

Curiosity-driven microbiologist studies life and cancer at the cellular level

By Marcia Locke

Katsura Asano grew up a curious boy in Japan. Over time, his questions became more philosophical. How did life originate? How did the earliest organisms diverge into different forms? What makes humans human? Guided by his university mentor, Asano turned his curiosity into a career in research, studying the human cell up close.

Now a biology professor at Kansas State University, Asano is an expert in a cellular process called translation. During translation, a tiny piece of cellular machinery called the ribosome makes protein. Asano studies how alterations in this process can initiate cancer formation.

After earning his doctorate in molecular biology from the University of Tokyo in 1994, Asano wanted a change. He moved to the United States, which he calls “a top scientific playground” where scientists can enjoy science, and redirected his research to be more relevant to humans. He switched from prokaryotic cells, which do not have a nucleus — like bacteria — to eukaryotic cells, which do have a nucleus — like human cells — and are considered more evolutionarily advanced.

While a postdoctoral fellow at the National Institutes of Health, Asano helped develop tools to study translation using yeast, a fairly novel approach at that time. Yeast is easier to work with than human cells and can provide answers relevant to humans.

\$129,583

was awarded in 2019 to graduate students who will lead the next generation of cancer research.

Asano brought this experience to K-State in 2001. Now, using yeast and human cells, he is looking closely at some specific proteins involved in cell translation that he has linked to cancer.

His team recently discovered that the protein 5MP1 is an oncogene, a gene that has the potential to cause cancer. 5MP1 reprograms the translation of a downstream protein called c-Myc. This genetic change promotes cancer formation in colorectal cells. Further investigation of this phenomenon could help develop a new cancer therapy.

With a \$23,000 Innovative Research Award from the Johnson Cancer Research Center, Asano is working to better understand the mechanism and physiological effect of 5MP1’s control over c-MYC and other target proteins, and clarify how they cause cell overgrowth, reprogramming and tumorigenesis, or cancer formation.

Asano believes that his findings with colorectal cancers should apply to all cancers. He plans to work with Nick Wallace, assistant professor of biology, to add human papillomavirus oncogenes to the study. HPV causes almost all cervical cancers as well as cancers of the throat, genitals and other sites in both men and women.

Another mission Asano takes seriously is mentoring students. He consistently sponsors student researchers in his lab, and he coordinates the Cancer Journal Club, a forum for students to discuss current cancer research articles and practice presenting to a group.

“To be a professional, you have to make a contribution to society,” Asano said. “I think my research will answer important questions about cancer, but I’m not there yet. Meanwhile, my contribution is through education.”

Asano is very active with the JCRC’s Cancer Research Award program, which fosters undergraduate student research experience by providing funds for the students and for their faculty mentors to cover research expenses. Asano has mentored 30 CRA students since 2004.

“I have had a lot of good mentors, and even students, who have opened my eyes to how I can make a contribution to solving the world’s problems, like cancer,” Asano said. “Science is my connection to the world and mentoring students is one of my missions.”

