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Activation of the estrogen receptor by human serum extracts containing mixtures of perfluorinated alkyl acids from pregnant women's serum

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H umans are exposed to a variety of perfluorinated alkyl acids (PFAAs). Several studies have found xenoestrogenic activity of single PFAAs. Studies on mixture effects of the PFAAs are however sparse. In the present study, we aimed to determine the xenoestrogenic activity in human serum extracts containing mixtures of PFAAs. Recently, we developed a method to extract the PFAAs from serum with simultaneous removal of endogenous hormones and interfering steroid metabolites. We used this method to extract the PFAAs from serum of 397 Danish pregnant women followed by analysis of estrogen receptor (ER) transactivation using MVLN cells carrying an estrogen response element luciferase reporter vector. Using 17β-estradiol (E2) concentration-transactivation curves, we calculated the E2-equivalents (EEQ) for the extracts containing the PFAAs. 52% of the PFAA serum extracts agonized the ER transactivation and 46% enhanced the E2-induced ER transactivation. We found positive associations between the ER transactivation and the PFAA serum levels. For the relatively few PFAA extracts that antagonized the ER in the presence of 24 pM E2 (n=38, 10%), we found inverse associations between the ER transactivation and the PFAA serum levels. The results indicated that the PFAA extracts induced the ER in a non-monotonic concentration dependent manner. The median EEQ of the extracts containing the PFAAs corresponds to the effect of 0.5 pg E2 per mL serum. In conclusion, we observed that most of the extracts containing the PFAA mixtures from pregnant women's serum agonized the ER and enhanced the E2-induced effects in non-monotonic concentration-dependent manners.

## Biography

Christian Bjerregaard-Olesen is defending his PhD thesis entitled, "Perfluoroalkyl acids in serum of Danish pregnant women: Levels, time trends, extraction and *ex vivo* xenoestrogenicity" on October 21<sup>st</sup> 2016 in Department of Public Health, Aarhus University in Denmark. Additionally, he has completed his Master's degree in Chemistry. He has published six papers in peer-reviewed journals and further four are in preparation.

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