平成 29 年 5 月 23 日
23, May, 2017

大学院学生各位
To All Graduate Students

平成 29 年度

基盤医学特論　開講通知

Information on Special Lecture Tokuron 2017

題目：染色体の構造を維持する KITE タンパク質及びその複合体
Title: KITE proteins and their complexes maintaining structure of chromosomes

講師：Dr. Jan Palecek

(Masaryk University National Center for Biomolecular Research)

日時：平成 29 年 6 月 12 日（月）17:00-18:30
Time and Date： June 12, 2017 (Monday) :00-:00

場所：環境医学研究所　北館セミナー室
Room : Conference Room, South Wing, Research Institute of Environmental Medicine

使用言語：英語
Language : English

Abstract :

KITE proteins and their complexes maintaining structure of chromosomes

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The SMC (structure maintenance of chromosome) proteins are conserved from bacteria to humans. They associate with kleisin and kleisin-interacting proteins, forming different complexes (cohesin, condensin and SMC5/6 in eukaryotes). The SMC/kleisin complexes form elongated annular structures, which are critical for DNA replication, chromosome compaction and segregation, genome maintenance, and the regulation of gene expression. Recently, we described marked structural similarities between bacterial and eukaryotic SMC/kleisin partner proteins (designated as ‘‘KITE’’ proteins for Kleisin Interacting Tandem-winged-helix Elements). KITE

proteins are integral parts of all prokaryotic SMC complexes and eukaryotic SMC5/6, but not cohesin and condensin, complexes. Based on architectural rather than sequence similarity, we proposed an adapted model for the evolution of the SMC protein complexes.

The KITE proteins play important role in structural organization of the SMC complexes. We analyzed protein-protein (PPI) and DNA-protein interactions of eukaryotic KITE proteins (called NSE1 and NSE3) and described an impact of NSE3 KITE subunit mutations on its PPI properties. We found that nse3 mutations identified in patients disrupted interactions within the SMC5/6 complex and led to destabilization of the complex in patient cells. The patient cells showed chromosome rearrangements, micronuclei, sensitivity to replication stress and DNA damage. Patients with these cellular defects exhibited combined T- and B-cell immunodeficiency and died during infancy after severe viral pneumonia. Based on these findings, we named this new genetic disease LICS for Lung disease Immunodeficiency and Chromosome breakage Syndrome.

Altogether, our findings suggest the importance of KITE proteins for maintenance of chromosome structure.

References:

1. Palecek, J.J. and Gruber S.: Kite Proteins: a Superfamily of SMC/Kleisin Partners Conserved Across Bacteria, Archaea, and Eukaryotes, *Structure* 23(12): 2183-90, 2015

2. van der Crabben, et al,: Destabilized SMC5/6 complex leads to chromosome breakage syndrome with severe lung disease. *Journal of Clinical Investigation*, 126(8): 2881-92, 2016

＊ 関係講座・部門等の連絡担当者： 環境医学研究所 発生・遺伝　荻　朋男（電話：789-3873）
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[注意]事前申し込みは不要です
Notice：No registration required

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