

## **Request for Application (RFA): Visible Molecular Cell Consortium Fellowships**

### **Executive Summary**

- We are announcing a Dual Mentor Pre- and Post- Doctoral Fellowship Program in order to initiate a new partnership between UCSD and TSRI on the Visible Molecular Cell. This program is open to all promising applicants at UCSD or TSRI with the purpose of bridging disciplines and methodologies and to foster new cross-laboratory activities which will catalyze development of data sets suitable for modeling and simulation of whole cells or subcellular domains, including key macromolecular constituents.
- This funding opportunity solicits Individual Research Fellowship grant applications from promising applicants with the potential to become productive, independent investigators in research on the multi-scale structurally-enabled functional biology of the cell. Each applicant must have one primary sponsor/mentor and one co-sponsor/mentor representing different disciplines from either UCSD and/or TSRI.
- The participating organizations (UCSD and TSRI) have committed a total of \$2.5 million over 5 years fund the fellowship program of this consortium.
- We anticipate supporting approximately 8 awardees in the first year and ~ 10 awardees in subsequent years.
- The total project period for the work described, and the period of fellowship support is to be one year. Based on progress determined at the end of the 3<sup>rd</sup> quarter of the first year, a second year of support may be considered, for highly productive fellows, whose work is deemed likely to result in a highly significant outcome.
- The participating laboratories will be expected to bear the costs of laboratory supplies used in the training and research of the awarded fellows.

### **Section I. Funding Opportunity Description**

#### *1. Background*

Biological science is on the cusp of a new and transformational way to view living systems – the creation of physical molecular models of the fundamental unit of life, the cell. Such an undertaking will lead to an understanding of the continuity of life's mechanisms from the atom to the organism. Its potential will be in how we can more comprehensively control cellular behavior in sickness and in health, and in transforming cell biology from an observational to a synthetic science.

Several technical and scientific advances have brought us to this inflection point. Structural data is now available at a wide range of length scales – ranging from atomic

resolution structures of cellular protein and nucleic acid components to organelle and larger cellular structures. Biophysical techniques range from atomic resolution x-ray crystallography and NMR spectroscopy, to electron and light microscopy. In addition, spatial distributions and dynamics are accessible by a variety of fluorescence microscopy methods, and expression and concentration levels are obtainable via technologies ranging from chip arrays and other mRNA technologies to mass spectrometric and other proteomic analyses. Complementary to these structure-based methods are the bioinformatic and systems biology approaches that describe and analyze molecular interaction networks, signaling pathways and information flow in complex cellular environments. Underpinning all of these advances is the continuing exponential growth of computer power, in parallel with the ability to gather and integrate enormous amounts of experimental data, and to then use that data to drive physical simulations. Computation will play a key role in turning these islands of data into a continuous landscape of interdisciplinary and cross-scale collaborations and knowledge.

## *2. Purpose and Objectives*

While constructing and simulating computational models of an entire human cell are beyond our current capabilities, we are initiating this training program in interdisciplinary research to foster new research and methodologies that will contribute to progress toward this long term goal. The systems that we envision being studied within these fellowships may include large biological systems such as enveloped viruses, bacteria, large biomolecular assemblies or machines, cellular organelles or non-enveloped cellular complexes, cytoskeleton and other cellular structural elements. Connection to biomedical challenges is strongly encouraged.

We also intend to support the exploration and development of computational framework(s) that allow and enable integration of all kinds and types of relevant biological data streams (e.g., genomic sequences, x-ray crystallography data, microscopy data, HDX-MS data, etc.) into one interoperable context. This may also include development or application of new or emerging mathematical techniques to biological systems of interest, or the development of computational programs / frameworks that provide new scale crossing capabilities.

Collaboration: A specific objective of the program is that fellows should be prepared for research careers in which collaboration and integration across levels of analysis are key elements. Plans for fostering collaborative relationships during the training period, should be addressed. The purpose of the dual mentorship nature of this fellowship is to bridge between two different and complementary aspects of cellular structure across scales of space or time and across disciplines. Examples of the kinds of cross disciplinary collaborations that this program wishes to foster are, but not limited to:

- Bridging between computational and experimental biology of cellular components
- Bridging across spatial or temporal scales of structural cellular systems
- Integration of bioinformatic, proteomic or metabolomics data with structural biological data

Fellows will be expected to gain broad research exposure in an area of molecular cell biology and/or neurobiology as well as in an allied discipline not typically associated with these disciplines such as, mathematics, physics, bioengineering, informatics, systems biology, computer science or translational medicine (but not exclusive to these areas). Active mentorship by a primary sponsor/mentor and a co-sponsor/mentor, representing different disciplines or levels of analysis, is required. Fellowship awardees are required to pursue their research training on a full-time basis, normally defined as 40 hours per week.

