# One Health Prescribing – New Analytical Methods to Inform Formulary Changes to Chiral Pharmaceuticals for Environmentally Friendlier Medicines.

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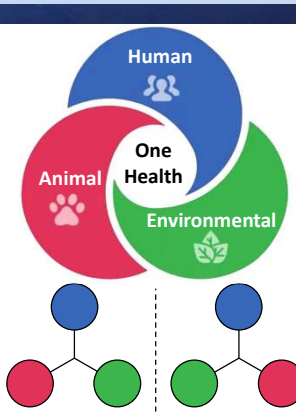
**Aim:**

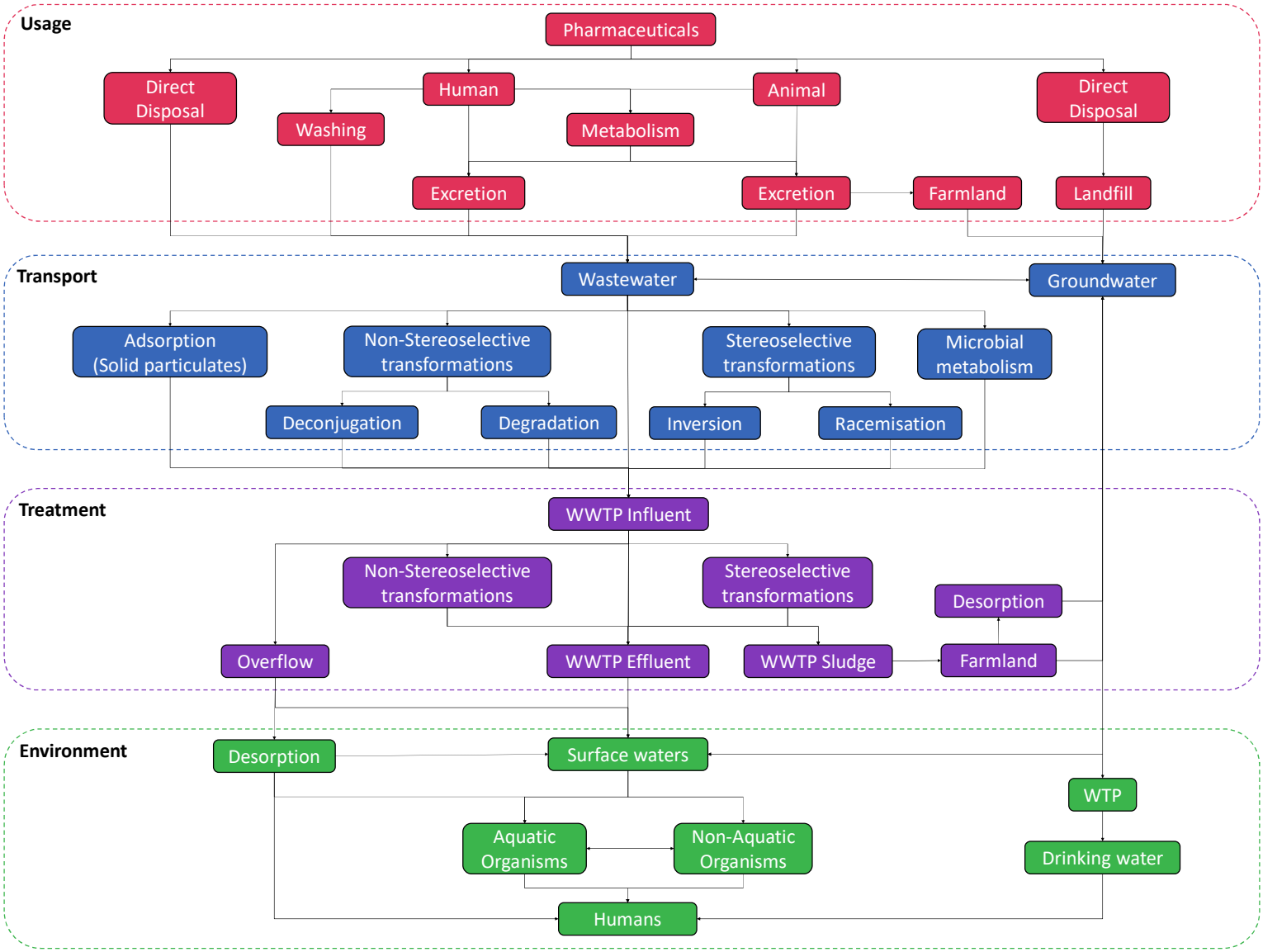
- *Improve source control of pharmaceutical waste entering Scottish waters.*

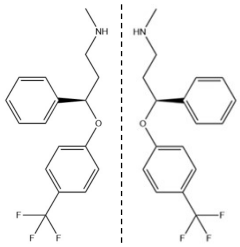
**Objectives:**

- *Develop new chromatographic methods for enantiomeric analysis of pharmaceuticals of concern in Scotland.*
- *Investigate the presence, fate, and effects of pharmaceutical enantiomers in the environment.*
- *Promote prescription policy changes for a more environmentally friendly Scotland.*




Approximately 56% of all pharmaceuticals are chiral (Singh, Sethi and Bhushan 2020). A chiral pharmaceutical exists in two forms, and each form is known as an enantiomer. A pair of enantiomers have the same chemical formula but different spatial arrangements, meaning they have identical chemical properties but different biological functions. 88% of chiral pharmaceuticals are prescribed as a racemic mixture (Singh, Sethi and Bhushan 2020), meaning both enantiomers together. The different effects that enantiomers can cause isn't unique to humans, different enantiomers of the same pharmaceutical can also have different environmental toxicities (Arenas et al. 2022).



For example, one enantiomer of fluoxetine (Prozac) is 30 times more toxic to aquatic organisms (protozoa) than the other (Andrés-Costa et al. 2017), however, they both have the same therapeutic effect, despite this it has been produced and prescribed since 1987 as both enantiomers. It is one of the most prescribed pharmaceuticals and is often detected in wastewaters (Andrés-Costa et al. 2017). Because enantiomers have identical chemical properties, they are difficult to analyse separately, therefore, new analytical techniques are needed to understand more about the fate and ecotoxicity of individual enantiomers (Vashistha 2022). From this we can begin to eliminate unnecessary ecotoxic enantiomeric waste through policy and formulary changes.

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