EIN PRESSWIRE

The Aoki Lab of Bioorganic Chemistry in Tokyo University of Science takes vital steps in the battle against cancer

How a pharmaceutical sciences lab in Tokyo University of Science has made headway in the battle against cancer

TOKYO, JAPAN, April 29, 2019 /EINPresswire.com/ -- Scientists at the Aoki Laboratory, headed by Professor Shin Aoki, at Tokyo University of Science have taken a giant leap in the battle against cancer. They have synthesized an artificial protein that can kill cancer cells.

According to the World Health Organization, there were 18.1 million new cases of cancer and 9.6 million fatalities worldwide in 2018. Cancer is the second leading cause of death globally. This emperor of maladies that afflicts over 10% of the world's population is the collective focal point of cutting-edge research by teams of scientists across the world.

Among the core issues that have perplexed scientists are how to effectively destroy cancer cells, and how to create simple and convenient methods to trap, culture, and re-collect cancer cells for further study. Scientists at the Aoki Laboratory, Tokyo University of Science (TUS), have, in a series of papers published recently, managed to advance our understanding of both problems.

The Aoki Lab works in several inter-related scientific areas, and it is this multidisciplinary approach that allows it to look at combating cancer from different angles. "A disease like cancer needs tackling from all directions," remarked Professor Shin Aoki, who heads Aoki Lab, "and so, my team works at the intersection of pharmaceutical sciences, organic chemistry, bioinorganic chemistry, and supramolecular chemistry." Commenting specifically on the research behind the papers published in Bioinorganic Chemistry and Applications and Bioorganic and Medicinal Chemistry, Professor Aoki said, "We looked at how we could cause a cancer cell to die and developed an artificial TRAIL (tumor necrosis factor related apoptosis inducing ligand) mimic that destroys cancer cells. In nature, TRAIL is a protein that binds to death receptors and induces programmed cell death, which is known as apoptosis."

Researchers at the Aoki Lab synthesized iridium complex-peptide hybrid that can bind to death receptors, which induces programmed cell death such as TRAIL-like apoptosis or necrosis-like cell death of cancer cells. It is the first reported example in available literature of artificial luminescent TRAIL mimics that can induce either apoptosis or necrosis-type cell death. The wild type TRAIL binds with death receptors on cancer cells and causes only apoptosis. However, the TRAIL "mimics" synthesized by these researchers bind with the death receptors on cancer cells, and can cause both apoptosis and necrosis-type cell death. How the TRAIL mimics induce cell death via both processes is a mystery, and is the focus of research by Professor Aoki and colleagues.

"The fight against cancer is important because as people live longer, more and more people will be susceptible to cancer," said Professor Aoki, "and one of the key challenges is going to be finding more efficient ways of collecting cancer cells for early diagnosis."

The spread of cancer via blood is facilitated by circulating tumor cells (CTCs), which originate

from primary cancer tissues. In a paper published in Biological and Pharmaceutical Bulletin, Professor Aoki, Professor at Faculty of Pharmaceutical Sciences at TUS, and his colleagues have described the combined use of a Particle Size Analyzer and computer software to distinguish cancer cells from normal cells, especially when cancer cells are similar in size to some of the normal white blood cells. In another related paper published in the ACS Biomaterials Science & Engineering, Professor Aoki and colleagues discuss how a simple technique using glass-bead filters (GBFs) can help collect, grow, and re-collect cancer cells.
With the understanding that cancer cells are larger in size than normal blood cells, the researchers developed a GBF-based filtration method that effectively sieves out the former. In this manner, a combination of chemical, material, biochemical, physical, and computational approaches can help improve the accuracy of cell-based diagnostic approaches for cancer.

The battle against cancer is being fought on multiple fronts. It is this multi-pronged attack that is helping scientists inch closer to cancer cure. The work of Professor Aoki and his team is a shot in the arm for such longstanding efforts to understand cancer with the aim of combating it.

Tsutomu Shimizu
Tokyo University of Science
+81 3-5228-8107
email us here
Visit us on social media:
LinkedIn
