[13-18th October 2025]

Bacteriocins of probiotic bacteria: from food safety to human and veterinary health-promotion

Overview

Various strains of lactic acid bacteria have been identified as probiotic organisms. These bacteria have won the scientific interests in last few decades and are known to produce antimicrobial peptides, bacteriocins active against closely related species and food-borne pathogens. Recent findings have suggested that antibiotic resistance has been emerged as a major problem worldwide due to the extensive use of classical antibiotics for the treatment of human and animal diseases. Therefore, the importance of developing new classes of antimicrobial agents has become more important in the field of medicine. In order to control the frequent use of antibiotics in clinical setting and agriculture, one potential substitute could be the use of probiotic bacteriocins. Recently, it has been realized that bacteriocin production is a probiotic trait which help producer strain to establish in the intestinal gut, direct inhibiting other bacteria and immune modulation. The future of bacteriocin applications is not only limited to antimicrobials but as potential anticancer, anti-inflammatory, immunomodulatory, and plant growth promoting agents as well. The course will consist of twelve hours lectures and tutorials, covering major aspects of modern developments in the field of health-promoting bacteria and their bacteriocins for applications in human health and veterinary sectors. Specifically, the course will focus on most up to date information on health-promoting bacteria and novel nature-derived approaches used for formulation and delivery of biologically functional substances.

Benefits of attending course

1. Understanding molecular taxonomy of microorganisms.
2. Advance methods for identification of microorganisms.
3. Concept of probiotics and beneficial bacteria.
4. Protein-based natural antimicrobials for human and animal health.
5. Development of commercial products.

Modules	**Day 1: 13th October 2025** **Lecture 1 and 2**: Introduction to systematics of lactic acid bacteria and methods for differentiation and identification **Tutorial**: Specificity in the application of different approaches in the identification. What is for industry and what is for research? Differences in identification approaches and importance of the choice of appropriate tools. **Day 2: 14th October 2025** **Lecture 3 and 4:** Key points in isolation, identification, and characterization of bacteriocin-producing lactic acid bacteria. Bacteriocin purification processes and identification of genetic determinates for antimicrobial proteins synthesis. **Tutorial**: How to isolate bacteriocin-producing LAB: A technical discussion; Bottleneck of purification strategies of bacteriocins. **Day 3: 15th October 2025** **Lecture 5 and 6:** Application of bacteriocins: From food processes to human medical and veterinary practices. Quorum sensing molecules and metabolisms controlling tools; New horizons in application of bacteriocins: antiviral, antifungal, anticancer, etc. **Tutorial**: A discussion on use of bacteriocins as an alternative to clinical antibiotics. **Day 4: 16th October 2025** **Lecture 7 and 8:** Probiotic concept and bacteriocins: Essential research points in pre-screening of effective probiotic and role of bacteriocin production in these aspects. Modification of bacteriocins polypeptide structure and modulation of their activity. **Tutorial**: Role of bacteriocins in probiotic trait? Biosafety and ethical issues **Day 5: 17th October 2025** **Lecture 9 and 10:** New horizons of applications of beneficial lactic acid bacteria: Human medicine and veterinary practice; synergetic formulations; cytotoxicity – how bad can be used in an advantages way. **Lecture 11 and 12:** Application of bacteriocins in therapeutics: Modulation of gut microbiota, modulation of host immune and alternative to antibiotics. **Date of Examination: 18th October 2025** **Number of participants for the course will be limited to thirty.**

You Should Attend If…	You are a student or faculty from academic institution interested in learning how probiotics are effective in health promotion and therapeutics. You are scientist interested to know detailed mechanism of action of probiotics and their metabolites in human and animal host. You are clinicians interested in knowing the applications of probiotics as natural antimicrobials as an alternative to clinical antibiotics developing antibiotic resistance.
Fees	The participation fees for taking the course is as follows: Participants from abroad : US $500 Industry/ Research Organizations/ Academic Institutions: INR 2000 Students: INR 1,000 Fill the online registration form (link is given below) and pay the course fee by NEFT/RTGS at SBI A/C No. 10222112164, IFSC: SBIN0004734. The above fees include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges etc. The participants will be provided food and accommodation on payment basis. Note: There is no central registration on the GIAN portal (gian.iith.ac.in). Participants can directly register using link given below.
Course Coordinator	Prof. Santosh Kumar Tiwari Head, Department of Genetics Maharshi Dayanand University Rohtak-124001, Haryana Mobile: 9996006990 Email: santoshgenetics@mdurohtak.ac.in
Local Coordinator	Prof. Narasimhan B. Director IQAC Maharshi Dayanand University Rohtak-124001, Haryana coordinatorgian.mdu@mdurohtak.ac.in
Registration Link	https://forms.gle/9eaYPZTZscyWwRk99

Course Faculty:

Dr. Svetoslav Todorov is a Professor at the Faculty of Pharmaceutical Sciences, University of Sao Paulo, Sao Paulo, Brazil. His research interests include Molecular taxonomy of lactic acid bacteria isolated from fermented foods; Characterization of bacteriocins produced by lactic acid bacteria and *Bacillus* spp.; Purification of polypeptides and small proteins; Probiotic lactic acid bacteria and *Bacillus* spp.; Postbiotics; Physiology and biochemistry of lactic acid bacteria; Medical application of the bacteriocins produced by lactic acid bacteria and Bacillus spp. For more information regarding Todorov's research, you can visit at https://www.scopus.com/authid/detail.uri?authorId=7005217476.

Dr. Santosh Kumar Tiwari is a Professor at Department of Genetics, Maharshi Dayanand University, Rohtak, Haryana, India. His research group has demonstrated bacteriocin production in food and soil isolates of lactic acid bacteria. These bacteria have been characterized for probiotic properties and their bacteriocins inhibited broad host-range of pathogens. The mode of action of these bacteriocins was found to be bactericidal, caused ATP efflux, dissipated membrane potential and pH gradient leading to death of target cells. These bacteriocins were found to be novel peptides with unique sequences and stability. Their activity against MDR strains has shown new way to be used as an alternative to clinical antibiotics to solve multidrug resistance problem. The inhibitory property of bacteriocins is also being characterized for the modulation of microbiota and improvement of human health. In addition, his group is working on Archaea metabolites such as halocins and carotenoids for their potential industrial applications.

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