

## **F22.055: The Development of a Biomimetic Nipple for Infant Feeding**

Faculty mentor: Christopher Mayerl

### **Overview**

The Mayerl lab is currently in the process of developing a novel biomimetic nipple to improve infant feeding function. Breastfeeding provides the optimal feeding experience for infants, from both nutritional and physiological perspectives. Yet not all infants can be breastfed. Some are born prematurely and are unable to breastfeed, in other cases, there can be problems establishing a proper latch, or the maternal milk supply may not be sufficient and infants must be fed on bottles. From a physiological perspective, feeding on a bottle is more similar to drinking from a cup than it is to breastfeeding, and perhaps as a result, there are several long-term health consequences to bottle feeding. For example, infants that are breastfed have better speech skills at the age of five than those are bottle fed. Part of this is due to the fact that while breasts in mammals are ducted, bottles are empty cisterns. Research in the Mayerl lab is currently focused on rectifying this situation, and we are designing a nipple that works on bottles that is ducted, like a maternal breast, to provide infants that are bottle fed with the biomechanical benefits of breastfeeding. The intern will assist in the development of the product, as well as in preparing for and conducting experiments on live animals.

### **What the student will DO and LEARN**

The intern will perform several key duties associated with the project. They will play an active role in setting up the lab and will learn a number of skills over the course of fall and spring semesters. Interns will have weekly (at least) meetings with Dr. Mayerl to discuss the scientific literature to provide a foundation of knowledge for infant feeding physiology. They will learn how to read and evaluate scientific manuscripts, and Dr. Mayerl will guide them through the literature as they explore their interests. Additionally, the intern will participate in the development of the biomimetic nipple. In doing so, they will gain experience working in a 3-D design software, learn how to use 3-D printing and how to assemble necessary scientific equipment for data collection. Interns will also participate in data processing and analysis, and Dr. Mayerl will teach them how to use a variety of coding languages (R, Python) with the goal for interns to be authors on scientific manuscripts. Students will also gain experience in infant mammalian anatomy and learn proper techniques to perform sterile surgeries on fragile patients. By the end of the spring the semester the intern will have the foundational knowledge and skills to participate in experiments over the summer.

### **Additional benefits**

There are several benefits to participating in the Mayerl lab. Students will be a part of a team and community and will grow as scientists and scholars. In addition to learning the software environments discussed above, students will also be able to explore their own interests and bring new perspectives into the lab. The research in the Mayerl lab also touches on multiple fields of science, including neurophysiology and comparative biology, as well as biomedical sciences. Exposure to this type of research will enable students to explore their interests in deciding on a career path. This will especially be facilitated by students being able to travel to national conferences that cover both animal physiology, as well as biomedical conferences about feeding in human patients.

### **Additional qualifications**

Passionate about gaining experience.

### **Time commitment**

6-10 hrs/week for 30 weeks