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OCCURRENCE AND RISK ASSESSMENT OF ESTROGENS AND ANTI-INFLAMMATORIES IN BAIYANGDIAN LAKE, NORTH CHINA

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Abstract

Estrogens and anti-inflammatories can pose adverse effects on human health and wildlife. This paper investigated four estrogens (estrone, E1; 17 β -estradiol, E2; estriol, E3; 17 α -ethynylestradiol, EE2) and three anti-inflammatories (ibuprofen, ketoprofen and naproxen) by solid-phase extraction (SPE) and liquid chromatography tandem mass spectrometry (LC-MS/MS) in Baiyangdian Lake during the dry (April) and wet seasons (September). These compounds were mostly detected at low levels (ng/L). The occurrence and spatial distribution of these compounds varied noticeably with the sampling seasons, particularly anti-inflammatories which were present in levels 1–2 orders of magnitude larger in the wet season than in the dry season. The concentrations of these compounds at sampling points S1, S4 and S9 (adjacent to the Fu River), S2 and S8 (affected by human activities) and S3 (receiving the input of more upstream pollutants) were higher than at other sampling points. The overall aquatic environment of Baiyangdian Lake was not at the “high risk” level, but at sites S1, S2 and S3 they were at the “medium risk” level mainly due to the mixture effect of estrogens. At site S2 the hazard quotient (HQ) reached a maximum value of 0.903. This HQ of almost 1 indicates that these estrogens pose a potential environmental risk of induced feminization of male aquatic organisms in Baiyangdian Lake.

Key words: anti-inflammatory, Baiyangdian Lake, estrogen, occurrence, risk assessment

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