

Details of the Collaborative Activity

2019-20

Name of the Collaborating Institute: CSIR – Indian Institute of Chemical Technology, Hyderabad (IICT).

Name of collaborating department from YDU: Yenepoya Research Centre

Student exchange and facility usage for research:

- Mr. Utsav Sen, Research Scholar, Yenepoya Research Centre, had training on molecular transfection experiments on cancer stem cells using liposomal gene delivery system, designed in Dr. Rajkumar Banerjee's Laboratory, at Applied Biology Division, IICT from 10th February to 6th March 2020 as a part of Joint Research including part of his PhD Study.
- Ongoing intellectual support from Dr. Rajkumar Banerjee to Ms. Shanooja Shanavas for her PhD project on Colon cancer stem cells therapeutics.

ATTESTED

Dr. Gangadhara Somayaji K S
Registrar
Yenepoya (Deemed to be University)
University Road, Dandakutte
Mangalore 575 018, Karnataka.



Dr Bipasha Bose <bipasha.bose@gmail.com>

Request for training in in-vitro gene manipulation technology using ongoing methods in the laboratory

6 messages

Utsav Sen <utsavsen.bio@gmail.com>

Tue, Jul 9, 2019 at 9:31 AM

To: banerjee@iict.res.in

Cc: Bipasha Bose <bipasha.bose@gmail.com>, sudhir shenoy <shenoy2000@yahoo.com>

Dear Sir,

Good morning!!

As my 4th objective in my Ph.D. project involves the validation of upregulated gene expression using RNAi approach, I require training in techniques for gene downregulation using RNAi approach. Currently, my home laboratory does not have suitable reagents and expertise to carry out the same. Moreover, as your esteemed laboratory has designed/established lipid delivery systems for nucleic acids under in-vitro systems, I would like to learn the same with the RNAi available in your laboratory. As of now, I wish to carry out the gene downregulation in triple negative breast cancer stem cells (CD44⁺/24⁻) isolated from two triple negative breast cancer cell lines, namely MDA-MB-231 and MDA-MB-468, and their parent cell types.

Regarding the cell lines/cancer stem cells, we have ample quantities isolated and characterized for purity in our laboratory. I will bring the cancer stem cells (CD44⁺/24⁻) isolated from two triple negative breast cancer cell lines, namely MDA-MB-231 and MDA-MB-468, and their parent cell types from my home institution laboratory.

Hence, I will be thankful to you if you could allow me for the same.

Thanking you,
Sincerely,
Utsav Sen.

Rajkumar Banerjee <banerjee@iict.res.in>

Tue, Jul 9, 2019 at 9:58 AM

To: utsavsen bio <utsavsen.bio@gmail.com>

Cc: bipasha bose <bipasha.bose@gmail.com>, shenoy2000@yahoo.com

Thanks Utsav, for your mail.

You are welcome to our lab and use our facility toward learning lipid-based genetic material delivery techniques. However, it is not clear though what do you want to down-regulate using RNAi approach. We have some targets but it may not be useful for your systems. Because you are bringing TNB CSCs, you would wish to use the RNAi of your choice directly. In that way, you will not only learn but also directly get your data that you intend to have.

Just a thought, contemplate and let me know.

Best wishes,

Rajkumar Banerjee

Rajkumar Banerjee, Ph.D.
Senior Principal Scientist
Associate Professor, Academy of Scientific & Innovative Research (AcSIR)
Applied Biology Division,
Centre for Chemical Biology Building
CSIR-Indian Institute of Chemical Technology
Uppal Road, Tarnaka
Hyderabad
Telangana 500 007

12/6/21, 3:15 PM

Gmail - Request for training in in-vitro gene manipulation technology using ongoing methods in the laboratory

Associate Professor, Academy of Scientific & Innovative Research (AcSIR)
Applied Biology Division,
Centre for Chemical Biology Building
CSIR-Indian Institute of Chemical Technology
Uppal Road, Tamaka
Hyderabad
Telangana 500 007
INDIA
91-40-2719-1859 (office)
Alternate emails:
rkbanerjee@yahoo.com
rkbanerjee.iict@gmail.com
<https://iictindia.org/People/view?id=89>

From: "bipasha bose" <bipasha.bose@gmail.com>
To: "Rajkumar Banerjee" <banerjee@iict.res.in>
Cc: "utsavsen bio" <utsavsen.bio@gmail.com>, shenoy2000@yahoo.com
Sent: Tuesday, July 9, 2019 10:32:26 AM
Subject: Re: Request for training in in-vitro gene manipulation technology using ongoing methods in the laboratory
[Quoted text hidden]

Utsav Sen <utsavsen.bio@gmail.com> Tue, Jul 9, 2019 at 10:54 AM
To: Bipasha <bipasha.bose@gmail.com>
Cc: Rajkumar Banerjee <banerjee@iict.res.in>, sudhir shenoy <shenoy2000@yahoo.com>

Dear Sir and Madam,

Thank you so much for your reply.

