



# 第 496 回つくば分子生命科学セミナー

TSUKUBA MOLECULAR LIFE SCIENCE SEMINAR

演題 : Advancing in vitro models of human early post-implantation development.

演者 : Dr. Takuya Azami

Research Associate

MRC Human Genetics Unit, Institute of Genetics and Cancer,  
the University of Edinburgh

日時 : 2025 年 12 月 16 日 (火) 17:00-18:30

会場 : 臨床講義室 D

要旨 :

STAT3 is well known for sustaining the self-renewal of naïve pluripotent mouse embryonic stem cells (mESCs), yet its function during gastrulation remains poorly understood. We recently demonstrated that zygotic Stat3 knockout embryos display consistent developmental delay from implantation to mid-gestation, associated with reduced epiblast cell number (Azami *et al.*, *Cell Reports*, 2025). To explore STAT3 function during gastrulation, we generated gastruloids, an in vitro models of post-implantation development, from Stat3 null ESCs. These gastruloids failed to elongate posteriorly and lost BRA/T expression. scRNA-seq revealed that although differentiation into presomitic mesoderm and neuromesodermal progenitors was initiated, these populations were not maintained, accompanied by reduced WNT3A expression. Prolonged WNT activation with CHIR99021 restored posterior elongation, suggesting that STAT3 regulates gastrulation through WNT signaling.

To establish a robust human model for studying early development, we optimized the efficiency and cost of human gastruloid formation using defined N2B27 medium. Reducing Activin A concentration, adjusting initial cell density, and delaying GSK3 inhibition markedly improved elongation efficiency (Azami *et al.*, *bioRxiv*, 2025). Comparable defects in human gastruloids carrying STAT3 loss- or gain-of-function mutations further indicate a conserved role for STAT3 in posterior axis formation. The optimized, simplified, and economical protocol provides a reproducible platform for investigating conserved signaling pathways underlying human post-implantation development, including the pivotal role of STAT3 in coordinating WNT-mediated tissue patterning.

本セミナーは、医学学位プログラム(博士)「医学セミナー」(担当:専攻各教員)、及び、フロンティア医科学学位プログラム(修士)「医科学セミナーII」(担当:入江賢児)の関連セミナーに相当します。

連絡先: 筑波大学医学医療系 高橋 智 (内線 7516, satoruta@md.tsukuba.ac.jp)

【筑波分子医学協会(TSMM)主催】HP: <http://www.md.tsukuba.ac.jp/public/tsmm/>

協会代表: 筑波大学医学医療系 久武幸司 TSMM セミナー担当: 筑波大学医学医療系 藤栄治