# Non-cancerous ‘cancer cells’

Mustapha Kaira

In normal tissue, cells communicate to inform each other when and how to multiply and die off after a certain number of generations. However, there is a situation whereby cells become ‘deaf’ to their environment and can grow uncontrollably thereby invading neighbouring tissues. When this happens our bodies are naturally armed with a defence system –the immune system, to kill these abnormal cells and protect us from disease. However, sometimes our immune system fails to do so resulting in a violent over growth of these faulty cells thus causing a disease called cancer.

In the past decades, most research effort has been dedicated to cancer cells which mean that most drugs are designed to target them. However in recent years, the non-cancerous cells surrounding the tumour have been found to play ‘nanny’ to these deadly tumour cells by them feeding, protecting them from immune and therapeutic attack, and supporting their dispersion to other parts of the body. These non-cancerous ‘nursing cells’ play a very important role in the disease progression for instance in breast cancer, high breast tissue density alone can increase ones chances of getting the disease by 3-5 folds. This high density tissue is a very favourable environment for breast cancer cells to communicate their growth needs to the normal host cells.

In light of this new insight, a team of scientists found evidence that one particular gene (PDGF-receptor-β) in the ‘nursing cells’, is associated with the bad clinical outcome of over 600 breast cancer patients. Furthermore, drugs designed against this gene and its associated genes have shown a significant improvement in treatment, however, the exact role of the gene in the disease development process is yet to be understood.

In this project we used a newly developed technique called in situ sequencing to study the role of the gene and its potential allies in the process. At the end of the project we found out that growth of the ‘nursing cells’ is stimulated predominantly by the cancer cells through the very PDGF-receptor-β gene that has been associated with breast cancer development. We also found a couple of other genes related to pathways, namely TGFβ and Hedgehog signalling, that might be related to the process. Finally we were also able to identify four other genes that have distinct distribution patterns that relate directly to the tumour morphology.

Our findings demonstrate that further research needs to be done to fully characterize this ‘nursing environment’ in order to have a better molecular understanding of the disease. We believe that such knowledge would contribute a lot in the evolution of cancer diagnosis and treatment.

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Biology Education Center and Department of Biochemistry, Stockholm University
Supervisor: Jessica Svedlund