Soon I will get back to you with my journey date and travel plan, also the work plan too.

Thanks and regards,
Utsav
Mr Utsav Sen
ICMR-Senior Research Fellow/PhD Scholar
Stem Cells and Regenerative Medicine Centre
Yenepoya Research Center
Yenepoya University
Mangalore-575018
India.

[Quoted text hidden]

Bipasha <bipasha.bose@gmail.com> Tue, Jul 9, 2019 at 3:10 PM
To: Rajkumar Banerjee <banerjee@iict.res.in>
Cc: utsavsen bio <utsavsen.bio@gmail.com>, sudhir shenoy <shenoy2000@yahoo.com>

Thank you, Rajkumar. Utsav will soon update his plan and inform you.

Regards,

[Quoted text hidden]

[Quoted text hidden]

MEMORANDUM OF UNDERSTANDING

THIS MEMORANDUM OF UNDERSTANDING IS DATED 03 MONTH 14th DAY

OF 2019 AND MADE BETWEEN:

1. The **CSIR-Indian Institute of Chemical Technology (IICT)**, Uppal Road, Tarnaka, Hyderabad-500 007, India, a constituent unit of the Council of Scientific and Industrial Research (CSIR), a Society registered under Societies Registration Act (XXI of 1860), having its registered Office at Anusandhan Bhavan, Rafi Marg, New Delhi – 110 001. *

(hereinafter referred to as **CSIR-IICT**, which expression shall where the context so admits include its successors and permitted assignees)

And

2. Yenepoya (Deemed to be University), Mangalore, Karnataka, India (hereinafter referred to as **YU**, which expression shall where the context so admits include its successors and permitted assignees) of the other part.

1.0 Introduction:

- 1.1 CSIR- IICT & YU agree to enter into a joint collaboration for biological research on cancer especially for developing and optimizing therapeutics against cancer stem cells which epitomize the highly drug-resistant phenotypes in cancer.
- 1.2 This Memorandum of Understanding (“MOU”) sets out below the principles followed by the CSIR- IICT & YU that can establish a formal agreement regarding such activity.

2.0 Fields of Competence (CSIR- IICT):

The Indian Institute of Chemical Technology (CSIR-IICT) is a leading Institute in India with expertise in several branches of chemistry especially in Organic Synthesis including Agrochemicals, natural products, medicinal chemistry, physical photochemistry backed up by world class analytical services and equipment for automated chemistry.

Terminal diseases, like cancer is given special attention and several programs are underway for development of new chemical entities as anti cancer therapeutics.

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IICT has also taken a lead in the development of drug delivery systems, especially for anticancer drugs. The integrin receptor specific liposomal delivery systems were found to be highly efficient for targeting anti-cancer drugs/genes selectively to tumor vasculatures in anti-angiogenic cancer therapy. IICT has also developed Sigma Receptor, Estrogen Receptor, Folate Receptor, Glucocorticoid Receptor-Specific liposomal delivery systems for use in Targeted Cancer Therapy. To screen and for preclinical evaluation of new delivery systems and therapeutics, target-based biochemical screens and cell-based screens for biological activity against diseases, a dedicated chemical biology facility is also arranged as part of research.

Fields of Competence (YU):

The Yenepoya (Deemed to be University) is one of the premier private Universities in southern India with expertise in several branches of medical fields. The major strength of this University is its existence primarily as a Medical University, thereby enabling the accessibility of patient samples. Yenepoya Research Centre (YRC) of YU is an upcoming research centre that was established in 2008. YRC was initially established to serve as a central research support system for the constituent colleges (Medical, Dental, Pharmacy, Nursing and Physiotherapy) of Yenepoya (Deemed to be University). YRC has state-of the art facilities to support high quality research in interdisciplinary/multidisciplinary areas to meet the contemporary challenges. Currently, part from being a central research facility, various research groups/divisions are operational in YRC undertaking independent basic/applied research work. All of these research groups/divisions in YRC have internationally trained faculties with highest credentials. The research work in YRC is primarily funded with extramurally received funds from various agencies of the Government of India, as well as, YU's intramural funding.

Stem cell and regenerative medicine centre (SCRMC) is a division under YRC having that undertakes specialized research work in the area of regenerative and cancer stem cell biology. This group/division has established the basic biology of breast and colon cancer stem cells and its targeting using water soluble vitamins.

3.0 Principles

3.1 The activities covered by this MOU will centre on the following:

- i. To develop newer, targeted delivery systems and cancer stem cell (CSC)-targeting molecules by CSIR-IICT.
- ii. Isolation, maintenance, propagation of cancer stem cells.
- iii. Exchange of materials and cell lines between the CSIR-IICT and YU
- iv. To conduct biological testing of the new chemical entities and delivery systems synthesized or developed by CSIR-IICT on the CSCs isolated in YU in both the Institutes, CSIR-IICT and YU.