## **Section II. Award Information**

### *1. Mechanism of Support*

This mechanism is intended for predoctoral candidates who are in a PhD program at TSRI or UCSD, and for postdoctoral candidates who have received a Ph.D., D. Sci., or equivalent doctoral degree from an accredited domestic or foreign institution prior to activation of the award.

### *2. Funds Available*

Awards pursuant to this funding opportunity are contingent upon the receipt of a sufficient number of meritorious applications, the program priorities of the UCSD/TSRI collaboration, and the continuing availability of funds.

Either full fellow support (i.e., 100% salary coverage by VMCC) or partial fellow support with PI matching (i.e., 50% support from VMCC, 50% support from PI) may be provided through the VMCC fellowships. The level of support requested should be specified in the budget and plans for research and training.

The opportunity will also support fellows who require 0% salary coverage, but who seek to use capability resources or core facilities within the VMCC umbrella as part of their interdisciplinary project. This could be relevant for trainees who, for example, are already supported by NIH T32 training grants, NIH F31/F32 Fellowships, or NSF Graduate Research Fellowships.

### *3. Stipends*

This fellowship award provides stipends to postdoctoral fellows as a subsistence allowance to help defray living expenses during the research training experience. The awards are not provided as a condition of employment with the sponsoring institution. The stipend level for the first year of support is determined by the number of full years of relevant postdoctoral experience at the time the award is issued (not at the time of activation, see below). Fellows with less than one full year of postdoctoral experience at the time of award will receive initial support at the zero-year level. Relevant experience may include research (including research in industry), teaching, internship, residency, clinical duties, or other time spent in full-time studies in a health-related field beyond that

of the qualifying doctoral degree. The current stipend schedule used for this fellowship is based on the NIH postdoctoral award schedule, which can be found at: <http://grants.nih.gov/grants/guide/notice-files/NOT-OD-16-047.html>. Fringe benefits, not to exceed 25% of the fellowship stipend will be covered by the award.

#### *4. Fellowship cost sharing*

All other fellowship training costs, including travel expenses, laboratory supplies, etc. will be borne by the investigating laboratories.

### **Section III. Eligibility Information**

#### *1. Eligible Applicants*

Any individual with the skills, knowledge, and resources necessary to carry out the proposed research training is invited to work with his/her sponsors at UCSD and/or TSRI to develop an application for support. Individuals from underrepresented racial and ethnic groups as well as individuals with disabilities are always encouraged to apply.

This Fellowship is open without restriction of national citizenship, as long as the applicant is or becomes a legal resident in the United States prior to accepting the Fellowship award.

#### *2. Other Eligibility Criteria*

Duration of Support: The duration of support under this RFA should minimally be for 1 year and maximally for 2 years.

Sponsors/Mentors: Before submitting a fellowship application, the applicant must identify a sponsoring institution and an individual who will serve as a primary sponsor (also referred to as mentor or supervisor) and will supervise the training and research experience, as well as a co-sponsor from a different allied discipline. The sponsors/mentors should be active investigators in the areas of the proposed research who are committed to the research training of the individual and will directly supervise the candidate's research. The sponsors/mentors should each document the availability of sufficient research support and facilities for high-quality research training, as well as how this dual sponsorship/mentorship will facilitate the interdisciplinary research and training program for the applicant. In most cases, the Fellowship supports research training experiences in new settings in order to maximize the acquisition of new skills and knowledge. Opportunities for the fellow to obtain additional guidance from other subject matter experts during the research training experience are encouraged.

### **Section IV. Application and Submission Information**

*1. Address to request copies of this Application Information:* <http://vmcc.ucsd.edu>

## *2. Content and Form of Application Submission*

Applications must be prepared following the instructions described in Section VII. Application Format.

