

# Sewage Epidemiology for the Assessment of Phthalate Health Risk in Ireland

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## Background

Phthalates are synthetic organic chemicals commonly used as plasticisers in PVC and additives in personal care products. Phthalates are ubiquitous within the environment, giving wide-range exposure to the public, and have been classed as endocrine disruptors, leading to a range of detrimental health effects. This project will pioneer in using sewage epidemiology to determine phthalate exposure in Irish population. Risk assessment data will be used to relate the level of exposure to an associated risk, providing the first step in phthalate risk assessment within an Irish population.

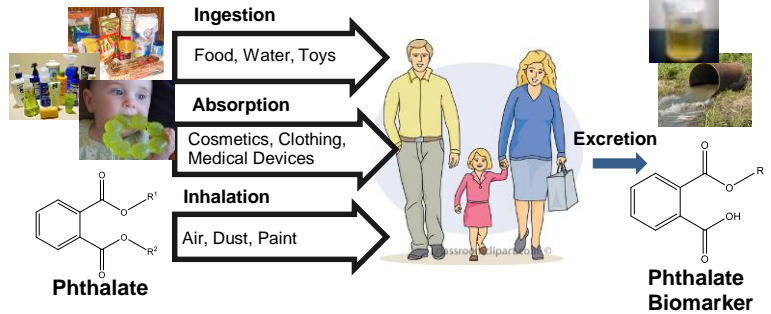
## Human Health Impact

Disrupt hormonal pathways leading to

- Association with birth defects in males
- Increased insulin resistance and obesity
- Decreased neurological development
- Association with some cancers

Often biomonitoring involves extensive, invasive and expensive individual sample collection (e.g. urine, blood, breastmilk) and does not capture the health of the public as a whole.

## Pathways of Exposure



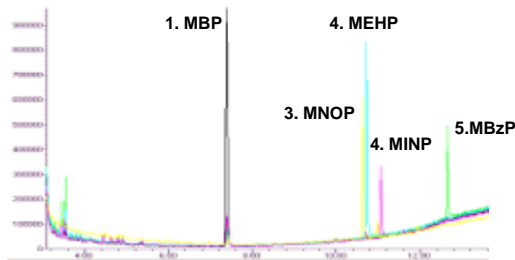
## Analytical Method Development

### GC-MS

Column: Phenomenex ZB 50, Injection port temperature: 130 ° C, injection volume: 5 µL, Mobile Phase: 130 °C to 200 °C @ 25 °C/min for 5 min, 200 °C to 270 °C @ 10 °C/min for 5 min Flow rate: 1 mL/min

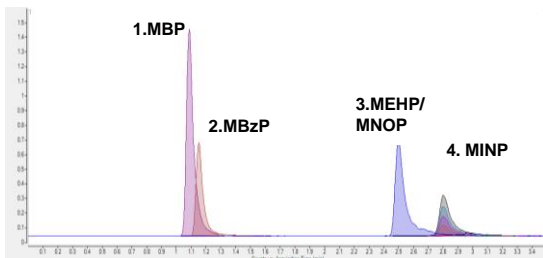
### Derivatization

BFTSA:TMS (75 µL, 99:1) is added to 75 µL phthalate residue and heated for 16 h @ 60 °C

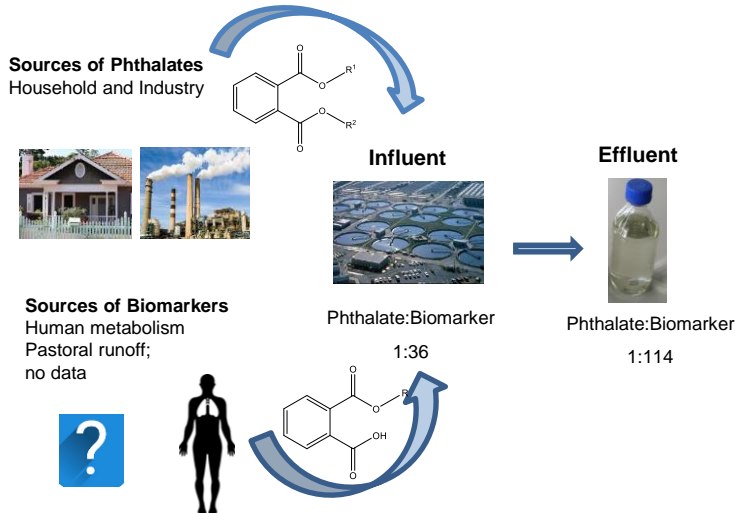


### LC-MS/MS

Column: Agilent Eclipse Plus C18 1.8 µm, 2.1 x 50 mm  
Flow rate: 0.5 mL/min Injection Volume: 5 µL  
Mobile Phase: A: Water, B: Methanol w/5mM Ammonium Formate  
Gradient Elution: 0 min 30%B to 35%B @0.1min to 40%B @0.4min to 45%B @0.6min to 55%B @1min to 60%B @1.5min



## Sewage Epidemiology



- Sewage Epidemiology is a cheap, easily accessible source of real-time information on public health
- Cannot get individual health data so defined risk is generalized for an "average" inhabitant
- Phthalate biomarker levels vary from influent to effluent depending on removal efficiencies etc. influent will therefore be used as a primary method for health risk assessment
- Results will be used to inform on future phthalate legislation

Research into the human health effects of phthalates is far from complete, and while phthalates including DBP, BBP, and DEHP have been banned or limited in manufacturing (in particular for items such as children's toys), new research is emerging which indicates that substitute plasticizers have similar deleterious health effects. This research is timely as the extent of phthalate exposure and their impacts on human health within Irish communities are unknown. This project represents an important collaboration between the EPA and three research centers (DCU, ASU, & NIVA) with support from local Irish utilities, to assess sources, environmental fate and health impact of phthalates in the Irish population.

Follow our progress and updates on twitter and online: <https://sites.google.com/site/phthalatesireland/> @phthalatesDCU