Microbeam therapy to target tumors

Microbeam radiation therapy is a precise painless technique that is being used to improve the treatment of many types of cancer compared to standard broad-beam radiation treatment. The new technique uses beams of X-ray light that are smaller than a human hair to hit tumors precisely while sparing healthy tissue to heal rapidly while applying a powerful level of radiation treatment to the diseased cells. In order to accurately test this technique, University of Saskatchewan and CLS researchers are studying the effects of radiation on samarium-doped glasses as potential detector dose monitors.

Merkz scientists gain insight into cancer treatment

Pembrolizumab helps the body fight certain cancers by increasing the body’s ability to detect and fight tumor cells. Merck scientists used the CLS crystallography facilities to help determine the new cancer antibody’s structure, down to a 2.3 angstrom resolution. Understanding the three-dimensional structural details of a therapeutic antibody can help in understanding its physical properties and how it interacts with receptors in the body. Certain cancer cells are able to express PD-L1 molecules which interact with PD-1 molecules on immune cells, inhibiting the immune response. Pembrolizumab blocks this interaction, thereby restoring the ability of the immune system to mount an immune response against the cancer cell.

Seeing more clearly

The bright light produced at the CLS allows researchers to see shapes and size of tissues more clearly than with conventional methods. The CLS image (right) reveals soft tissues such as the lungs (the dark triangular shape) and muscles that are obscured in the conventional X-ray radiograph (left).

Research team identifies new markers involved in cancer progression

Breast cancer is the second leading cause of cancer deaths in Canadian women. A team from the University of Saskatchewan became the first group to locate and identify increased levels of phosphorus, sulfur, potassium, and calcium in cancer-associated fibroblasts. Increased levels of these elements may affect cellular activities important in cell development, but becomes dysfunctional within cancerous cells, leading to rapid growth. Using CMCF the team was able to visualize the antibodies’ interaction with molecules in the signaling pathway, allowing the team to fine tuned them for a better fit. This increases the efficacy of the therapy.

Targeting the powerhouse of the cancer cell

By modulating the activity of the ClpP protease in mitochondria, a group of researchers from Princess Margaret Cancer Centre and the University of Toronto have discovered a promising approach to treating leukemia. With the help of the CLS, they visualized the structure of the mitochondrial protein and are better able to understand an important interaction with the anti-cancer drug INCAT. This drug appears to stimulate the ClpP protease, causing hyperactivity of this enzyme, which is responsible for protein unfolding responses. By stimulating this ClpP response in the mitochondria of cancer cells, the researchers found they could induce cell death.

Anticancer nanodelivery systems

New anticancer molecules are developed every year, for a wide variety of cancers. Developing these compounds into drugs, however, poses a challenge, as many are difficult for human cells to absorb. Nanotechnology provides a new way to develop drug delivery systems, helping get cancer-fighting molecules to the cells they need to treat. University of Saskatchewan researchers have paired curcumin, a powerful anticancer agent, with a nanocarrier, and used a combination of CLS techniques to better understand their interaction and function. Their results suggest that the combination could be a non-toxic drug delivery candidate. The team hopes to gather more in-depth structural data about the drug delivery system’s interaction with cells on the way to developing treatments.

FIGHTING CANCER

DOI: 10.1002/open.201600102

DOI: 10.1063/1.4864424

DOI:10.1038/nsmb.3129

DOI:10.1016/j.ccell.2019.03.014

DOI:10.2147/

Breast cancer is the second leading cause of cancer deaths in Canadian women. A team from the University of Saskatchewan became the first group to locate and identify increased levels of phosphorus, sulfur, potassium, and calcium in cancer-associated fibroblasts. Increased levels of these elements may affect cellular activities important in cell development, but becomes dysfunctional within cancerous cells, leading to rapid growth. Using CMCF the team was able to visualize the antibodies’ interaction with molecules in the signaling pathway, allowing the team to fine tuned them for a better fit. This increases the efficacy of the therapy.

Targeting the powerhouse of the cancer cell

By modulating the activity of the ClpP protease in mitochondria, a group of researchers from Princess Margaret Cancer Centre and the University of Toronto have discovered a promising approach to treating leukemia. With the help of the CLS, they visualized the structure of the mitochondrial protein and are better able to understand an important interaction with the anti-cancer drug INCAT. This drug appears to stimulate the ClpP protease, causing hyperactivity of this enzyme, which is responsible for protein unfolding responses. By stimulating this ClpP response in the mitochondria of cancer cells, the researchers found they could induce cell death.

Anticancer nanodelivery systems

New anticancer molecules are developed every year, for a wide variety of cancers. Developing these compounds into drugs, however, poses a challenge, as many are difficult for human cells to absorb. Nanotechnology provides a new way to develop drug delivery systems, helping get cancer-fighting molecules to the cells they need to treat. University of Saskatchewan researchers have paired curcumin, a powerful anticancer agent, with a nanocarrier, and used a combination of CLS techniques to better understand their interaction and function. Their results suggest that the combination could be a non-toxic drug delivery candidate. The team hopes to gather more in-depth structural data about the drug delivery system’s interaction with cells on the way to developing treatments.

FIGHTING CANCER

DOI: 10.1002/open.201600102

DOI: 10.1063/1.4864424

DOI:10.1038/nsmb.3129

DOI:10.1016/j.ccell.2019.03.014

DOI:10.2147/

Breast cancer is the second leading cause of cancer deaths in Canadian women. A team from the University of Saskatchewan became the first group to locate and identify increased levels of phosphorus, sulfur, potassium, and calcium in cancer-associated fibroblasts. Increased levels of these elements may affect cellular activities important in cell development, but becomes dysfunctional within cancerous cells, leading to rapid growth. Using CMCF the team was able to visualize the antibodies’ interaction with molecules in the signaling pathway, allowing the team to fine tuned them for a better fit. This increases the efficacy of the therapy.