Basics of Medical Microbiology and Virology

Dr. Ishan Y. Pandya
Dr. Renuka Sharma
Dr. C. Ravinder Singh

Kripa Drishti Publications, Pune.

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Authored by: **Dr. Ishan Y. Pandya, Dr. Renuka Sharma,**

Dr. C. Ravinder Singh

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PREFACE

Medical microbiology, the large subset of microbiology that is applied to medicine, is a branch of medical science concerned with the prevention, diagnosis and treatment of infectious diseases. Disease causing agents may be acellular or cellular organisms that attack on hosts and controls over its metabolic machineries thus situation may fatal to host. Viruses and prions are acellular pathogens and protozoan, fungus, or helminths are cellular organism that infects to the humans. Beijerinck used the word 'virus' to described the mysterious agent in his *'contagium vivum fluidum'*. Viruses can be classified according to the host cell they infect: animal viruses, plant viruses, fungal viruses, and bacteriophages and in size from about 30-450 nm and their shape and structure are studied by electron microscopy, NMR spectroscopy, and X-ray crystallography. The history of medical microbiology is oldest among the field of medicines, usually after the discovery of microscopes by Antony-von-Leeuwenhoek it was originally more explored and understood. In 1796, Edward Jenner developed a method using cowpox to successfully immunize a child against smallpox. The same principles are used for developing vaccines today. In 1857 Louis Pasteur also designed vaccines against several diseases such as anthrax, fowl cholera and rabies. Later, in 1867 Joseph Lister is considered to be the father of antiseptic surgery and in 1884 Robert Koch first scientists to focus on the isolation of bacteria in pure culture. In 1884, Hans Christian Gram developed a staining method for bacterial studies under a microscope. In 1910 Paul Ehrlich tested multiple combinations of *arsenic based chemicals* on infected rabbits with syphilis. In 1929 Alexander Fleming developed the 'boon of medicine' antibiotic penicillin. In 1939 Gerhard Domagk 'founder of sulfa-drugs' discovered *Prontosil* red protected mice from pathogenic streptococci and staphylococci without toxicity. With the advancement under scientific research, Walter Gilbert and Frederick singer developed a DNA sequencing technique in 1977, caused a rapid change the development of vaccines, medical treatments and diagnostic methods, this leading work become milestone for the development of first genetically engineered vaccine

in 1986 for hepatitis B. In 1995 a team at The Institute for Genomic Research sequenced the first bacterial genome; Haemophilus influenzae. Today, PCR, Chromatography, ELISA, ELISPOT and many other techniques are developed for the rapid diagnosis of the diseases. The book 'Basics of Medical Microbiology and Virology' covers all about the history of microbiology, diagnosis of microbial diseases and applications of molecular diagnostics or modern methods of microbial diagnosis, bacteriology and pathogenesis of Streptococci, Bacillus, Clostridium, Corynebacterium, Salmonella, medical mycology of dermatophyte, Cryptococcus, Histoplasma, and Candida, medical parasitology of Entamoeba, Giardia, Plasmodium, Taenia etc. Another section of the book is about virology informing about classification of viruses, cultivation of plant and animal viruses, Viral assays, and structure and life cycles of adenoviruses and retroviruses, and vaccines production, and future of vaccines i.e., nanovaccines. As the science and research in progressing, the dependence upon the technologies is increasing, it may possible that soon many new inventions upon the biochips, or nanochips will useful in field of medicine, thus pathogen will recognised before generating the infection or disease and prior treatment of the disease will save the life. We are sure that the book 'Basics of medical microbiology and virology' will significant in direction of medicine, and useful for better understanding of the concepts of medicine to many graduates and researchers, worldwide.

Dr. Ishan Y. Pandya, Dr. Renuka Sharma, Dr. C. Ravinder Singh.

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About the Authors

Dr. Ishan Y. Pandya

Dr. Ishan Y. Pandya (DSc.hc., PhD., FBSS, FISCA), has served as Ecologist researcher in at Gujarat cological Education and Research (GEER) Foundation, Govt. of Gujarat. He has collectively 10 plus years of research and teaching experience of human physiology, Biotechnology, and Ecology. Currently, he is an academic Director, iClonexon Science Institute, a digital platform for developing scientific education to undergraduates and graduates in India. He is an International Author of 15 plus research papers, and 7 academics books in life sciences. His invention and ideas are published in Intellectual Property Rights (IPR), India. He has 2 national patents on CoViD-19, and 3 international Australian Patents on neural networks, blockchain technology for healthcare sectors, and security of medical cloud data. He awarded with **18 plus academic or research awards** including 'Gold medal-Indian Book of Records', Best Scientist Award-IMRF, **Hargobind Khorana Young Scientist award, Dr. Sarvepalli Radhakrishnan Teaching Excellence Award, ISSN-international Award,** Young Scientist Award-Western Sydney University-I2OR, Best Senior Faculty Award- NRA, and many others. He is fellow and life member of ISCA, Indian Virological Society-IVS, ISEBNBRI, Bose Science Society-TNSRO, IBRF.

Dr. Renuka Sharma

Dr. Renuka Sharma is Asst. Professor of Virology in Department of Research, Chandigarh Group of Colleges, Mohali, India. She awarded Ph.D. (Virology) from Amity University and worked with international and national eminent virologists. She is elected as fellow of Indian Virological Society. She conferred with many **travel grants awards** from ICAR for participating in national conferences and invited as speaker in USA, Paris and many other countries. She has also done R&D work in biotech and stem cell industries. Dr. Renuka is also a part of **'Atal Community Innovation Centre'.** She has submitted number of research projects in national agencies including **DST, DBT, INSA, SERB, ICMR.** She has delivered many free trainings and webinars for students during pandemic COVID-19.

Dr. C. Ravinder Singh

Dr. C. Ravinder Singh (Ph.D., CLAS, PDF) is a Chief Scientist & Head, Research & Innovation Department, Aakash Green Research Pvt. Limited, Dubai, UAE. Particularly, He has 10+ years of academic cum research experience in microbiological studies and fundamental experiment skills like pathogen culture and staining processes etc. He is a proud recipient of scientific research awards including **Dr. A.P. J. Abdul Kalam Researcher award, Dr. M. S. Swaminathan Research Excellence award,** and **Har Govind Khorana award** etc., He holds Lifetime membership in various Science Societies, Research Institutions and Professional Bodies. He has published over 35 research articles in national and international Journals of high impact. He has also presented more than 30 research findings in National/ International Level Conferences and organized various seminar/Workshops and training programs.

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A-503 Poorva Heights, Pashan-Sus Road, Near Sai Chowk,
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