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Opinion

Possible Human Exposure Routes of Emerging Contaminants

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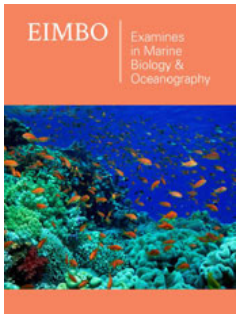

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Opinion

Contaminants are emerging everyday with new products in market and their application in daily use things that carry future health concerns from ecosystem to human health. Emerging Contaminants (ECs) are now used from food products [1,2] clothing [3], to furniture [4]. With their application the fate and transport to surface waters are very well documented in USEPA report and literature [5,6]. Wastewater dilution in surface water demonstrated the highly susceptible areas with these CEC content [7]. When the diluted surface water used in either land-based farming, aquaculture, mariculture, and agriculture may bioconcentrated in resulting products and move up to the food chain reaching human.

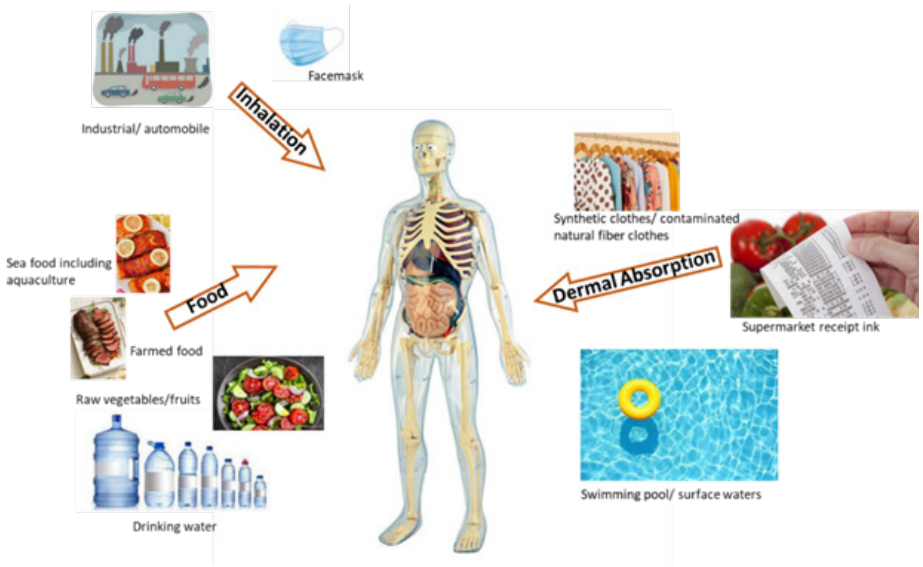

Figure 1: Different pathways for contaminant exposures in human.

Depending upon their presence in environment human may exposed from inhalation, ingestion or adsorption (Figure 1). As documented in various studies the presence of ECs from raw vegetables [8,9] wild capture from aquatic systems [10-12] and in drinking water systems [13,14]. To identify these routes and risk, we recently exposed tilapia fingerlings to two ECs, a high blood pressure medicine (Diltiazem) and another a PFAS compound, Gen X [15,16]. Gen X is recently identified as a highly concerned PFAS by USEPA and necessary actions are starting

to be in place soon. The amount of both ECs bioconcentrated in fish fillet were enough to expose a human if they eat just more than a portion during a day. The kinetic potential for both the ECs was also determined to be a risk for the grower from product quality point and for consumer from health perspectives.

Adsorption *via* skin surface also possible in some cases, generally referred as dermal route of exposure [17] (e.g., crystal violet and its homologues are detected in ink from printing receipts [18]. Garcia et al. [19] reported a review on EC presence in indoor air and associated to the suspended Particulate Matter (PM) and settled dust. The wide range of EC from pesticides, flame retardants and other class of chemicals was documented in a high range in both indoor and outdoor spaces. Using contaminated clothes can also increase the risk for dermal absorption [20], increase allergic [21] and toxic effects. Similarly, eating contaminated vegetables can increase the health risks [22]. Such an increased amount of exposure caused EC contamination not only in kids and adults, but also in unborn foetus in mother womb [23]. Once a contaminant enters into the human body, it may partition in various body parts including brain tissue [24]. Therefore, there is a need to identify the ECs, calculate their risk and prepare policies and laws to limit exposures.

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