影響西卡毒與重金屬有毒物質的生物累積性之因素探討

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111 年 10 月 26 日

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三、利用地理空間和環境分析對夏威夷的 *Cephalopholis argus* (Epinephelidae) 進行西卡毒素預測

四、西地中海 (阿爾梅里亞灣) 常見食用魚種潛在的有毒元素:肝臟與肌肉組織的生物累積和生物特徵指標的關係

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摘要

海洋汙染中的有害物質，包含動物性天然毒素的西卡毒 (ciguatoxins, CTX) 和化學性的重金屬毒素，這兩者毒素皆會透過生物濃縮作用 (bioconcentration)，在生物系統的食物鏈中循環反應，使其濃度在生物體內逐漸累積，造成人類食品中毒的風險。廣泛應用於 CTX 檢測的方法是由神經母細胞瘤 (Neurro-2a) 細胞內分析試驗法 (cell-base assay, CBA)，可以初步確認樣品中的 CTX 存在，配合 LC-MS/MS 可以用來分析各種 CTX 衍生物。地理空間及環境因素會影響有毒甲藻及捕食者的生存環境，這些可作為預測 CTX 爆發區域的參考因素，魚類的大小也會影響 CTX 積累的含量不同。重金屬 As、Cd、Cr、Cu、Ni 和 Pb 是潛在的有毒物質，因人類在工業上的高度發展產生的環境汙染，物種特徵與身體組成成分會影響重金屬含量及部位的累積，鎘含量與魚類脂質、有機物含量及大小有關，砷含量與魚的高蛋白質含量有關，且紅鯔魚 (*Mullussur muletus*) 特別容易將砷累積於肌肉組織而不是肝臟，肌肉為魚類可食用部位，生物蓄積可能放大帶來的風險，但以危害商數 (THQ) 評估重金屬數值小於 1，表示目前在阿爾梅里亞灣捕捉的魚類沒有對人體健康的風險。

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