

Realization of common platform technologies, facilities and equipment that create innovative knowledge and products

Development of technologies to facilitate bioimaging research using *Danionella*

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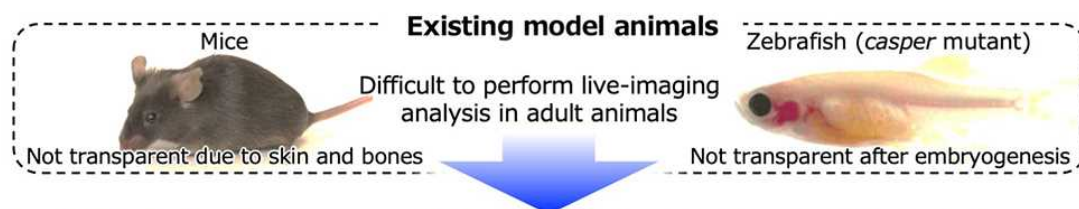
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Summary :

In this project, we will propose a novel approach for biomedical research and innovation using the transparent fish, *Danionella*. The *Danionella* is a genetically tractable, freshwater minnow possessing a spectacular transparency throughout its lifetime. As a vertebrate, the *Danionella* possess the same organs as humans, except for the lung, and can be modified genetically to develop human-like diseases. In this study, we will develop fundamental genetic technologies that facilitate biomedical research using *Danionella*. Specifically, we will first obtain the complete genome sequence to perform modern genetic analyses with this model. We will also establish novel conditional knockout and optogenetic approaches that enable high resolution analysis of gene and cell functions in live *Danionella*. Furthermore, we will develop genetically modified *Danionella* for live imaging of cell behaviors, signal transduction, and metabolic changes in various organ systems, and address whether these tools are useful to investigate fundamental mechanisms of biological systems and diseases.

Danionella : a new versatile model for bioimaging research



To establish *Danionella* as a new model to investigate physiological and pathological phenomena



- Physiological and pathological function of diverse cell types can be analyzed at a single cell resolution in various organs by live-imaging
- Human diseases can be modeled by genome editing
- Easily housed with the aquarium system used for zebrafish and medaka

Specific Aims

- 1) To develop a genome analysis platform and a genetic tool to perform conditional gene deletion in *Danionella*
- 2) To generate various transgenic strains that facilitate bioimaging research using *Danionella*
- 3) To develop light-inducible techniques to manipulate cell and gene function in *Danionella*