

Cytotoxic Drugs in Drinking Water: A Prediction and Risk Assessment Exercise for the Thames Catchment in the UK

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Cytotoxic, also known as antineoplastic, drugs remain an important weapon in the fight against cancer. This study considers the water quality implications for the Thames catchment (United Kingdom) arising from the routine discharge of these drugs after use, down the drain and into the river. The review focused on 13 different cytotoxic drugs from the alkylating agent, antimetabolite and anthracycline antibiotic families. A Geographic Information System-based water quality model was used in the present study. The model was informed by literature values on consumption, excretion and fate data to predict raw drinking water concentrations at the River Thames abstraction points at Farmoor, near Oxford, and Walton, in West London. To discover the highest plausible values, upper boundary values for consumption, and excretion, together with lower removals values for sewage treatment were used. The raw drinking water cytotoxic drug maximum concentrations at Walton (the higher of the two) under mean and low flow conditions were predicted to be, 11 and 20 ng/L respectively from the 5 combined alkylating agents, 2 and 4 ng/L for three combined antimetabolites and 0.05 and 0.10 ng/L for two combined anthracycline antibiotics. If they were to escape into tap water, the highest predicted concentrations would still be a factor of between 25 to 40 below the current recommended daily doses of concern. While the risks may be negligible for healthy adults more concern may be associated with special sub-group populations such as pregnant women, their fetuses and breast-feeding infants due to their developmental vulnerability.

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