HUMAN EXPOSURE TO ARSENICALS IN SEAFOOD

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INTRODUCTION

Seafood is a staple and functional food. However, seafood is also the main dietary source of total arsenic exposure in humans, excluding regions with widespread elevated drinking water contamination. Arsenic in seafood is primarily found in a variety of organic chemical forms, such as arsenobetaine (AsB), arsenosugars, and arsenolipids that present considerable challenge for food safety regulatory authorities. Total arsenic as an indicator for risk assessment is inadequate. Current regulations for arsenic exposure focus mainly on inorganic arsenic (iAs), a well characterized Class A carcinogen, and AsB an organic arsenic species that is non-toxic. Knowledge of arsenic speciation is the key as the chemical form of arsenic controls its bioavailability, mobility and toxicity. Toxicity of organic arsenicals is unknown and the International Agency for Research on Cancer (IARC) classifies virtually all organoarsenicals as potentially toxic. Seafood is considered safe owing to the benign nature of AsB that predominates and the low levels of iAs. However, this is not true in all cases because, for example, the edible seaweed Hijiki (Hijikia fusiformis) has elevated quantities of iAs. Recent toxicokinetic studies also show that some organoarsenicals are bioaccessible and cytotoxic with toxicities similar to that of iAs. It is therefore imperative to target and quantify these organoarsenetic species in order to adequately determine the risk associated with consumption of seafood.

EXPERIMENTAL

RESULTS

DISCUSSION

1. Of concern is the level of toxic iAs in spirulina. While spirulina is not a typical dietary source, it is widely consumed as a dietary supplement because it has many other health benefits. Dietary supplements are not typically regulated, however, in this case where they pose risk to the health and safety of consumers, it may be prudent to provide consumption guidelines by notifying the consumers of the inherent risks. It is therefore important to monitor the consumption patterns of spirulina and probably consider adding it to the list of food products for which regulatory limits should be established. 2. The main As species detected in seaweed is arsenobetaine, which is non-toxic. In seaweed, like kelp, the main As species are arsenosugars with unknown toxicities. 3. Work presented here is only for polar arsenicals and does not consider lipophilic arsenicals, like arsenolipids some of which are known to demand high toxicity.

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