# Modelling Pattern formation during development.

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■ Place: Lecture room 2, Medical Education & Library Building 3F.

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■ 日時：平成２７年６月３日（水） １７：３０～

■ 場所：医学教育図書棟３階 第２講義室

Vertebrate development consists of various spontaneous pattern formation phenomena. Information from molecular genetics has contributed to list up molecules involved in each phenomenon, but how interaction of these molecules result in pattern formation remains to be elucidated. In this talk I will present a simple example, Delta-Notch interaction and random cell movement during retina vasculature development. By modeling, numerical simulation and analysis we will show how spontaneous pattern formation phenomena in development can be studied using mathematical modeling.

Delta-Notch interaction is one of the most well studied systems in theoretical biology. They are membrane proteins and show lateral inhibition, resulting in salt-and-pepper pattern. However, not all delta-notch system shows this alternating pattern. For example, in retina vasculature, arterial endothelium show salt-and-pepper pattern while in other regions they simply show sporadic or no pattern. Delta-Notch pattern formation can be understood by simple linear model, in which shortest wavenumber component becomes unstable and results in alternate expression pattern. Next, we implement the effect of random cell movement using flip of the cell during pattern formation process. The probability of flip can be directly correlated to diffusion coefficient of cell, and magnitude of effect on pattern can be obtained using simple order estimation. We can show that effect of random cell migration is always negative on Delta-Notch pattern formation. Finally we predict that random cell movement is slower in arterial region, and trying to experimentally verify the model using organ culture system.

■ Inviter: Prof. H. Ogawa (Dept. of Cardiovascular Medicine) / 循環器内科学分野 小川久雄 教授

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