

Workshop on Cytogenetics, Cell, and Molecular Biology Techniques

18th - 24th June 2022

Sponsored by

**Department of Science & Technology - Synergistic Training Program Utilizing the
Scientific and Technological Infrastructure (DST-STUTI)**

Organized by

Department of Biochemistry and Department of Medical Genetics

JSS Medical College and Hospital, Mysuru



Brief Report

The Department of Biochemistry and Department of Medical Genetics, JSS Medical College and Hospital, JSS Academy of Higher Education & Research Mysuru organized a 7-day workshop on Cytogenetics, Cell, and Molecular Biology Techniques from 18th to 24th June 2022. The Department of Science & Technology - Synergistic Training Program Utilizing the Scientific and Technological Infrastructure (DST-STUTI) sponsored the workshop. We had received more than 125 applications for the workshop, among whom 30 participants were selected based on merit considering their biodata, research interest, and recommendation letter and were sponsored to attend the workshop.



Inauguration of the 7 days JSSAHER-DST STUTI workshop

The workshop was inaugurated on 18th June 2022 by Dr. H. Basavanagowdappa, Principal JSS Medical College, Dr. (Col). M. Dayananda, Director, JSS Hospital; Dr. C.P. Madhu, Superintendent, JSS Hospital; Dr. M.N. Suma, Vice-principal, JSS Medical College; Dr. V. Prashant, Director Research, JSS AHER, and Dr. Akila Prashant, Organising Secretary, JSS Medical College. The workshop handbook was released on this occasion by Dr. (Col). M. Dayananda, Director, JSS Hospital.



Release of the workshop handbook

The 7-day workshop consisted of a series of lectures from various faculties as well as hands-on sessions on different techniques which are generally used in research and diagnostic laboratories. The first six days of the workshop were scheduled at the Department of Medical Genetics, JSS Hospital. Participants were administered a pre-workshop test comprising 30 multiple choice questions to assess their understanding of the subject. The participants were then divided into two groups to engage them in both cytogenetics and molecular biology hands-on work in parallel.



Participants attempting the pre-workshop test MCQs

On the first day, Dr. P.V.V. Gowri Sairam, Assistant Professor, Department of Medical Genetics, JSS Medical College introduced the concepts of cytogenetics to the participants. This was followed by collecting peripheral blood samples and setting up the culture for the karyotype experiment by Mr. H.C. Manju and Ms. B. Supriya. In the afternoon session, Ms. S. Anju and Ms. Sumaiya Kalaigar demonstrated the procedure to isolate DNA from peripheral blood samples collected in EDTA vacutainers. The quantity and quality of the isolated DNA were checked using the nanodrop and gel electrophoresis.



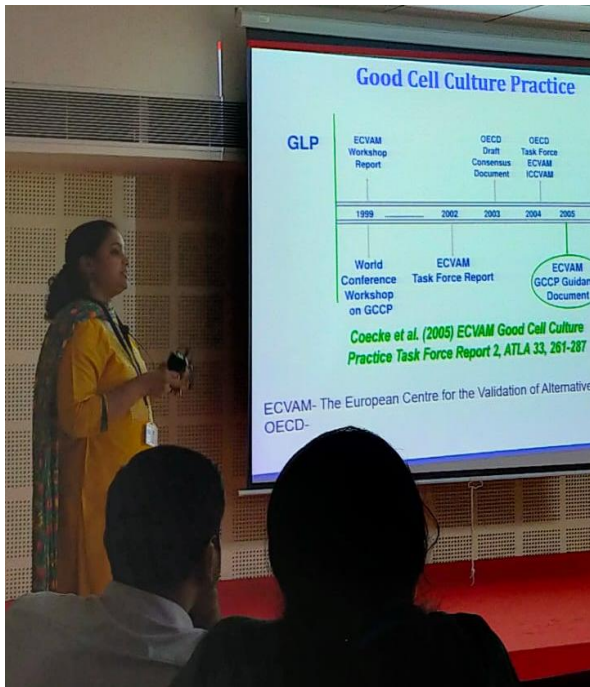
Demonstration of setting up the culture for the karyotype experiment by Mr. H.C. Manju and Ms. B. Supriya



Demonstration of isolation of DNA from peripheral blood samples Ms. S. Anju and Ms. Sumaiya Kalaigar

On the second day, students attended lectures from Dr. Divya Prasannakumar, Assistant Professor, Department of Biochemistry, and Dr. S. Prassannakumar, Associate Professor, Department of Biochemistry, JSS Medical College which included Good cell culture practice and Basics of RNA interference technology. A hands-on session for students followed this. Mr. Adel engaged the participants with mammalian cell culture, sub-passaging, cell counting, and re-plating. Later, they performed RNA isolation and cDNA synthesis from mammalian cells. The day ended with participants measuring both the quality and quantity of RNA and

preparation of cDNA for real-time PCR analysis. The sessions were handled by PhD scholars, including Ms. B. Supriya, Ms. V. Deepthi and Ms. M. Vaibhavishree.



