

# Investigating Pharmaceutical Distribution, Persistence and Degradation in Scottish Waters

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# Pharmaceuticals: 'Emerging' Environmental Contaminants

- Pharma extensively used: >102 mil prescriptions in Scotland (2015 – 2016)
- Entering environment mainly through inadequate wastewater treatment

Point Source



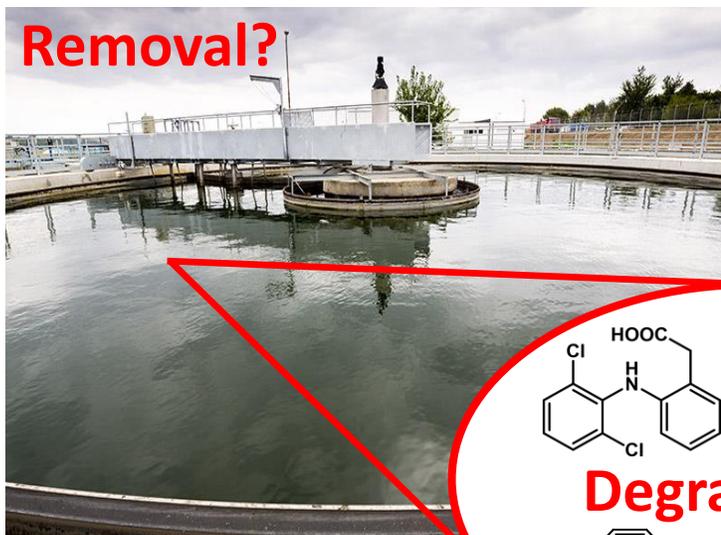
Wastewater Treatment



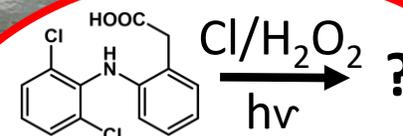
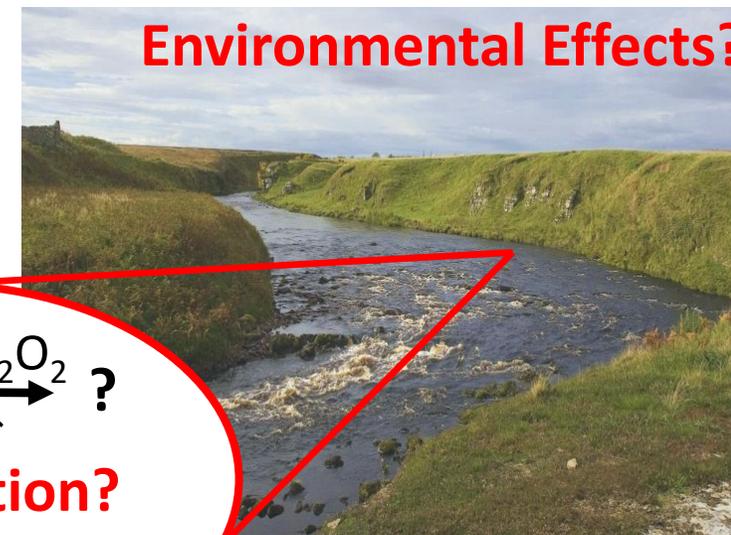
Surface Water



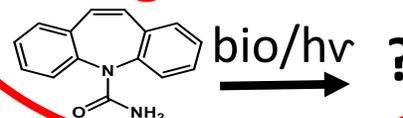
Removal?



Environmental Effects?



Degradation?



# My Research Aims...

To investigate pharmaceutical distribution, persistence and degradation in wastewater and effluent-receiving surface water

1. Develop analytical methods
2. Pharmaceutical monitoring (rural & urban)
3. Degradation studies



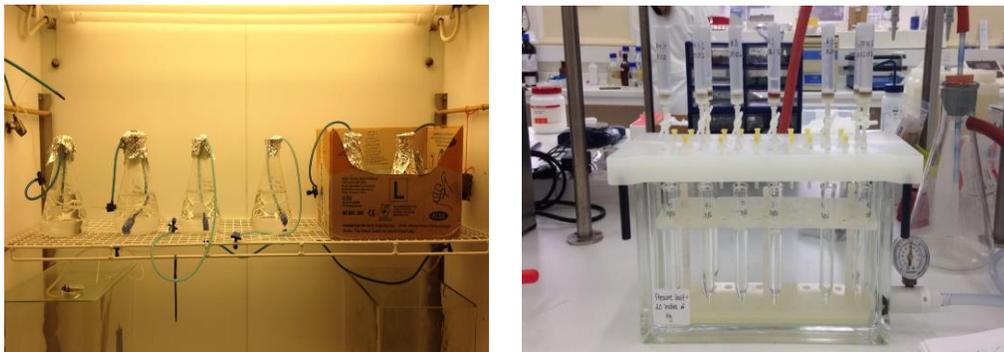
# Current Work...

