京都大学　大学院生命科学研究科 / 医生物学研究所

Graduate School of Biostudies / Institute for Life and Medical Sciences
Kyoto University

演題：Exploring roles of nuclear architecture in neural plasticity and brain aging

脳神経可塑性の基盤となる核内構造の探索

演者：Tomohisa Toda, PhD／戸田智久

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日時：１３：３０～１５：３０

Friday, December 22, 2023／2023年12月22日(金)

場所：1F Seminar Room of Bldg. No.2, LiMe／医生物学研究所2号館1階セミナー室

Ageing is one of the most critical risk factors for neurological and psychiatric diseases. However, the biological links between physiological ageing and pathological development are still largely unknown. A solid understanding of the biology of brain ageing will thus be a key to developing the means to treat these diseases. Since neurons and adult neural progenitor cells in the brain are mostly generated during development with limited capacity of replacement, they need to maintain their identity and function throughout our lives.

We recently discovered that a cell type-specific nuclear architecture organized by nucleoporins and nuclear lamins work as a structural gatekeeper for the maintenance of neural progenitor cells (NPs). Strikingly, nucleoporins and lamins are the most long-lived proteins in a cell and are known to be damaged during brain ageing. Thus, we are addressing how these long-lived proteins contribute to maintain brain plasticity, and how aging affects the identified mechanisms. In parallel, in addition to nuclear structural proteins, we found that some of RNAs do not turn over for years in the brain in a cell type-specific manner. We characterized these long-lived RNAs using in vivo and in vitro models. In the seminar, I will discuss about these classes of RNAs as novel “long-lived cellular constituents” and their potential roles in the long-term maintenance of brain function.

(Selected publications)

Zocher S and Toda T, “Epigenetic Aging in Adult Neurogenesis” Hippocampus, (2023):33(4):347-359.

Bedrosian, TA* Houtman J*, Eguiguren JS, Ghassemzadeh, S, Rund N, Novaresi. NM, Hu L, Parylak S, Denli AM, Moore RM, Namba T, Gage FH, and Toda T. “Lamin B1 decline underlies age-related loss of adult hippocampal neurogenesis” EMBO Journal (2021):40 e105819.

Toda T, Hsu JY, Linker SB, Hu L, Schafer ST, Mertens J, Jacinto FV, Hetzer MW & Gage FH.“Nup153 interacts with Sox2 to enable bimodal gene regulation and maintenance of neural progenitor cells” Cell Stem Cell, 21, 5, 618-634 (2017)

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