ARSENIC AND RICE

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The recent sharing of a newsletter article penned by Dr. Tim Sandle via social media opened a floodgate of accusations and a rush to conclusions without doing due diligence of carefully reviewing the literature and winnowing facts from myths. Since rice consumption is such an integral part of our culture, any associated health issue becomes a matter of utmost concern. This is an attempt to cull the data objectively and make sensible recommendations.

Certainly, tackling rice use and cooking can amount to a fool's errand since it's so steeped in tradition and our national psyche. Nonetheless, it's a worthwhile exercise because, as H. Jackson Brown once said, "When facing a difficult task, act as though it's impossible to fail." What may come to us as an unpleasant surprise that rice is laced with heavy metals and, primarily arsenic, has been known for quite some time. To fully comprehend the stakes, let's delve into the particulars.

Rice. The varieties of this cereal run into the thousands. It has 3 edible components:

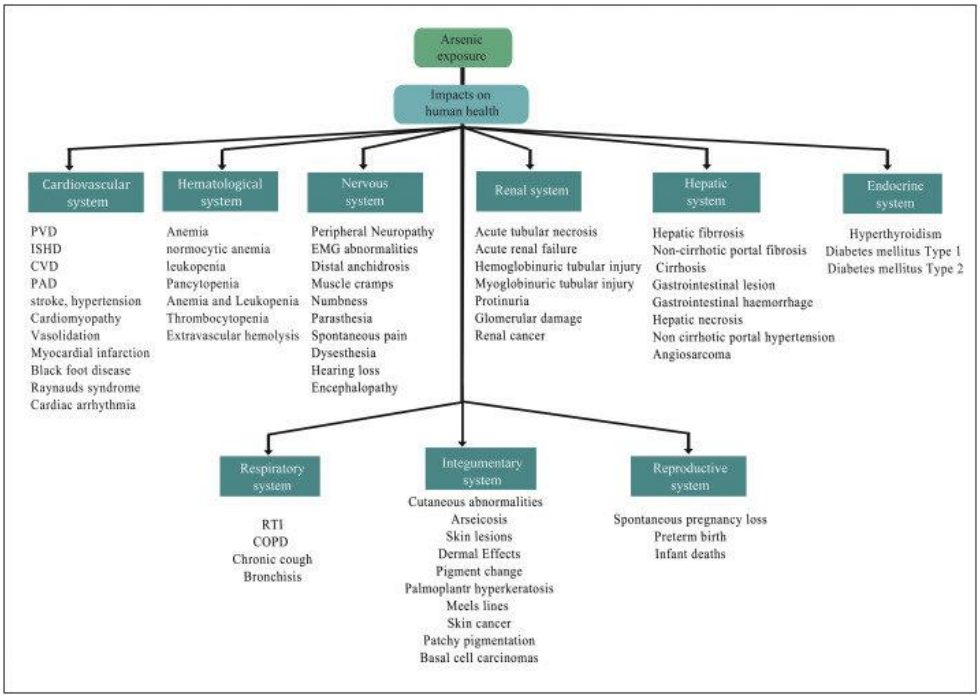
a) the bran just below the husk.
b) the germ or embryo.
c) the endosperm.

It needs to grow in plenty of water, and therein lies the problem. The soil has arsenic because it occurs naturally; it is an integral element of the earth's crust. Rice has an affinity to absorb arsenic and far more than any other crop. The concentration of arsenic in the soil and water can increase because of pollution (insecticides, coal mining, leeching of preservatives from wood and paint into the water system). Therefore, the amount of arsenic in rice depends on the soil content of it.

The main types of rice for consumption include whole or refined forms. Whole rice includes brown, black, violet, and red. The refined type is white. The nutritional value of each variety differs. Refined rice is essentially the endosperm or the starchy part. It contains less arsenic but at the cost of significant loss of nutrients such as B vitamins, minerals, and fiber. Each variety's starchy content and glycemic index will warrant another review, but suffice it to say that plain white rice is at the bottom of the health ladder.

Arsenic. As stated above, it is a known poison. However, the inorganic type is the one that possesses this distinction. The organic type doesn't. Arsenic in the soil gets absorbed by rice,

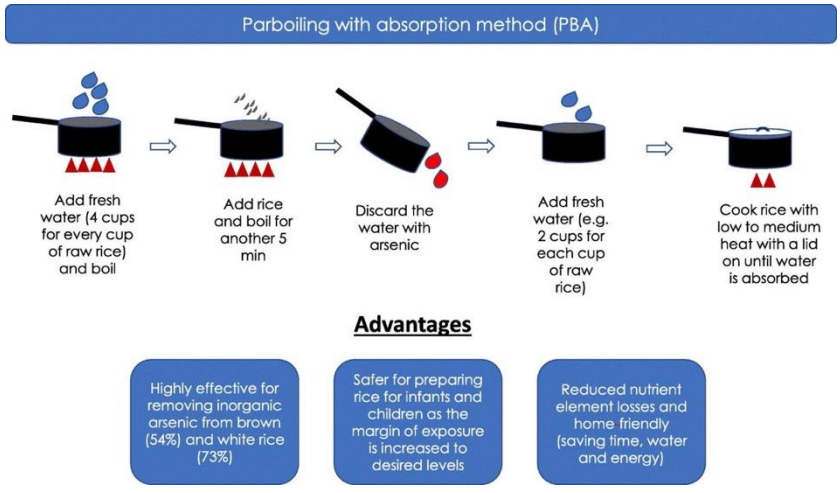
whether grown under normal or organic conditions. In the US, among rice-producing states, California ranks lowest, and Louisiana ranks highest in arsenic content in the soil. Arsenic poisoning can cause a range of complications involving various systems, as seen in the graph below. Children are especially susceptible. Arsenic, however, is a carcinogen and is especially harmful to pregnant females.



Health consequences of arsenic (ResearchGate)

The arsenic content of soil varies by geographic location. Unfortunately, the Indian subcontinent retains the highest exposure to Arsenic, with Bangladesh holding the highest concentration.

Available option to reduce inorganic arsenic in rice. Adapted from Menon et al. This method supposedly reduces the level of inorganic arsenic in white rice up to 72% and about 50% in brown rice.



The case of Haiti.

The above newsletter referenced an article published last year by Koski-Karell, V., Monprevil, R. J., Schell, J., Sampson, N., Charles, S., & Goodrich, J. M. (2023). Exposure to the global rice trade: A comparative study of arsenic and cadmium in rice consumed in Haiti. *Journal of Agriculture, Food Systems, and Community Development.* The findings:

> We found that median concentrations were nearly two-fold higher for both arsenic and cadmium in imported rice (0.15 μg/g and 0.007 μg/g) compared to local rice (0.07 μg/g and 0.003 μg/g). Our simulation of arsenic intake through rice consumption suggests that adults of varying weights consuming *3 or more cups of imported rice per day would exceed a daily minimum risk level for toxicity. The simulation also suggests that most children consuming 1 or more cups of local or imported rice per day would exceed a health-based arsenic intake limit.*

The conclusion is debatable, while the data are not. Clearly, the soil in Haiti contains less arsenic than the soil from which the rice is imported. However, the average family in Haiti cooks between 1 cup and, at most, 2 cups of rice a day. An adult consuming 3 cups or a child eating 1 cup daily is unheard of. Maybe this was a typo. Nonetheless, this should be used as a good reason why local rather than imported rice should be the daily staple. We have enough cardiovascular disease burden. We don't need to add to it.