RIOT
Research Information Outreach Team

Ten Hallmarks of Cancer Series

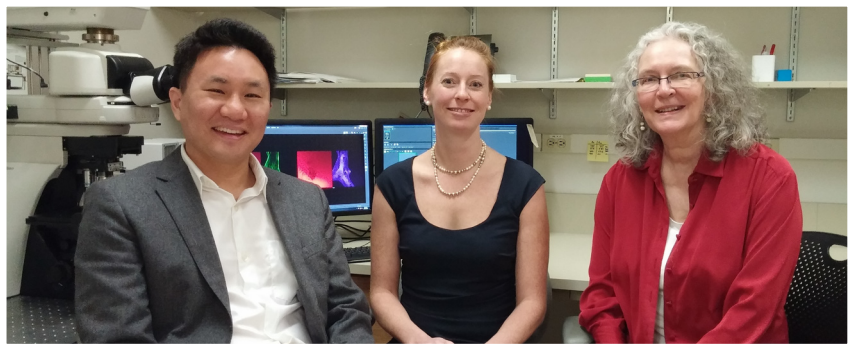
Invasion by the cancer cell: the final frontier - Hallmark #7

We have all heard how early detection of cancer is important for having the best chance of surviving cancer. So why is this? Well, if detected early, often the cancer will not have invaded surrounding tissues or moved through the blood stream to other parts of the body; a process we call metastasis. A lot of research has gone into accurately predicting which cancers will be aggressive (become metastatic). By looking at the physical appearance of a tumour (as examined by a pathologist) and by testing for certain genetic traits, we can estimate how aggressive a tumour may be at moving through the body. But - we know very little about how cancer cells move through the body. For instance, how - and why - does a cancer cell move into and out of the bloodstream to get to new organs? Why isn't it recognized by immune cells and destroyed? These are some key questions which are quite hard to address, since watching a cancer cell moving in a living organism is very challenging. This is the focus of our lab and we use a unique animal model that allows us to ask some of these key questions.

Our research, based at St. Joseph's and Victoria hospitals here in London, focuses on understanding metastasis by looking at how cancer cells leave the tumour and move into and out of the bloodstream; processes we call intravasation and extravasation. There does not appear to be a single gene or protein that is responsible for metastasis of all cancers, based on research looking at the genetic sequences of thousands of different cancer types and comparing non-metastatic cancers to metastatic ones. Our focus is on special structures called invadopodia, which are only formed and used by very aggressive cancer cells. Invadopodia are tentacle-like structures that extend from the cancer cell body. We have shown that they are used by the cancer cell to get out of the bloodstream (extravasation). These tentacle-like structures are so important that if we stop aggressive cancer cells from making them, we stop extravasation. To watch and monitor cancer cells, we inject cancer cells into a rich network of blood vessels of a fertilized chicken egg and then, using high powered microscopy, we can watch their movements. This has allowed us to capture live footage of cancer cells as they form these microscopic tentacles and escape out into the blood stream. Since these tentacle-like structures appear to be needed for metastasis, we want to know more about them. How are they made, how are they controlled and what do they do? We are now looking at whether they have other roles besides helping cancer cells to move out of the bloodstream and are looking to see if they also have a role in moving the cancer cells into the bloodstream. We hope to identify proteins that control how they form. Then we might be able to use inhibitors against these proteins and stop their formation.

Cancer cells need to enter into and leave the bloodstream before they can gain access to tissue in their new destinations - which are often organs such as the lungs, liver or brain. If we can stop the movement of cancer cells into and out of the bloodstream, this would give doctors time to focus treatments on shrinking and removing the primary tumour without having to worry about the cancer spreading. Our research on cancer cell tentacles may give us new approaches to help stop cancer metastasis.

"All articles brought to you by Canadian Cancer Society RIOT volunteers and past articles can be found at rioitteam.blogspot.ca"



Article written by Dr. Karla Williams, Dr. Ann Chambers and Dr. Hon Leong