Department of Biotechnology
Ministry of Science & Technology
Government of India
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CALL FOR PRE-PROPOSALS (CFPP) FOR THE INDO-JAPAN COOPERATIONS IN THE AREA OF BIOINFORMATICS

1. Background:

The Department of Biotechnology (DBT), Government of India and the National Institute of Advanced Industrial Science & Technology (AIST- www.aist.go.jp), Japan has signed a MoU to undertake joint activities in the field of Life Sciences and Biotechnology. To begin with it has been proposed to work on Bioinformatics field with the specified areas of interest to both the countries. Four challenging themes are to be taken up through this cooperation which includes (i) Designating Potential Targets in Membrane Proteins (ii) Designing GPCRs Mimetics (iii) Designing FIXER for Disorders and (iv) Designing Cyborg Lectins. These are interdisciplinary research areas comprising of Information Science, Computational Chemistry and Bioinformatics focusing on biological molecules like membrane proteins, disorder proteins and glycol-conjugates. The objective is to utilise bioinformatics tools for analyzing sequence and structures of target molecules with potential applications to create artificial proteins from the viewpoint of "engineering". While pursuing R&D, it would also be required to develop a protein database with associated software tools.

Towards this the DBT is inviting pre-proposals from the Scientists, Institutions and Industries for carrying out these research activities. Multi-institutional projects and projects in association with the industries would be given preference. The pre-proposals would be short-listed on merits. The short-listed applicants then will be asked to raise full proposals in association with the AIST laboratories. Interested investigators may submit two copies of the pre-proposal through proper channel, as per the format which is available through www.dbtindia.gov.in/bioinformatics.htm (or) www.btisnet.gov.in/bioinformatics.htm. The pre-proposals are to be submitted latest by 28th July 2008, to Dr. T. Madhan Mohan, Adviser, Department of Biotechnology, Block -2, CGO Complex, Lodi Road, New Delhi – 110 003. It is necessary to send the soft copy of the proposal through email to madhan@dbt.nic.in. Please see the details below:

2. Area Description:

(i) Designating Potential Targets in Membrane Proteins – Membrane Proteins are either iron channels or receptors that are keen to regulation of cell function with a role in many diseases such as cancer, metabolic, inflammatory etc. It is proposed to combine structural and biochemical information on membrane proteins, development algorithms to identify druggable regions on them and provide techniques to develop drug like molecules with high binding affinity and selectivity. It is well known draw back to purify and characterize membrane proteins focused by offering through bioinformatics and computational biology means are not shown to be effectively use membrane protein for pharmaceuticals applications.

(ii) Designing GPCRs Mimetics – In order to design potent drugs to target GPCRs, it is useful top mimic these loops instead of expressing the whole GPCR. Design of GPCR peptide mimics using protein modeling techniques and mining of structural databases in an exciting research area.

iii) Designing FIXER for Disorder – A significant number of proteins contain small regions or even entire domains that are structurally unstable or intrinsically disordered. Such regions are rarely observable with structure determination techniques, but are functionally relevant as domain liners or elements that fold upon binding their cellular target. The current view on disorder is that disordered proteins are disordered to allow for more interaction partners and modification sites. Protein disorder is linked with protein aggregation and hence important to neurodegenerative disease mechanisms. In this context, design of synthetic peptides to prevent the nucleation of aggregation is important.

(iv) Designing Cyborg Lectins – Lectins are a class of proteins that recognize their specific carbohydrate substrate, due to which they play a major role in host/parasite, host/pathogen recognition, immune response, regulating cell adhesion, etc. Lectin design will aim at modifying existing lectins in order to change their specificity or increase their binding affinity to a substrate over the native lectin. This will allow targeted drug delivery using the ‘cyborg’ lectin carriers and modulation of cellular binding.