## *3. Submission Dates and Times*

Application Receipt Date: February 1, 2016  
Review Dates: February 2016  
Earliest Anticipated Start Date: March 1, 2016  
Latest Anticipated Start Date: July 1, 2016

## *4. Funding Restrictions*

Tax Liability: Internal Revenue Code Section 117 applies to the tax treatment of all scholarships and fellowships. The Tax Reform Act of 1986, Public Law 99-514, impacts on the tax liability of all individuals supported under this fellowship program. Under that section, non-degree candidates are required to report as gross income all stipends and any monies paid on their behalf for course tuition and fees required for attendance. Degree candidates may exclude from gross income (for tax purposes) any amount used for tuition and related expenses such as fees, books, supplies, and equipment required for courses of instruction at a qualified educational organization.

Future Year Support: Funds for continuation beyond the initial year are determined by the progress described a yearly progress report, and the availability of funds.

## *6. Other Submission Requirements*

The applicant's two sponsors/mentors, who will directly supervise the applicant's research, should be active investigators in the area of the proposed research and meet the eligibility requirements. The sponsors/mentors must each describe in detail their commitments to and proposed roles in guiding the individual applicant during the research training experience. They must also provide a 4 page NIH biosketch.

## **Section V. Application Review Information**

### *1. Criteria*

Only the review criteria described below will be considered in the review process.

### *2. Review and Selection Process*

Applications submitted for this funding opportunity will be assigned to a review panel appointed by the Steering Committee of the UCSD/TSRI Visible Molecular Cell Consortium, which will evaluate applications for scientific and technical merit.

As part of the merit review, applications:

- May undergo a selection process in which only those applications deemed to have the highest scientific merit will be discussed and assigned a priority score
- All applications will receive a written critique

The following will be considered in making funding decisions:

- Potential for interdisciplinary training.
- Potential to promote, align with, and develop transformative advances in the interdisciplinary studies of interest to the VMCC.
- Overall scientific merit of the proposed project as determined by the review panel
- Qualifications of the fellow him/herself.
- Qualifications of the mentors/PIs.
- Relevance to mission priorities and portfolio balance of the Fellowship program
- Availability of funds
- Given fellowship applications of equal quality and budget, an application with inter-institutional dual mentorship may be given preference.

## **Section VI. Review Criteria**

### **1. Candidate**

- An assessment of the candidate's previous and current academic and research performance
- An assessment of the candidate's potential to, and commitment to, becoming an important contributor to biomedical, behavioral or clinical science

### **2. Sponsors/Mentors and Training Environments**

- An assessment of the quality of the training environments including the institutional commitments to research training, the quality and availability of the facilities and related resources (e.g. equipment, laboratory space, computer time, subject populations), and the availability of research support
- The qualifications of the sponsors as mentors for the proposed research training experience, as well as researchers including successful competition for research support
- Statements from each sponsor/mentor indicating how they will work together to foster the interdisciplinary training and research of the applicant.

### **3. Research Training Proposal**

- The merit of the scientific proposal
- The quality of the research training plan

## Section VII. Application Format

Application should be prepared using NIH format, 11 pt Arial font, 0.5 inch margins, and should contain the following sections:

**1. Preamble** (300 words max): clearly articulated layperson description of the *Interdisciplinary Challenge-to-be-Addressed* and the requirement for involvement of cross-disciplinary faculty

**2. Research Plan** (4 pages max), Required Sections:

- *Significance and brief background*, including a clearly articulated description of the *Interdisciplinary Challenge-to-be-Addressed*
- *Innovation* of the proposed approach
- *Approach*
- Description of how two mentors complement each other, and the characteristics of mentorship relative to interdisciplinary bridging aspects

**3. Training Plan** (2 pages max):

- Plans for training within and *across* disciplines
- Plans for soft skills training, including giving talks, proposal writing, etc.
- Plans for ethics training

**4. Budget** (1 page max):

- Budget should describe plans for salary support for fellow (% effort, etc)

**5. Personal Statement** (2-page max), written by the fellow, describing career and research goals.

**6. NIH Biosketch of the Proposed Fellow** (4-page max)

**7. NIH Biosketch of the Primary Mentor** (4-page max, "Section D. Research Support" must be included).

**8. NIH Biosketch of the Secondary/Co-Mentor** (4-page max, "Section D. Research Support" must be included).

All sections 1-8 listed above should be compiled into a single PDF application package, and emailed to [visiblemolecularcell@gmail.com](mailto:visiblemolecularcell@gmail.com) by the application deadline of 11:59PM February 1, 2016. For applications from fellows designating Primary Mentor from TSRI, the application must first be RACO reviewed and approved by the TSRI Office of Sponsored Research prior to submission by the applicant to the email listed above. UCSD-based applicants can email their application package directly to the program email listed above.