Summer Undergraduate Research Program 2018

Faculty Project Proposal Submission

Project Submission deadline: *February 23rd 2018*

**Faculty Name:** Giorgio Cavigiolio, PhD

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**Department/Organization Affiliation:** Children’s Hospital Oakland Research Institute (CHORI) at UCSF Benioff Children’s Hospital Oakland

**Preferred Method of Contact:** e-mail

**Project Name(s):**
Dysfunctional apolipoproteins as a factor in the development of atherosclerosis

**General Topic (Keywords):** Protein Chemistry, Biophysics, Fluorescence Spectroscopy, High Density Lipoproteins, Cholesterol Metabolism, Atherosclerosis, Cardiovascular Disease, Amyloidosis.

**Project Description(s):**
Several lines of research are currently pursued in our laboratory, with the common denominator of investigating the *function/structure of apolipoproteins* and how this correlates with the development of *atherosclerosis* and *cardiovascular disease*. Our main focus is the study of apolipoprotein A-I and A-II, which are primarily associated with high density lipoproteins (HDL), also known in the past as “the good cholesterol” (a term now obsolete!).

Our research extends from structural studies using biophysical methods, such as different spectroscopies (fluorescence, infra-red, circular dichroism, etc.), electron microscopy, and mass-spectrometry, to the investigation of the biological functions of apolipoproteins using cell culture techniques and animal (mouse) experiments.

For a more in depth description of some of the projects currently active in our laboratory, please refer to our webpage at:

http://www.chori.org/Principal_Investigators/Cavigiolio_Giorgio/cavigiolio_research.html
**Desired Skills or Experience:** Biochemistry, Chemistry, Molecular Biology, Spectroscopy, Cell Culture.

Our research centers on the molecular causes of disease, for this reason a background in molecular (in particular protein) structure is required to effectively contribute to our experimental work. Interest and knowledge of the principles and techniques of biochemistry is essential. Our investigation also uses basic tools of molecular biology (recombinant DNA mutation, recombinant protein expression) and several biophysical techniques for the investigation of molecular structure and molecular interactions. Principles of cell biology will also be required to thoroughly understand the purpose of some of the cellular experiments that will be executed in the lab, in particular, some previous experience in cell culture techniques would be appreciated.

A list of some generic techniques that will be employed during the research internship follows. Previous expertise in these techniques will be positively considered.

1) Basic DNA cloning techniques (e.g. PCR, Agarose gel electrophoresis, DNA restriction and ligation …)
2) Basic recombinant protein expression techniques
3) Protein purification techniques (e.g, Affinity column chromatography, HPLC …)
4) Size Exclusion Chromatography
5) Fluorescence spectroscopy, Infra-red spectroscopy, Mass-spectrometry
6) Sterile (mammalian) cell culture techniques
7) Mouse handling, treatment, and dissection.

**Time Commitment:** Not less than 3 full days a week, possibly consecutive.

**Preferred Starting Date:** June 1\textsuperscript{st} 2018