- Hospital wastewater & WWTP sampling

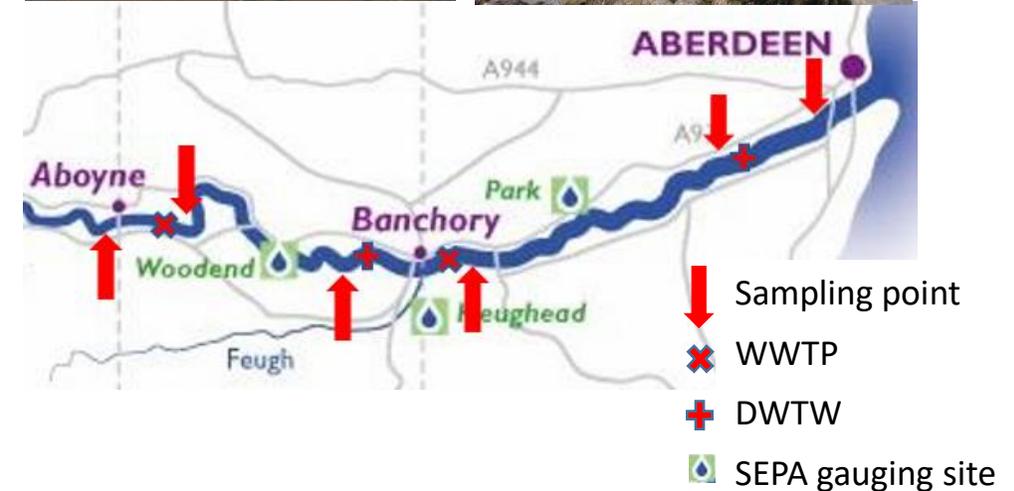


Water quality changes from source to final effluent

- Pharma degradation in lab-scale studies

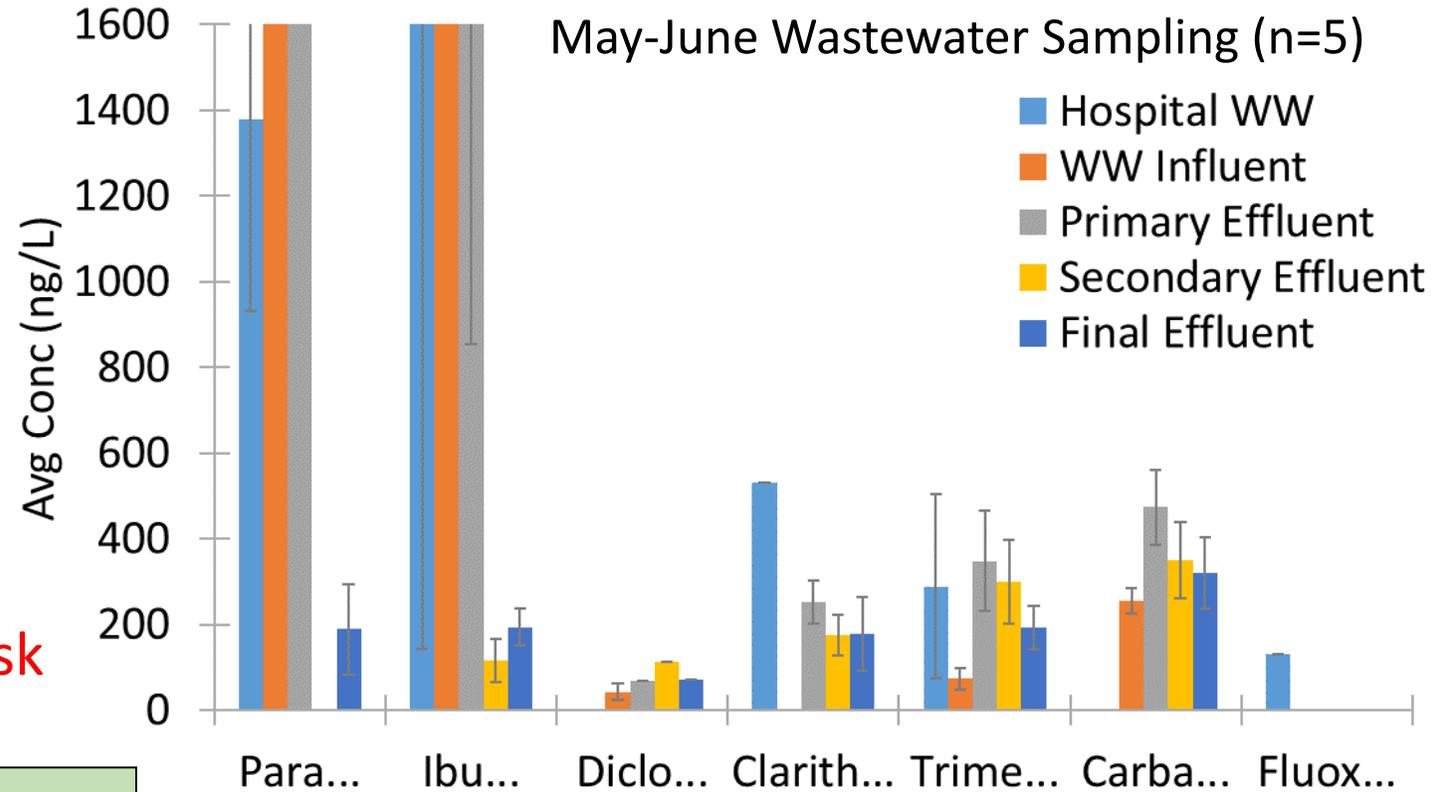


- Active & passive sampling in River Dee



# Results and Significance

- Pharma quantifiable in hospital wastewater and final effluent
- Hospitals impact pharma loads in municipal wastewater
- Rural WWTP ineffective for pharma
- Effluent-receiving surface water at risk



## Significance of research:

- ✓ Improve understanding of pharma life cycle
- ✓ Support water regulation policies in Scotland
- ✓ Protect water quality in Scotland

Conc (ng/L)	Hospital WW	WW Influent	Primary Effluent
Paracetamol	1380 ± 450	3790 ± 1030	4030 ± 420
Ibuprofen	2070 ± 1920	3180 ± 730	1840 ± 980

# Acknowledgements

- WWT Water Scotland Conference organisers and participants;
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## Thank you!!

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#### References

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