



Title of Project : Regulation of polarity signaling during morphogenesis, remodeling, and breakdown of epithelial tubular structure

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【Purpose of the Research Project】

Epithelial tubular structures are essential units for each organ. Epithelial stem cells differentiate into epithelial cells, which form tubule-like structures through assembly and coherent association, and its structures are maintained. Disruption of epithelial tubular structures leads to developmental malformations and various postnatal diseases, including cancer. While understanding of cellular functions at the molecular level has been deepened, the molecular mechanism of the formation and maintenance of epithelial tubules remains to be clarified.

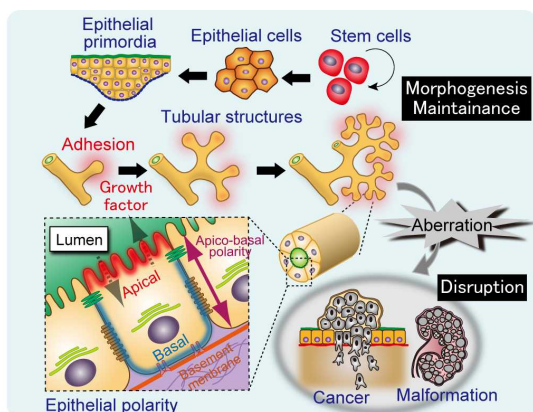


Figure 1 Morphogenesis, maintenance, and disruption of epithelial tubular structure.

There are various patterns of epithelial tubular structures, depending on organs. However, we assume that the principle structure of epithelial tubules is regulated by cellular polarization. In this project, we challenge to clarify unresolved issues existed between cell and organ levels: how epithelial cells are polarized to form tubular structures; how disruption of epithelial tubular structures results in diseases.

【Content of the Research Project】

Understanding of the mechanism underlying the formation of epithelial tubular structures and that of its disruption are two side of the same coin. Therefore, simultaneous analyses of both normal and pathological conditions are required to clarify the molecular mechanism of the formation and maintenance of epithelial tubular structures via cell polarity regulation. Thus, this project has two cooperative research

groups with different strategies to clarify the mechanism of “formation and maintenance of epithelial tubular structures” and “disruption of epithelial tubular structures”.

【Expected Research Achievements and Scientific Significance】

While researches on the formation of central nervous and blood vascular systems, which also show tubular structures, have been progressing, this groundbreaking study on epithelial tubular systems has just begun. Progress in this new research area would contribute to understanding of functional relationship between epithelial tissues and other tissues. It is also expected to contribute to understanding of the formation of central nervous and blood vessel systems. In addition, research achievement in this project would be useful for developing regenerative medicine in next generation, which will be performed on the basis of further understanding of tissue conformation. Finally, we would like to establish new scientific field called “Tubulology (Tubule + biology)” by promoting this new research.

【Key Words】

Polarity signaling: The system that regulates the asymmetric accumulation of mobile components and the oriented organization of polar cytoskeletal components.

Epithelial tubular structure: Tubule-like structure with epithelial cells having an apical free and a basal surface.

【Term of Project】 FY2011-2015

【Budget Allocation】 1,035,500 Thousand Yen

【Homepage Address and Other Contact Information】

<http://www.med.osaka-u.ac.jp/pub/molbiobc/tubulology/>