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Team receives $3 million NIH award to identify genetic components of disease

Dr. Maura McGrail and Dr. Jeff Essner were awarded $3 million from the National Institutes of Health (NIH) to identify genetic components of disease using their state-of-the-art zebrafish discovery platform.

Dr. Maura McGrail, left and Dr. Jeff Essner, right, inside their zebrafish research lab in the Advanced Teaching and Research Building. The team recently received a $3 million National Institutes of Health award to identify genetic components of disease.

"Zebrafish is one of the premier genetic animal systems for the study of vertebrate development and disease," McGrail said. "These organisms are uniquely suited for the examination of development in living animals, and the creation of genetic models that recapitulate the cellular context and complexity of disease found in vivo."

A significant roadblock in advancing zebrafish genetics had been the inability to efficiently create conditional alleles that allow manipulation of gene activity in a specific tissue or cell type relevant to a disease or stage of animal development. The team of McGrail and Essner were the recipients of a previous NIH award to solve this problem and thereby validate the zebrafish gene editing platform.

Essner explained, "In our previous NIH-funded study, we developed a gene editing discovery platform that vastly enhances the correlation of genes and disease. The CRISPR/Cas gene editing technology we developed in the parent grant can now be used to generate zebrafish genetic tools interrogate gene activity at the level of individual cells with unprecedented spatial control."

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— Dr. Maura McGrail

Initially, McGrail and Essner will provide the zebrafish community with a set of molecular tools to define critical cell lineages in the vascular, neural, digestive and immune systems as they relate to human disease. Simultaneously, the team will continue to improve and expand the platform technology for investigating specific human disease gene variants. Finally, in keeping with the global community spirit embraced by all GDCB researchers, Essner and McGrail will host onsite gene editing workshops at Iowa State and the Mayo Clinic.

When asked about the future of this line of research, McGrail said, "It is our vision that the disease gene identification platform we are creating will provide a powerful resource for any researcher interested in the genetic basis of human development and disease."