The Organized Session No. 3

The Dynamics of Immune Systems

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Chaired by Dr Hisashi Inaba (University of Tokyo)

1. Mathematical models of immune systems: An introduction

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We owe our lives to immune systems because biological world is full of parasites. Immune system detects and attacks to invading parasites to prevent our bodies from malfunctioning caused by the proliferation of the parasites. Immune system has three remarkable characteristics: 1) the recognition of self and not-self, 2) being ready to enormous number of possible parasites (antigens), and 3) the memory of a specific parasite (antigen) that invaded before. It is important to avoid attacking mistakenly our constituent cells. There are immensely many parasites in the environment. It has adaptive significance to respond quickly to parasites that have ever invaded. In this introductory talk on immunity and mathematical models, we first summarize the immune system and explain how it is described in mathematical models. This talk aims at an introduction and concentrates on basic models. Advanced topics will be presented in the following talks. Some new approach is included. Immune systems can be viewed as ecological systems of parasites and immune cell populations within an individual host. The similarity and difference of these systems are also discussed.