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BACKGROUND

- Particulate compounds like microplastics and carbon nanomaterials are released into the environment via air and water.
- adsorb toxic chemicals onto their - Can surfaces, leading to concentrated exposure (Wang et al. 2018).
- Certain pharmaceuticals (e.g. analgesics, hormonals, antineoplastics) pose a risk for aquatic species.
- Ingestion of contaminated nanoparticles and microplastics particles by fish and other organisms is a concern.

OBJECTIVE & HYPOTHESIS

- Objective: Investigate the impact of particle adsorption on bioavailability of ethinyl estradiol (EE2) in fish using vitellogenin (VTG) as an indicator.
- Hypothesis: Single-walled carbon nanotubes (SWCNTs) will adsorb EE2 and reduce bioavailability and subsequent bioactivity of EE2 in male fish.

Nanoparticle and EE2 Adsorption/Desorption Experiments

Fish	Gavage	
X4-0	25 mg/L 0.2 mg/L	
		48 h
С х8	HO HO	
	25 mg/L 4 mg/L	

Desorption Experiments

Compound	Concentration (mg/L)	Procedure 1. SWCNTs qui
SWCNTs	25	
Estradiol (E2)	0.003	2. E2 or etha
Trypsin 100	100	 3. Orbital sha 4. Protein or 5. Orbital sha 6. Centrifuge 7. 50 uL supe counts per counter
Pepsin 100	500	
Low Bile	1	
Medium Bile	10	
High Bile	100	

Effects of particle adsorption in aquatic environments on the bioavailability of pharmaceutical contaminants in fish



Wang, F., Wong, C. S., Chen, D., Lu, X., Wang, F., & Zeng, E. Y. (2018). Interaction of toxic chemicals with microplastics: a critical review. Water research, 139, 208-219.

Figures 2 & 3: Fold change in VTG liver mRNA in male fish (largemouth bass and fathead minnows) exposed to SWCNTs, EE2, or mixture of the two via gavage. Asterisks represent groups with increase vitellogenin expression levels when compared to controls (p < 0.05).

Figures 4 & 5: Calculated E2 remaining in supernatant following addition of SWCNTs alone or SWCNTs with protein and bile. Letter groupings indicate differences in adsorbed E2 (p < 0.05).

FUTURE DIRECTIONS

Largemouth bass feeding experiments have been conducted with SWCNT mixtures using dichlorodiphenyldichloroethylene (DDE) and

Planned LC/MS tissue analysis to assess adsorption particle on

Adsorption experiments planned for DDE and venlafaxine with SWCNTs using LC/MS methods

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