Talk by Dr. Divya Prasannakumar and Dr. S. Prassannakumar

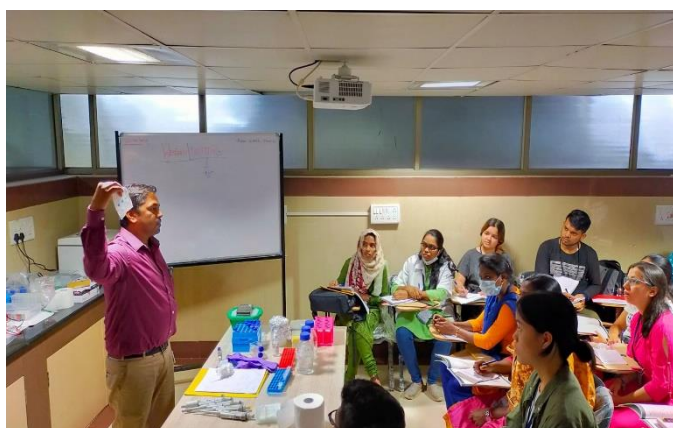


Hands-on sessions on cell culture, RNA isolation, and cDNA synthesis by Mr. Adel, Ms. B. Supriya, Ms. V. Deepthi, and Ms. M. Vaibhavishree.



Participants loading the isolated DNA and RNA samples in the agarose gel for electrophoresis

Day 3 started with a demonstration of SDS PAGE- gel preparation, protein estimation from cell lysates, followed by western blotting. Half-day was dedicated to learning the western blotting technique, as instructed by Mr. Anshu Kumar. The participants also attended the lecture on The Basics of Real-time PCR and analysis by Dr. Rajeshkumar Thimmulappa, Associate Professor, Department of Biochemistry, JSS Medical College. In the afternoon, the participants were exposed to PCR master mix preparation and setting up a PCR to identify the deletion of exon 7 from the spinal motor neuron 1 (SMN1) gene.



Demonstration of SDS PAGE by Mr. Anshu Kumar Yadav and Talk by Dr. Rajeshkumar Thimmulappa



Demonstration of master mix preparation and setting up the PCR

The next day (4th) started with a talk from Dr. Subbarao V Madhunapantula, Professor, Department of Biochemistry, JSS Medical College, on the Application of cell-based assays in drug discovery and development, followed by Basics of primer designing by Dr. Akila Prashant, Professor, Department of Biochemistry, & Convener, Department of Medical Genetics, JSS Medical College. Participants engaged themselves in the continuation of karyotyping experiments. We also had Dr. Lakshman Kumar, an Application specialist from Metasystems India, who spoke on Metasystems – products for FISH.



Talk by Dr. Subbarao V Madhunapantula and Dr. Akila Prashant



Participants harvesting the cells for slide preparation



Talk by Dr. Lakshman Kumar



Participants preparing the metaphase spread on the glass slide

The 5th day included a talk from Dr. D. Devananda, Assistant Professor, Department of Biochemistry, JSS Medical College, on Multiplex PCR: Protocol development and applications in medical diagnosis, followed by a talk from Dr. Pooja Aggarwal, Senior Resident, Department of Anatomy, JSS Medical college on Molecular Diagnostic tools & Genetic testing in the field of Clinical Medicine. Ms. B. Supriya, Tutor, Department of Medical Genetics, JSS Medical College, delivered a talk on the most frequent chromosomal abnormalities in genetic disorders. Further, for the rest of the day, participants carried out slide preparation and GTG banding for the karyotyping, followed by FISH prehybridization. They also performed the isolation of DNA from Bacteria, assisted by Mr. Kaleem and Ms. Nishitha R Kumar.



Talk by Dr. D. Devananda and Dr. Pooja Aggarwal



Participants performing bacterial DNA isolation assisted by Mr. Kaleem and Ms. Nishitha R Kumar



Talk by Ms. B. Supriya and participant preparing the agarose gel for electrophoresis

On the 6th day, Dr. Vinay Kumar Rao, Assistant Professor, Department of Medical Genetics, JSS Medical College, delivered a lecture on the fundamentals of confocal microscopy. An online talk followed this *via* the Zoom platform from 10x Genomics on See biology in new ways with single-cell and spatial technologies by Dr. Ivonne Petermann, Science &

Technology Advisor, ANZ, 10x Genomics. Mr. Mohammed Kaleem Ullah, ICMR-SRF, Department of Biochemistry, JSS Medical College, delivered a talk on Online Tools for NGS data analysis. In the hands-on session, students carried out FISH post-hybridization work. Later in the day, students were made to understand, analyze and interpret Karyotyping results by Dr. P.V.V. Gowri Sairam.