- v. To conduct tests or experiments with CSIR-IICT materials on patient derived primary cells and on patient derived samples' humanized animal models in YU in accordance with proper human ethical clearance.
- vi. For the flow of research there shall be exchange of students between CSIR-IICT and YU.
- vii. Output of the results will be shared in the form of joint-co-authored research publications. The exchange of publications and other materials (related to publications and reports) is of common interest.
- viii. All reports to be sent for publication arising out of the joint research will bear names of investigators from both the institutions.
- 3.2 Any activity carried out within the broad framework of this MOU shall be the subject to the mutual consent of parties, taking into account any constraints of time, funding and other relevant resources.
- 3.3 It is recognized that the work carried out jointly through the collaboration will require special intellectual property protection. Legal agreements defining joint technology development will need to be implemented and will need to recognize the nature of the collaboration.
- 3.4 For the entire duration of the '**Joint Collaboration**' the partners undertake to seek each other's consent for the publication of any results arising from the research carried out by the Parties. This consent may only be withheld where justified.
- 3.5 In case of IP generated out of the outcome of the joint research, it must be first patented by either of the parties before they go into its publication.
- 3.6 If the outcome of the collaboration studies yields encouraging results useful to society or industry then, it can be pursued for attracting external funding from Govt. /Pvt. Agencies for advancement of the developed technology/process and for such purpose a joint research proposal can be submitted.
- 3.7 The intellectual property rights arising out of the programme shall be the common property between the two organizations. CSIR-IICT shall file the joint patent application and all the necessary support like the persons who have directly contributed to the intellectual property generation shall be mentioned as inventors by CSIR-IICT and YU.
- 3.8 The sharing of intellectual property among the two organizations shall be in the ratio of 50:50 (CSIR-IICT and YU).
- 3.9 The expenditure connected with securing and maintaining the Intellectual Property Rights shall be shared equally in the above said ratio by CSIR-IICT and YU.
- 4.0 The sharing of revenues, in case if it is licensed / commercialized shall be shared in the above said ratio between the two Institutes, namely 50:50 (CSIR-IICT and YU).


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Registrar
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University Road, Derlakatte
Mangalore- 575 018, Karnataka

4.1 The molecules and delivery systems provided by CSIR-IICT if found active in biological testing in CSCs, will also be tested in advanced animal models developed in both CSIR-IICT and YU after obtaining appropriate clearances from the Animal Ethics Committee.

5.0 Separate Agreements: In addition, it is envisaged that each activity, that the parties wish to pursue in accordance with the purpose of this MOU will be governed by terms and conditions to be separately negotiated and mutually agreed upon by the parties through the signing of one or more subsidiary agreements.

6.0 Renewal Amendment and Termination:

6.1 This MOU shall be effective for an initial period of 5 years from this date. Thereafter, this MOU may be extended for further periods of 5 years or for any other period of time as deemed appropriate by both parties, subject to their mutual consent any such extension to be made in writing.

6.2. Either party may amend or vary this MOU at any time provided it is with the prior written consent of both parties.

6.3. Either party may terminate this MOU at any time by giving six month's notice to the other party in writing.


7.0 General

7.1 The parties to this MOU shall not be deemed to be in breach of this understanding or otherwise liable to any other party in any manner whatsoever for any failure or delay in performing or initiating the activities proposed in this MOU.

7.2 This MOU records the understanding between the parties and is not intended to be a legally binding document and shall not be enforceable in any court of law.

Registrar
For/on behalf of

CSIR-IICT
[For/on behalf of]

ATTESTED

Dr. Gangadhara Somayaji K.S.
Registrar
Yenepoya (Deemed to be University)
University Road, Deralakatte
Mangalore- 575 018, Karnataka

Yenepoya University

Director, CSIR-IICT

Signed K.S. Somayaji

Signed Dr. P. Radha Krishna 14/3/2019

Name: Dr. K.S. GANGADHARA SOMAYAJI
Registrar
Yenepoya (Deemed to be University)
University Road, Gerelakatte
Mangalore 575 018

Name: डॉ. पि. राधा कृष्णा
Dr. P. Radha Krishna
मुख्य वैज्ञानिक एवं अध्यक्ष / Chief Scientist & Head
ज्ञान एवं सूचना प्रबंधन प्रभाग
Knowledge & Information Management Division
सीएसआईआर-भारतीय रासायनिक प्रौद्योगिकी संस्थान
CSIR-Indian Institute of Chemical Technology
Tarnaka, Hyderabad - 500 007, Telangana, India.

Designation: Registrar

Designation:

Date: 20/03/2019

Date:

Seal:

Seal:

Witnesses

1)

2)

Name:

Name:

Designation:

Designation:

Affiliation:

Affiliation:

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