

Summer Undergraduate Research Program
Faculty Project Proposal Submission

Faculty Name:

Roger Cooke

Department/Organization Affiliation:

Biochemistry UCSF

Project Name(s):

Fatigue of Skeletal Muscle

General Topic (Keywords):

muscle, physiology, biophysics, mechanics

Project Description(s):

The student will investigate the mechanics of muscle contraction. When muscles become fatigued, a number of their physiological responses are altered. They become slower, weaker, and more efficient at using ATP to maintain tension. Our laboratory is attempting to understand these responses with a view to eventually developing new drug therapies that could manipulate cardiac contractility. In particular, we would like to understand why the muscles become more efficient as they become more fatigued. The ability to make muscle fibers slower and more efficient would be very useful in the treatment of a variety of cardiac disorders. To study the mechanisms of fiber fatigue, we use a preparation of single muscle fibers that lack a cell membrane. These fibers are mounted on an apparatus that can measure their mechanics. They can be incubated in solutions that mimic conditions thought to occur in muscle fibers during fatigue. In this way, we can independently assess the effect of altering specific conditions, e.g., an increase in lactic acid that may influence the response of the contractile apparatus. The project uses skinned muscle fibers that can be stored for months in a freezer, the student thus does not work directly with live animals.

Desired Skills or Experience:

Knowledge of biochemistry, some physics.

Time Commitment:

40 hrs/week during summer for 10 weeks, with the possibility of continuing into fall and spring semesters.

Preferred Starting Date:

Early summer, flexible