形態発生学分野

【研究プロジェクト名および概要】

I. Research on Molecular regulation of EMT during amniote chorioallantoic membrane formation

II. Research on Molecular specification of blood and vascular development in amniotes

III. Research on Roles of EMT in pluripotency maintenance and iPSC differentiation

IV. Research on Reprogramming of avian fibroblast cells to pluripotent stem cells

Our lab is interested in understanding relationship between cellular morphology and cellular differentiation and function during vertebrate development. At the center of our studies is the concept of Epithelial-Mesenchymal Transition (EMT) (Yang et al, 2020 Nature Reviews MCB; Hamidi et al, 2020, Development), which describes cell shape changes during morphogenesis of multicellular systems. EMT is important both in normal animal development and in disease (e.g., cancer and fibrosis). We use two developmental models in our research: germ layer specification during gastrulation (using both avian embryo and human/avian pluripotent stem cells) and mesoderm differentiation during formation of blood and vascular systems (Weng et al, 2020 Haematologica) and of the chorioallantoic membrane (which is the forerunner of placenta in mammals).

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【特殊技術・特殊装置】

1. Embryo extraction and ex ovo culture
2. In vitro culture of pluripotent cells
3. Immunohisitochemistry and RNA in situ analysis
4. Molecular cloning and in vivo perturbation
5. RNA-seq and CAGE-seq
6. Time-lapse imaging
7. Bio-informatics analysis
8. Epithelial and mesenchymal analysis

【英文原著】

1. K. Sawanyawisuth*, G. Sashida* and G. Sheng* *Epithelial Mesenchymal Transition in liver fluke-induced cholangiocarcinoma* **Cancers** *13*(4), 791; https://doi.org/10.3390/cancers13040791
2. (2021) G. Sheng* *Defining epithelial-Mesenchymal Transitions in animal development* **Development** [review] [in press]
3. (2021) G. Ismagulov, S. Hamidi and G. Sheng* *Epithelial-Mesenchymal Transition drives three-dimensional morphogenesis in mammalian early development* **Frontiers in Cell and Developmental Biology** https://doi.org/10.3389/fcell.2021.639244
4. (2021) S. Hamidi, H. Nagai and G. Sheng* *Partial EMT/MET: an army of one* **Methods in Molecular Biology** 2179:29-33. doi: 10.1007/978-1-0716-0779-4_5 [commentary]
5. (2020) T. Alam, S. Agrawal, J. Severin, R. S. Young, R. Andersson, E. Arner, A. Hasegawa, M. Lizio, J. Ramilowski, I. Abugessaisa, M. S. Taylor, T. Lassmann, M. Itoh, T. Kasukawa, H. Kawaji, L. Marchionni, G. Sheng, A. Forrest, L. M. Khachigian, Y. Hayashizaki, P. Carninci, M. de Hoon* *Comparative transcriptomics of primary cells in vertebrates* **Genome Research** [primary research] DOI:10.1101/gr.255679.119
6. (2020) J. Yang*, P. Antin, G. Berx, C. Blanpain, T. Brabletz, M. Bronner, K. Campbell, A. Cano, J. Casanova, G. Christofori, S. Dedhar, R. Derynck, H. L. Ford, J. Fuxe, A. Garcia de Herreros, G. J. Goodall, A. Hadjantonakis, R. J. Y. Huang, C. Halcheim, R. Kalluri, Y. Kang, Y. Khew-Goodall, H. Levine, J. Liu, G. D. Longmore, S. A. Mani, J. Massague, R. Mayor, D. McClay, K. E. Mostov, D. F. Newgreen, M. A. Nieto, A. Puisieux, R. Runyan, P. Savagner, B. Stanger, M. P. Stemmler, Y. Takahashi, M. Takeichi, E. Theveneau, J. P. Thiery, E. W. Thompson, R. A. Weinberg, W. Williams, J. Xing, B. P. Zhou and G. Sheng* *Guidelines and definitions for research on epithelial-mesenchymal transition* **Nature Reviews Molecular Cell Biology** [review] **cover feature** [PMID:32300252]
7. (2020) S. Hamidi, Y. Nakaya, H. Nagai, C. Alev, T. Kasukawa, S. Chhabra, R. Lee, H. Niwa, A. Warmflash, T. Shibata and G. Sheng* *Mesenchymal-epithelial transition regulates initiation of pluripotency exit before gastrulation.* **Development** [primary research] DOI:10.1242/dev.184960 [PMID:32014865]
8. (2020) W. Weng, H. Hagai, S. Hamidi and G. Sheng* *NPAS4L is involved in avian hemangioblast specification.* **Haematologica** [primary research] DOI:10.3324/haematol.2019.239434