The Vision and Role of Biomathematics in Biomedical Industry and Government Policy

Eunok Jung

1) Department of Mathematics, Konkuk University, Seoul, KOREA

Corresponding Author: Eunok Jung, junge@konkuk.ac.kr

ABSTRACT

For Korean mathematicians and engineers, a decade ago, the words “biomathematics, mathematical biology or medical mathematics” were not very familiar. However in recent years there has been a growing interest in mathematical biology in the biomedical field. Biomathematical modeling and optimization have played an important role in suggesting the scientific basis of core technology and policy decision-making, in order to solve current problems and challenges in corporations or government agencies in the biomedical field.

To study the complexity of life phenomena through mathematics, the analysis and interpretation of a given problem must consist of various connections. For example, mathematical models are established for the study of the blood circulation system, computational methods are used to obtain numerical results, images and visualization are needed to help interpret the results, and in order to verify numerical results comparative analysis with actual data is essential. As such, the study of biomathematics is not a simple science that requires complexity and connection with various disciplines. It is an enterprising discipline that can challenge the mystery and complexity of life phenomena. It is a discipline that academia, industry, society and government communicate, that is, 4C, "Complexity, Connection, Challenge, Communication".

In this presentation, we first present the case studies of Korean biomathematicians. Next, the role and vision of mathematical modeling, especially, in infectious diseases will be discussed. Recently, mathematical models can help anticipate the emergence and evaluate the potential effectiveness of different approaches for bring an epidemic under control. The mathematical models have been also used to help understand and predict the spread of emerging and re-emerging infectious diseases, such as Middle East Respiratory Syndrome (MERS), Ebola, and 2009 A/H1N1 influenza. In this talk, we present the dynamical models of transmission for emerging infectious diseases and discuss what role mathematics can play in disease prevention and intervention policies. Finally, I would like to discuss what factors are necessary for young mathematicians to become key human resources in the industry and government agency. It is also a time to think about how to prepare for communication between the mathematics world, industry and government.