

A TRANSPOSABLE ELEMENT–EPIGENETICS PERSPECTIVE TO UNDERSTAND ANTIMICROBIAL RESISTANCE (AMR) AND CONTAMINATION BY ENDOCRINE DISRUPTING CHEMICALS (EDCs) LIKE HEAVY METALS, BIOCIDES, GLYPHOSATE, MICROPLASTICS, BIS(2-ETHYLHEXYL) PHTHALATE (DEPH), AND PER- AND POLY-FLUOROALKYL SUBSTANCES (PFAS): ADAPTATION TO GLOBAL CHANGE

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Somos lo que comemos / We are what we eat’

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Antibiotic-resistant pathogens are a public health concern, and better understanding of the underlying processes responsible for this continuous expansion is urgently needed. Here we discuss transposable elements (TEs) and epigenetic components in the context of ONE HEALTH to understand AMR and neuroendocrine disrupting chemicals (EDCs) in soil, animals and people, and adaptation to global change via horizontal gene transfer and horizontal transfer of transposons.

Heavy metal/biocide and antibiotic resistance genes (ARGs) co-selection has been suggested as one potential mechanism promoting the proliferation of antimicrobial resistance (AMR) in livestock farming. Metals are used as growth promoters and biocides as disinfectants with little restrictions in livestock farming. The interplay of metals and biocides was recently reported in pig farming, with pigs under continuous antibiotic exposure displaying the highest co-occurrence of ARGs and other genetic elements while the pigs under limited use of antibiotics still showed abundant co-occurrences (Li *et al.* 2022). Pathogens belonging to Enterobacteriaceae displayed increased co-occurrence phenomena, suggesting that this maintenance is not a random selection process from a mobilized pool but pertains to specific phylogenetic clades. These results suggest that metals and biocides displayed strong selective pressures on ARGs exerted by intensive farming, regardless of the current use of antibiotics. Very little has been published for aquatic species on the interplay of co-selected non-antibiotic factors metals and biocides.

Bis(2-ethylhexyl) phthalate (DEPH) is the most common member of the class of phthalates, which are used as plasticizers, and the most used for the widely used plastic polyvinylchloride (PVC) used in aquaculture. DEPH can cause cancer and birth defects or other reproductive harm. Exposure to DEHP may increase the risk of cancer and may also harm the male reproductive system. DEHP exposure during pregnancy may affect the development of the child. DEHP is also an antimicrobial from the species of the genus *Burkholderia*, filamentous bacteria like *Nocardia levis*, *Streptomyces sp.*, and other actinomycetes like *Saccharothrix sp.* (Bharti & Tewari, 2015). A review of the molecular mechanisms involved in TEs-epigenetics interactions associated with AMR is presented using metals-biocides, microplastics-phthalates, and PFAFs as examples. Urgent transgenerational epigenetic inheritance-One Health research is needed to address them.