Developmental Challenges of Xenoestrogens on Cardiac Development

* Endocrine System
	+ Role in organismal physiology
		- Nervous system
		- Cardiovascular system
		- Reproduction
		- Immune System
		- Interaction of systems
			* Ex) Nervous System and Cardiovascular System
	+ Role in development
		- Cell Growth
		- Cell Proliferation
		- Cell differentiation
* EDCs and Development
	+ Regulation and production of hormones
* Molecular Pathways of Androgens
* Molecular Pathways of Thyroid
	+ - Molecular Pathways of Estrogens
			* ER alpha and ER beta
				+ Gene regulation
			* GPER
				+ cAMP and Calcium modulation
			* Interaction between different proteins
* Development
	+ Basic zebrafish developmental periods
		- Describe the 6 developmental period of zebrafish development (zygote-hatch)
	+ Cardiovascular development
		- Both structural and molecular events that occur during development
* Zebrafish as a model organism
	+ Using zebrafish as a model to study cardiovascular system
		- Advantages and possible limitations
			* Microscopy
				+ *cmlc*2::GFP transgenic zebrafish
				+ Fli1:GFP/GATA1:dsRed double transgenic zebrafish
			* Genetic tools
	+ Using zebrafish as a model to study endocrine disruption
		- Advantages and possible limitations
* Endocrine Disruptors
	+ Overview of endocrine disruption
		- Examples of natural and synthetic EDC
	+ Xenoestrogens
		- Distribution in the environment
		- Potential exposure mechanism
		- Mechanism of transformation (biotic and abiotic)
		- Known effects of Xenoestrogens
			* Cell physiology
				+ Known molecular targets that affect cell biology for example disruption in the cell cycle
			* Reproduction
				+ Known targets that affect different aspects of reproduction such as inhibition of egg maturation
			* Development
				+ Known targets that affect normal development of an embryo
* Future Research Needs
	+ Characterize the role of estrogen receptors during development
		- Example- GPER’s role during embryogenesis
	+ Further explore the molecular pathway for cardiovascular toxicity of xenoestrogens during early development
	+ To match the molecular events of toxicity to a specific time point in the very complex timeline of development