

Estrogen Content and Relative Performance of Japanese and British Sewage Treatment Plants and their Potential Impact on Endocrine Disruption

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Both the UK and Japan are densely populated islands with relatively short rivers. Therefore, both countries are likely to be highly exposed to contaminants emanating from their human populations. This review considered how effective the different sewage treatment facilities of the two countries are at removing steroid estrogens from the effluent. The methods of estrogen analysis in sewage effluent, the number and importance of different sewage treatment types, and their apparent effectiveness at removing estrogens were all considered. In both countries, the activated sludge treatment was dominant in terms of people served and water discharged. The analytical techniques used by those studying estrogen concentrations in effluents in both countries were broadly similar. Activated sludge plant (ASP) effluent in the UK typically contained around 2 ng/L estradiol (E2) and 8 ng/L estrone (E1), while Japanese ASPs typically reported E2 as below detection, and 10 ng/L E1 in their effluents. When estrogenic bioassays were used in Japan, they typically record an estrogenic potency of 10 ng/L E2 equivalents. Even taking into account ethinylestradiol (EE2) (not found in Japanese effluents), the overall estrogenicity of British sewage effluents would appear to be the same as that of Japanese sewage effluents (around 10 ng/L E2 equivalents). This suggests that the ASPs serving the large urban communities in Japan and the UK would have effluent of similar estrogenic potencies. Less information is available about the more numerous biological (trickling) filter plants (BFP) in the UK and oxygen ditches (OD) in Japan which tend to serve smaller, more rural communities. The available data would suggest that the BFPs are significantly less efficient than the ODs at removing E1. This would suggest that in similar circumstances, British headwaters (where this sewage treatment plant (STP) type is often found) might be more at risk from endocrine disruption than their Japanese counterparts. Overall, the apparently higher incidence of endocrine disruption in British wild fish than in Japanese wild fish cannot be attributed to differences in the efficiency of their respective STPs.