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Research Interests

Stem cell and developmental biology, organoid medicine

Education

2011	M.D., Yokohama City University School of Medicine
2019	Ph.D., Yokohama City University School of Medicine

Professional Career

2011-2013	Research Associate, Department of Regenerative Medicine, Yokohama City University
2013-2018	Associate Professor, Department of Regenerative Medicine, Yokohama City University
2015 - present	Assistant Professor, Division of Gastroenterology, Hepatology and Nutrition and Division of Developmental Biology, Cincinnati Children's Hospital Medical Center, USA
2017 - present	Director of Commercial Innovation, Center for Stem Cell and Organoid Medicine (CuSTOM), Cincinnati Children's Hospital Medical Center, USA
2018 - present	Professor & Founding Director, Communication Design Center, Yokohama City University
2018 - present	Professor, Institute of Research, Tokyo Medical Dental University

Scientific Activities

2018 - present	Deputy to the Chairman, Japanese Society for Regenerative Medicine (JSRM)
2018 - present	Board of Directors, International Society for Stem Cell Research (ISSCR)

Honors

2020	NIH Director's New Innovator Award, Bethesda, USA
2018	JSPS Prize of The Japan Society for the Promotion of Science, Tokyo
2016	Robertson Investigator Award, New-York Stem Cell Foundation, NY

Publications

1. Koike H, Iwasawa K, Ouchi R , Maezawa M, Giesbrecht K, Saiki N, R-R, Ferguson A, Kimura M , Wendy T, Wells J, Zorn A, and **Takebe T**: Modeling human hepato-biliary-pancreatic organogenesis from the foregut-midgut boundary. ***Nature***, 574(7776):112-116, 2019.

2. **Takebe T***, Wells JM *: Organoids-By-Design. ***Science***, 364 (6444), 956-95, 2019. (* Correspondence)

3. Camp JG, Sekine K, Gerber T, Loeffler-Wirth H, Binder H, Gac M, Kanton S, Kageyama J, Damm G, Seehofer D, Belicova L, Bickle M, Barsacchi R, Okuda R, Yoshizawa E, Kimura M, Ayabe H, Taniguchi H, **Takebe T***, Treutlein B*: Multilineage communication regulates human liver bud self-organization from pluripotency. ***Nature***, 546, 533–534, 2017. (* Correspondence)

Promise and Impact of Organoid Medicine

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Organoids are multicellular structures that can be derived from adult organs or pluripotent stem cells. Early versions of organoids range from simple epithelial structures to complex, disorganized tissues with large cellular diversity. The current challenge is to engineer cellular complexity into organoids in a controlled manner that results in organized assembly and acquisition of tissue function. These efforts have relied on studies of organ assembly during embryonic development and have resulted in development of organoids with multilayer tissue complexity and higher order functions. For example, we show that antero-posterior interactions recapitulate the foregut and the midgut boundary in vitro, modeling the inter-coordinated specification and invagination of the human hepato-biliary-pancreatic system from human pluripotent stem cells. Coupled with patient-derived stem cells, my group studied the mechanisms of human hepatic diseases that includes viral hepatitis, steatohepatitis, recently extended to drug induced liver injury (DILI), wherein organoid modelled the clinical phenotype and genotype are correlated. Here I will summarize the next generation of organoid by design, and discuss its promise and impact to elucidate personalized disease mechanisms and understand drug reactions underlying individual variations in humans.

References

[1] Koike H, Iwasawa K, Ouchi R , Maezawa M, Giesbrecht K, Saiki N, R-R, Ferguson A, Kimura M , Wendy T, Wells J, Zorn A, and **Takebe T**: Modeling human hepato-biliary-pancreatic organogenesis from the foregut-midgut boundary. ***Nature***, 574(7776):112-116.

[2] Ouchi R, Togo S, Kimura M, Shinozawa T, Koido M, Koike H, Thompson W, Karns R, Mayhew C, McGrath PS, McCauley HA, Zhang RR, Lewis K, Hakozaki S, Ferguson A, Saiki N, Yoneyama Y, Takeuchi I, Mabuchi Y, Akazawa C, Yoshikawa HY, Wells JM, **Takebe T***: Modeling Steatohepatitis in Humans with Pluripotent Stem Cell-Derived Organoids. ***Cell Metabolism***, 30(2):374-384, 2019 (*Correspondence)

[3] Koido M, Kawakami E, Fukumura J, Noguchi Y, Ohori M, Nio Y, Nicoletti P, Aithal G, Daly, A, Watkins P, Anayama H, Dragan Y, Shinozawa T and **Takebe T***. Polygenic architecture informs potential vulnerability to drug-induced liver injury. ***Nature Medicine***, 2020. (* Correspondence), PMID: 32895570

[4] Shinozawa T , Kimura M , Yuqi C, Saiki N, Yoneyama Y, Ouchi R , Koike H , Koido M, Zhang R-R, Dunn A, Ferguson A, Togo S, Lewis K, Thompson W, Asai A , **Takebe T***: High-Fidelity Drug Induced Liver Injury Screen Using Human iPSC Liver Organoids. ***Gastroenterology***, in press.