



SU2C DREAM TEAM: EPIGENETICS WENDY WEGNER

What if there was a way to locate cancer stem cells in the body and essentially, turn them off? That's what one Stand Up To Cancer [Dream Team](#) is trying to do. Stephen Baylin, M.D. and Peter Jones, Ph.D. have committed to unearthing the benefits behind epigenetic therapy and how it could lead to meaningful progress in the treatment of various types of cancer.

Epigenetics, Defined

"Epigenetics describes the way in which cells take different parts of the genetic information within them and package them in such a way that certain genes are used in one tissue and other genes are used in other tissues," says Jones. "Without epigenetics, quite frankly, you could never develop as a human being." While a genome carries an individual's hereditary information and history, epigenetics influences the way these genes are expressed in the body. Think of the genome as a blueprint for someone's potential development and the process of epigenetics as an architect choosing the way to express that particular set of DNA. This is why two persons with identical DNA can still look very different.

When Things Go Wrong

DNA mutations in a person's body are often responsible for the development of numerous diseases such as muscular dystrophy and cystic fibrosis. However, diseases can sometimes form in the body without ever changing the DNA. Jones explains that when cancer develops in the body, it causes normal cells to switch off genes that should be on. Some are boxed up, unable to function, while others get activated in places in the body where they don't belong. It is under these conditions when cells can become cancerous.

Our genomes are relatively fixed; changes in our DNA are carried on for generations and are very difficult to reverse. In contrast, our epigenome is malleable and changes as we grow and age. Baylin and Jones are hoping to learn how to reshape a cancerous epigenome into a normal state.

Making Strides

"There's a time for individual competition and a time for teamwork," says Jones. "And I think this is the time for teamwork in this particular area. We've competed against each

other for years.”

With the help of clinical trials, Baylin and Jones’ team believe they can make a significant impact in three years time while involving patients at a fundamental level. Their research then becomes more than theoretical, and instead, can be applied in a practical manner, causing quick and effective change.

By using drugs that are already in existence, Baylin says they can help stagnant genes start functioning at their normal levels. This type of epigenetic therapy has been successful with certain types of pre-leukemia, and they hope to utilize these tools with all types of cancer, from adolescence to adulthood. With the success of drug therapy in the leukemia spectrum, Baylin and Jones’ team started taking that drug regimen, and applied it to patients with advanced lung cancer. One particular patient, a 53-year-old woman, was extremely ill with advanced stages of the disease. After less than three months of therapy, her body began to respond positively. She’s now back to her normal weight, and for the most part, back to her normal life. Unfortunately, they’ve found that the drug doesn’t work on all patients, so discovering the “why” behind this challenge is a key component of their research.

Moving Forward

Developing the full potential of epigenetic therapy requires a balance of patience and impatience, says Baylin. “You have to start now. You have to do something about it. But it’s going to take years to play out,” he says. “And it’s often a hard thing to understand about cancer when a relative or a friend is suffering. So we need the immediacy. We have to be able to bring the most exciting things to bear when they’re ready, on the actual planet. But we need the patience of science to allow that process to keep playing out...”

Each type of cancer has something in common with the rest. When we use that knowledge to our advantage, progress can be made. Advancement in one type of cancer research and drug therapies can potentially benefit them all, and that is the intention behind the Dream Team model.

“This is an era where it’s just unbelievable the opportunities we have,” says Baylin. “I think we’re limited only by our wisdom and our resources... it’s that kind of time in science, and it’s exciting.”

Wendy Wegner is editor of *SU2C Mag*