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Elevated Urine Silicon When a New Fishing Season Starts: Implications for Diatom Frustules in Trash Fish and ESCC

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Background

 The incidence of esophageal squamous cell carcinoma (ESCC) in China has remained persistently high with significant geographical clustering in highincidence areas. While the regional etiology of ESCC remains incompletely understood, accumulating evidence suggests that environmental cause may play a pivotal role in its pathogenesis.

2. Dietary components, particularly silica fibers in food, have been implicated in ESCC etiology due to their sharp edges potentially causing repeated esophageal damage and chronic injury^{1,2}. In some river basins, these fibers mainly exist as diatom frustules in diet, which may enter the human diet through the consumption

Results

 Fish intake change: Compared to the closed season, the fish products intake by participants significantly increased after the new fishing season opened.



- of filter-feeding trash fish.
- The Dawen River Basin represents a region with notably high ESCC mortality rates. Based on above evidence, we hypothesize that the exposure of sharp diatom frustules from local fish may serve as a potential environmental risk factor for ESCC.



Objectives

We aimed to assess diatom frustule exposure from fish-related diets during closed and open fishing seasons, focusing on changes in **fish intake**, **urinary silicon levels**,

 Urinary silicon change: Urinary silicon levels were increased during the open season compared to the closed season. The trash fish intake increased during the open season, increasing urinary silicon.

80-	Eaters of trash fish only after Sep. 1 (n=11)	Eaters of trash fish in all months (n=11)	Eaters of fish but not trash fish (n=11)
	p = 0.011	p = 0.700	p = 0.240
60			

and fecal diatom frustule presence.

Method

1. Natural experiment design

Two time points: 1 week before the open season, 2 weeks after the open season.



2.Questionnaire

Basic information and fish diet during the closed and open seasons were investigated.

3.Urinary silicon measurement

Urinary silicon levels were measured and adjusted based on creatinine.

ICP-OES

Urine Urine Urinary silicon Urinary creatinine



 Fecal diatom frustules: Sharp diatom frustules were found in feces of those who ate trash fish after new fishing season opened.





Urine analyzer

4.Fecal diatom detection

Diatom frustules in feces were identified by an automatic diatom identification system.



References

- O'Neill, C., Clarke, G., Hodges, G., Jordan, P., Newman, R., Pan, Q.-Q., . . . Toulson, E. (1982). Silica fragments from millet bran in mucosa surrounding oesophageal tumours in patients in northern China. The Lancet, 319(8283), 1202-1206.
- Lian, C., Xie, S., Li, W., Ran, J., Zhang, J., Han, Z., . . . Tian, L. (2019). Association of wheat chaff derived silica fiber and esophageal cancer in north China. Ecotoxicology and Environmental Safety, 178, 79-85

Conclusion

The natural experiment of before and after September 1, when a new fishing season starts, provides us with an opportunity to examine the intake of diatom frustules via trash fish in an area with high esophageal cancer rate. Elevated urinary silicon levels and the detection of diatom frustules in feces encourage us to further explore the 'glass roots' of esophageal cancer in China.

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