

MASTER'S THESIS

Measuring the binding between estrogen receptor alpha and potential endocrine disruptors by fluorescence polarization and total internal reflection fluorescence

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**Measuring the Binding between Estrogen Receptor Alpha and
Potential Endocrine Disruptors by Fluorescence Polarization
and Total Internal Reflection Fluorescence**

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**A thesis submitted in partial fulfillment of the requirements
for the degree of
Master of Philosophy**

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Abstract

Endocrine systems are found in all mammals and many other types of living organisms. It consists of glands that secrete hormones and receptors that detect and react to the hormones and regulates all biological processes in the body. Endocrine disruptors are hormone-like chemicals that can be found in the environment around us. Once taken in, they may cause hormonal effects. This thesis reports the measurement of binding strength and binding kinetics between human estrogen receptor and different kinds of endocrine disruptors by means of fluorescence polarization and total internal reflection fluorescence. Our results show that the equilibrium dissociation constants for different endocrine disruptors ranged from $\sim 1\text{nM}$ to $\sim 100\mu\text{M}$ and their off-rates ranged from $\sim 1.5 \times 10^{-3}$ to $\sim 30 \times 10^{-3} \text{ s}^{-1}$. We also found that mixture of endocrine disruptors (PBA, PFOS, PFNA and PFOA) did not show synergistic binding with the endocrine disruptor.

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