

## Molecular and Developmental Biology

Principal Investigator Makoto Kobayashi

E-mail address [makobayash@md.tsukuba.ac.jp](mailto:makobayash@md.tsukuba.ac.jp)

URL <http://www.md.tsukuba.ac.jp/MDBiology/mdbiol.index.html>



### Major Scientific Interests of the Group

- Stress response and gene regulation in the cellular defense system
- Epigenetic regulation in the cell-fate determination

### Projects for Regular Students in Doctoral or Master's Programs

- 1) Functional foods and healthy life expectancy
- 2) Defense against a variety of stresses
- 3) Development of hematopoietic stem cells
- 4) Development of internal organs: liver, pancreas, gut, ...

### Study Programs for Short Stay Students (one week – one trimester) (select one or two)

- 1) Functional analysis of food phytochemicals using zebrafish
- 2) Genotyping of gene knockout zebrafish
- 3) Genome editing of zebrafish by the CRISPR-Cas9 system
- 4) Live imaging of GFP transgenic fish

### Selected Publications

- 1) Tamaoki J, Takeuchi M, Abe R, Kaneko H, Wada T, Hino S, Nakao M, Furukawa Y & Kobayashi M. (2020) Splicing- and demethylase-independent functions of LSD1 in zebrafish primitive hematopoiesis. *Sci Rep* in press.
- 2) Endo Y, Muraki K, Fuse Y & Kobayashi M. (2020) Evaluation of antioxidant activity of spice-derived phytochemicals using zebrafish. *Int J Mol Sci* 21: 1109.
- 3) Mukaigasa K, Tsujita T, Nguyen TV, Li L, Yagi H, Fuse Y, Nakajima-Takagi Y, Kato K, Yamamoto M & Kobayashi M. (2018) Nrf2 activation attenuates genetic endoplasmic reticulum stress induced by a mutation in the phosphomannomutase 2 gene in zebrafish. *Proc Natl Acad Sci USA* 115: 2758-2763.
- 4) Fuse Y, Endo Y, Araoi S, Daitoku H, Suzuki H, Kato M & Kobayashi M. (2018) The possible repositioning of an oral anti-arthritis drug, auranofin, for Nrf2-activating therapy: The demonstration of Nrf2-dependent anti-oxidative action using a zebrafish model. *Free Rad Biol Med* 115: 405-411.
- 5) Fuse Y, Nguyen VT & Kobayashi M. (2016) Nrf2-dependent protection against acute sodium arsenite toxicity in zebrafish. *Toxicol Appl Pharmacol* 305: 136-142.
- 6) Nguyen TV, Fuse Y, Tamaoki J, Akiyama S, Muratani M, Tamaru Y & Kobayashi M. (2016) Conservation of the Nrf2-mediated gene regulation of proteasome subunits and glucose metabolism in zebrafish. *Oxid Med Cell Longev* 2016: 5720574
- 7) Takeuchi M, Fuse Y, Watanabe M, Andrea CS, Takeuchi M, Nakajima H, Ohashi K, Kaneko H, Kobayashi-Osaki M, Yamamoto M & Kobayashi M. (2015) LSD1/KDM1A promotes hematopoietic commitment of hemangioblasts through downregulation of Etv2. *Proc Natl Acad Sci USA* 112: 13922-13927.