Talk by Dr. Vinay Kumar Rao and Dr. Ivonne Petermann



Participants processing the slides post-hybridization with fluorescent probes and Dr. P.V.V. Gowri Sairam explaining the interpretation of the karyogram



Talk by Mr. Mohammed Kaleem Ullah

The last day (7th day) of the program was arranged at JSS Medical College. Dr. Gopinath M. Sundaram, Principal scientist, Department of Molecular Nutrition, Central food technological research institute (CFTRI) spoke about MicroRNAs to nanovesicles: Exploration of novel therapeutics for skin diseases. This was followed by a talk from Dr. Jayaram S Kadandale, Professor and Head Clinical and Molecular cytogenetics, Centre for Human Genetics, Bangalore on Molecular cytogenetics in Genetic Diagnosis. His talk included clinical cases involving chromosomal analysis. Later, students were involved in setting up real-time quantitative PCR for gene expression studies.



Talk by Dr. Gopinath M. Sundaram and Dr. Jayaram S Kadandale



Demonstration to set up a real time PCR and participants attempting the post-workshop test

The knowledge gained by the participants during the workshop was assessed by giving a post-workshop test. Two participants who scored the highest marks were Ms. Sai Charitha Mullaguri from Osmania University and Mr. Amit Bharadwaj from Kasturba Medical College, Manipal. These students were rewarded with a certificate and a memento.



Ms. Sai Charitha Mullaguri and Mr. Amit Bharadwaj being awarded for scoring the highest marks in the post-workshop test

The program ended post-lunch with a valedictory function, attended by Dr. H Basavanagowdappa, Principal, JSS Medical College; Dr. Prashant Vishwanath, Director Research, JSS Academy of Higher Education & Research; Dr. M.N. Suma, Vice Principal, JSS Medical College; Mr. Sathish Chandra, Administrative Officer, JSS Medical College. Students gave positive feedback on the workshop as a whole. Finally, both participants and volunteers were presented with participation certificates.

| List of delegates | | | |
|--------------------------|------------------------|---------------------------|--|
| Sl.No. | Name | Designation | Host institution |
| 1. | Nithya Shankar | Postgraduate Cum Tutor | BMCRI, Bangalore |
| 2. | SupriyaDhotre | M.Sc Applied Genetics | Bangalore University, Bangalore |
| 3. | Zoya Shaikh | Ph.D. Scholar | CFTRI, Mysuru |
| 4. | Basavaraju K C | Ph.D. Scholar | CFTRI, Mysure |
| 5. | Shashidhar R Kolur | Project Associate | CSIR-CDRI, Lucknow |
| 6. | AmbarishaChabbi | Assistant Professor | DOS in Zoology, Davangere University |
| 7. | Damini C S | Research Scholar | DOS In Zoology, Manasagangotri, Mysuru |
| 8. | Kajal Sharma | MSc Medical Biotechnology | Dy Patil International University, Pune |
| 9. | Sriraman P | Junior Resident | JIPMER, Puducherry |
| 10. | Nayana P | Ph.D. Scholar | Jnana Sahyadri, Kuvempu University, Shivamogga |
| 11. | S.K.Janani | Research Scholar | JSS College Of Pharmacy, Ooty |
| 12. | Jarnain Naik | Research Scholar | Karnataka University, Dharwad |
| 13. | Sarah Gomes | Master's Student | KMC, Manipal |
| 14. | Amit Bharadwaj | M.Sc Student | KMC, Manipal |
| 15. | Mallika Basera | Ph.D. Scholar | KMC, Mangalore |
| 16. | Sujit Kumar Shukla | Senior Resident | MMCRI, Mysuru |
| 17. | Sai Charitha Mullaguri | Ph.D.Scholar | Osmania University, Hyderabad |
| 18. | Meghana Korikani | M.Sc Genetics | Osmania University, Hyderabad |
| 19. | TN Ravi | Assistant Professor | PES Institute of Medical Sciences and Research Institute, Kuppam |
| 20. | Shraman Kumar Bohra | M.Sc. Biochemistry | Pooja Bhagavat Memorial Mahajana Education Center, Mysuru |
| 21. | M.Maha Lakshmi | Tutor | Sree Balaji Medical College and Hospital, Chennai |
| 22. | Dhaarini S Y | M.ScIn Molecular Biology | Yuvaraja's College, University of Mysore |
| 23. | Suriya P | M.Sc., Biochemistry | Bharathidasan University, Tiruchirappalli |
| 24. | Nagarjuna Dalbanjan | Ph.D. Student | Department Of Biochemistry, Karnataka University, Dharwad |
| 25. | M Kruthika | M.Sc Graduate | Yuvarajas College, Mysuru |
| 26. | Chandan Gowda G O | MSc. Molecular Biology | JSS Academy of Higher Education & Research, Mysuru |
| 27. | Chandana B S | Ph.D. Scholar | JSS Academy of Higher Education & Research, Mysuru |

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| 28. | DeepadarshanUrs | Research Scholar | Mangalore University, Jnana Kaveri Post Graduation Centre, Kodagu |
| 29. | Ika Lin | Graduate Student | Arizona University, USA |
| 30. | Dr. Medha Alexander | MD.Microbiology | St. Johns, Bangalore |