

応用物理学会北海道支部会後援会

トポロジー理工学教育研究センター (共催)

エンレイソウの会 (第141回)

場 所 : 工学部 A 棟 A 1 - 1 7 (物理工学系大会議室)

日 時 : 平成 22 年 8 月 23 日 (月曜日) 16:00 ~ 17 : 30

講演者 : Prof. Dean Korosak (University of Maribor, Slovenia)

題 目 : 『**Networking beta-cells: The role of cell-to-cell network topology in bursting oscillations patterns**』

要 旨 : Network theory helped uncover the common scale-free structure of different cellular processes in living organisms that is robust against random errors but highly sensitive to targeted attacks on most connected nodes. However, apart from the neuronal and brain network models, few attempts have been made so far to consider the changes in structure and function of living tissues from the network perspective.

In this talk we shall consider the use of spatial complex networks to quantify the functional role of endocrine pancreatic tissue architecture. We will introduce coupling between beta-cells based on the spatially embedded complex network cytoarchitecture model of an intact islet. Using a fitness network model approach complex networks were constructed by connecting the beta-cells based on their ability to communicate with other cells in the islet. Bursting patterns of the membrane potential of networked beta-cells were then computed in regular lattices with nearest neighbor interactions and in networks with complex topologies. We will show that long range communication between beta-cells emerging from the scale-free topology of the islet cytoarchitecture can have important consequences for the beta-cells bursting patterns. Furthermore, we shall introduce the tissue complexity, expressed as the function of node-node link correlations of the underlying network, and show that it decays extremely fast under targeted attacks on beta-cells in islets with heterogeneous network structure, whereas the more homogeneously organized islets display increased tolerance to progressive beta-cell death.

世話人 : 矢久保 考介

エンレイソウの会連絡先

〒060-8628 札幌市北区北 13 条西 8 丁目

北海道大学大学院工学研究科 OL 棟 1-1-2

トポロジー理工学教育研究センター事務室 佐原

TEL (011)706-6154 (代表) 内線 6154

Email:sahara@topo.hokudai.ac.jp