AX, and resistant starch and other types of fiber when consumed both individually and in combination as part of various foodstuffs and diets. Food intake studies are needed to quantify their impact on total dietary fiber nutriture and to test whether this effort reduces the significant ‘fiber gap’. Food science research is needed to better understand their functional role in food applications. To create an aligned food supply chain, resources must be made available for wide-spread planting and food production of higher-fiber grains. Groups that recognize the value of increasing dietary fiber for public health should fund high fiber grain development and implementation. A novel collaboration between agri-food, government, healthcare, and researchers could ensure that key stakeholders, including farmers and consumers, benefit without an impact on consumer prices.

Organizations incentivizing grain fiber must be clear about what they’re purchasing. For acceptance by all sectors- agriculture, industry, bakers, millers, nutritionists and food professionals, standards must be developed for operations, commercial agreements, and communication. These standards should be determined by key stakeholders, including agricultural and nutrition scientists, farmers and other members of the agri-food and nutrition supply chain, healthcare professionals, community leaders, and regulators. The socio-economists connected with these groups can provide data and analytic models to prioritize required grain breeding, food science, nutrition, and healthcare research, development, and implementation; identify any unintended consequences; and measure health and economic impact. Together, such a coalition can agree on needed standards and other methods of coordination.

For the wheat supply chain, efforts to improve the nutritional content of key staple foods can also contribute to brand loyalty, bolster industry perception, and demonstrate a desire to be socially responsible.

The US Dietary Guidelines Committee designated dietary fiber an “under-consumed nutrient of concern” [9]. Recent studies showing differences in fiber amounts in various wheat cultivars provided a basis for agri-food technology and related infrastructure for stealth health to increase fibers in desired foods. Government, healthcare, and other organizations who understand the importance of dietary fiber to nutrition and public health should incentivize this increased fiber incorporation.

The Coalition for Grain Fiber (CGF), the first initiative of a recently established nonprofit, gathers over 60 international scientists and professionals committed to transforming the food industry by prioritizing the role of nutrition in overall health. CGF is adopting the approach described in this article by the Foundation for Innovation in Healthy Food [12], with detailed planning for the effort already begun. This approach has the potential to reduce the fiber gap and mitigate chronic disease risk and significantly decrease healthcare costs. It also has potential to benefit all socioeconomic groups, while not requiring a change in consumer behavior.

Fiber may be available from many sources today — but it remains an insufficient part of people’s diets. Good science and “stealth health” can change that.

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