

Experimental Pathology

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Other Faculty Members

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Major Scientific Interests of the Group

The roles of transforming growth factor- β related molecules (TMETPAI, MAFK, GPNMB, THG-1) in cancer stem cells.

Establishment of cancer stem cell targeting therapies using macrocyclic peptides.

Projects for Regular Students in Doctoral or Master's Programs

- 1) Molecular mechanisms of TGF- β related molecules (TMETPAI, MafK, GPNMB, THG-1) in stem cell dynamics and carcinogenesis.
- 2) Quantitative live imaging of cancer stem cell dynamics.
- 3) Macrocyclic peptide screening for the establishment of cancer stem cell targeting therapy.

Study Programs for Short Stay Students (one week – one trimester)

- 1) Tissue preparation, Immunohistochemistry and 3D reconstruction
- 2) *In vitro* assay of tumorigenic activities (cell proliferation, colony formation, sphere formation, Matrigel invasion assay, etc.) of TMETPAI, MAFK, GPNMB, THG-1 and stem cell imaging.

Selected Publications

- 1) Chen C, Okita Y, Watanabe Y, Abe F, Fikry MA, Ichikawa Y, Suzuki H, Shibuya A, **Kato M**. Glycoprotein nmb is exposed on the surface of dormant breast cancer cells and induces stem cell-like properties. **Cancer Res.** 78(22): 6424-6435, 2018.
- 2) Okita Y, Kimura M, Xie R, Chen C, Shen LTW, Kojima Y, Suzuki H, Muratani M, Saitoh M, Semba K, Heldin C-H, and **Kato M**. The transcription factor MAFK induces EMT and malignant progression of triple-negative breast cancer cells through its target GPNMB. **Science Signal.** 10, eaak9397, 2017.
- 3) Vo Nguyen TT, Watanabe Y, Shiba A, Noguchi M, Itoh S and **Kato M**. TMETPAI/PMETPA1 enhances tumorigenic activities in lung cancer cells. **Cancer Sci.** 105: 334-341, 2014.
- 4) Okita Y, Kamoshida A, Suzuki H, Itoh K, Motohashi H, Igarashi K, Yamamoto M, Ogami T, Koinuma D, and **Kato M**. Transforming Growth Factor- β induces transcription factors MafK and Bach1 to suppress expression of the heme oxygenase-1 gene. **J. Biol Chem.** 288: 20658-20667, 2013.
- 5) Watanabe Y, Itoh S, Goto T, Ohnishi E, Inamitsu M, Itoh F, Satoh K, Wiercinska E, Yang W, Shi L, Tanaka A, Nakano N, Mommaas AM, Shibuya H, ten Dijke P, and **Kato M**. TMETPAI, a transmembrane TGF- β -inducible protein, sequesters Smad proteins from active participation in TGF- β signaling. **Mol. Cell** 37: 123-134, 2010.