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Press Release

Drug researchers' valuable "bycatch"

Bacterial eliamid inhibits tumor cells

The natural substance eliamid is capable of suppressing cancer cell proliferation – so far in the test tube. Produced by certain strains of soil bacteria, the substance was re-cently characterized by a group of scientists at the Helmholtz Centre for Infection Research (HZI) in Braunschweig, Germany. Now, Dr. Evgeny Prusov and his team are sharing their insights into why they consider eliamid a potential candidate for drug development and how synthetic versions of it might be "created" in the lab, in the sci-entific publication "Chemistry – A European Journal."

As one of their long-term effects, certain infectious diseases can cause cancer. As such, the hepatitis B virus, for example, is known as a potential trigger of hepatic cancer. In 2008, the scientists who first documented the connection between certain viruses – such as HPV, the human papilloma virus – and cervical cancer were awarded the Nobel Prize in Physiology or Medicine. Although vaccines can effectively afford protection against these two viruses, the need to find new active compounds to fight cancer persists.

One such potential candidate substance is the newly discovered bacterial eliamid. When examining its biological activity, eliamid stood out for its antifungal, and, most remarkably, anti-proliferative effects on a number of different cancer cell lines. Back in the 1980s, Braunschweig scientists had already discovered another nowadays im-portant substance, epothilone, a secondary metabolite synthesized by certain bacterial strains. Epothilone has been successfully developed into an anti-breast-cancer drug and marketed in the US since 2007.

The soil-dwelling bacterium Sorangium cellulosum belongs to the order of myxobacteria. Myxobacteria produce a plethora of secondary metabolites – substances that are not vital to bacterial survival but can bestow a certain evolutionary advantage on them over competing species. For that reason some of these substances have antibiotic properties, whereas others seem better suited to tumor therapy. In fact, a number of HZI scientists have focused their research on identifying such medically useful substances.

And in the process, Evgeny Prusov and his team discovered eliamid's potential anti-cancer activity practically by accident. "What we were actually looking for were natu-ral substances that could be developed into novel antifungal drugs," explains Dr. Klaus Gerth of HZI's Department of Microbial Drugs, one of the study's co-authors. "We only discovered eliamid serendipitously when we analyzed two strains of Sorangium cellulosum, a bacterial species, which produces antifungal substances." However, upon closer inspection we found that, in the test tube, eliamid inhibited cellular proliferation of both cervical cancer cells and lymph node ulcers, at a comparatively low-level toxicity. And just as a fisherman would not discard a valuable bycatch back into the sea, the researchers immediately realized the potential of this promising by-product.

It will be a few more years, however, before eliamid may help treating cancer patients. Between epothilone's discovery and the point where it finally hit the market, two whole decades had come and gone. "The continued development of a natural substance into a drug is extremely time-consuming", Prusov explains. "First, we need to do a lot more work with eliamid and also figure out how to produce derivatives" – slightly modified variants with enhanced efficacy and selectivity. The additional steps towards creating a mature drug would then be taken by a pharmaceutical company, as the process is far too costly and time-consuming for a research institute. But Evgeny Prusov is confident: "If our eliamid can one day help treat or cure a sick person, that would be an especially rewarding success of our research."

Original publication:

Gerhard Höfle, Klaus Gerth, Hans Reichenbach, Brigitte Kunze, Florenz Sasse, Edgar Forche & Evgeny V. Prusov
Isolation, Biological Activity Evaluation, Structure Elucidation, and Total Synthesis of Eliamid: A Novel Complex I Inhibitor
Chem. Eur. J. 36/2012

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