

A Holmes Investigation: Who Is the Cancer Spreader? Cassidy Van Stiphout

It is no secret that I've always wanted to be the famous detective. But I got older, and those dreams became a time of the past – Or did they?

The character that is Sherlock Holmes was inspired by Dr. Joseph Bell, a medical school professor. Holmes's exceptional observation skills was derived from Bell's method of diagnosing patients with cancer, like breast cancer (BC).

Today, BC is still one of the most deadliest and invasive cancers in women worldwide, where obesity is a major risk factor. In order to improve patient outcomes, we must better our understanding on how the obese state effects the spread of BC.

Just like Holmes may investigate the scene of a crime to gather all the evidence, we turned to study the tumour to get the full picture. A tumour is not just made up of cancer cells. It's composed of other cell types, like fat cells, as well as a mesh network that supports and surrounds cells.

Taking a closer look, researchers have found that fat cells, in the presence of the mesh network, enhance the potential of BC cells to spread from the breast to other parts of the body. Yet still, a vital question remained, how were fat cells doing this?

So, I put on my detective hat.

It was plausible that fat cells were releasing *something* that BC cells were then using to help them spread. In my lab, we identified that *something* to be a protein called Lysyl Oxidase, or LOX for short.

Using a new and improved system, we cultured LOX in a dish with BC cells and the mesh. We then looked for structural changes in shape of the BC cells.

Why? Well, as BC spreads, the cells undergo a migration-to-tumour formation transition. To migrate away from the breast tumour, the cancer cells acquire an elongated shape to easily navigate and invade neighboring tissues. But once the cells reach their new tumour site, like the bone, they transform to a more square, compact shape to form a new tumour.

Indeed, in our dishes, we found that LOX promoted this more compact shape, suggesting that this fat-derived protein may help BC spread by assisting with the new tumour formation. As the detective himself would say, "Elementary, my dear Gryphons, Elementary!"

So, I may be more like Sherlock Holmes than I initially thought. I followed the trail of footprints that led me to LOX as the cancer spreader. But Holmes would not stop mid investigation, and neither will I. We aim to further evaluate whether blocking the activity of LOX will stop the spread of cancer throughout the body.

Thank you.