



CRYSTAL-CLEAR CLARITY FOUND IN SPACE

Japanese drug discovery company PeptiDream is collaborating with JAXA, Japan's national space agency, to **FAST-TRACK THE DEVELOPMENT OF NEW DRUGS**.

Chemistry experiments

conducted aboard the Japanese Experiment Module of the International Space Station are helping researchers at PeptiDream to explore how potential new drugs interact with their biological targets.

A drug discovery company spun out of Tokyo University in 2006, PeptiDream specializes in developing technology that can rapidly screen large libraries of peptide molecules for hits against specific medical targets. This technology has seen PeptiDream collaborate with many big pharmaceutical companies on drug discovery projects, and the company has used it to discover new compounds that hit the HER2 receptor linked to certain breast cancers.

USING X-RAYS TO ANALYSE STRUCTURE

But that first hit from a peptide screen is just the initial step in the process of developing a successful therapeutic, says Keiichi Masuya, PeptiDream's vice president and head of chemistry. "We want to see the structure," he says. By co-crystalizing the peptide with its biological target, the team can use X-ray analysis to observe how peptide and target bind, gaining structural insights that can inform the design of a second-generation peptide or another small molecule that binds even better.

PeptiDream initially used contract research organizations in the UK and USA to carry out these studies, but Masuya was keen to find a local collaborator. After a chance

meeting between Masuya and a JAXA scientist at a conference, PeptiDream and JAXA began collaborating on co-crystallization experiments in September 2015.

"But co-crystallization is sometimes not easy," Masuya says. It can be difficult to determine the right conditions under which the peptide and target will form a high-quality crystal. With the HER2 work, the co-crystal did not provide a sharp enough X-ray image for the next phase of the project.

GROWING CRYSTALS IN SPACE

So in early 2017, JAXA tried again — this time, on the Japanese Experiment Module of the International Space Station. "Under low gravity, we can usually get a finer crystal,"

explains Masuya. Repeating the experiment under low gravity, the team was able to form very high-quality co-crystals of the peptide bound to the HER2 receptor, which were returned to Earth for X-ray analysis.

"We obtained very fine images," Masuya says. "Our peptide bound to the HER 2 receptor very strongly — even better than the available therapy." Based on the X-ray images, the company's chemists are now optimizing the peptide to make it even better, Masuya says.

"JAXA scientists are so smart; everything is very quick," Masuya adds. "We will be sending more samples to space." ■



PeptiDream

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