Introduction:

CYP1A enzymes - the group of enzymes, responsible for the metabolism of PAH compounds excreted in fish bile and urine. The enzyme activity assay, ethoxyresorufin-O-deethylase (EROD) as well as PAH metabolites are established biomarkers for PAH exposure and effects in fish.

PAH-metabolites in gall bladder and urine of the eelpout Zoarcus viviparus were investigated as potential biomarkers of PAH exposure. Levels of PAH-metabolites in fish urine and bile were compared with effects (CYP1A) in Danish coastal waters.

Methods:

Examples of Synchronous Fluorescence Spectra (SFS) of: (I) fish bile sample SFS Δλ = 42 nm; (II) 1-hydroxyphenanthrene standard measured by SFS Δλ = 70 nm; (III) tyrosine standard measured by SFS Δλ = 70 nm; (IV) fish urine sample measured by SFS Δλ = 42 nm; (V) same fish urine sample measured by SFS Δλ = 70 nm.

Validation of SFS method with HPLC/F method. Measurements of 10%PS in bile and urine by both methods show very good correlation, thus SFS is a good screening tool, although much simpler than HPLC/F.

Results:

A weak relationship between CYP1A activities and PAH metabolites in bile of eelpouts from November 2005, 2006, 2007 and 2009 was observed, although not significant at 5% level.

Conclusions:

- Eelpout is useful indicator fish species for study of biological effects of PAH exposure.
- Eelpout bile and urine: important routes of PAH metabolites excretion.
- Bile is most useful PAH metabolites containing matrix compared to urine.
- Urinary FACs: questionable potential as biomarkers of exposure.
- When using CYP1A activity as biomarker: season of the year, sexual cycle-triggered changes and abiotic factors have to be taken into account.
- Potential links to effects on reproduction success in eelpout.