Cancer. Not all bad news

As a society we enjoy better health than previous generations and we are living longer as a result. Yet paradoxically cancer incidence is on the rise. Is this because of our polluted environment, increased obesity and stress levels? To some extent it is, but the main risk factor for cancer is our increasing lifespan.

Fortunately, survival rates are also increasing due to earlier detection and more effective, less toxic treatments.

Healthy cells in adults only divide to replace themselves with new cells when there is a need to do so or when they have reached the end of their pre-programmed lifespan.

They are good citizens, responding appropriately to their neighbouring cells and their environment. They are also self-sacrificing. If, for example, a small piece of their DNA becomes damaged beyond repair, say after nasty sunburn, those cells will self-destruct rather than reproduce damaged copies of themselves. The result is that the top layer of your skin peels and the underlying skin cells receive a signal to replace this lost layer of skin.

But as we age, the ability of our cells to fight continual damage to our DNA - caused by environmental factors such as sun, pollutants, and even by what we eat - decreases. This increases the chance that cells will not die when they should. They may also divide uncontrollably to form an abnormal mass of cells, known as a tumour, which can often be removed surgically. Unfortunately, sometimes cells within the tumour invade nearby tissues and spread to other parts of the body forming secondary tumours. This potentially lethal process is called metastasis and is the subject of intensive research to find effective treatments.

Why is cancer so difficult to cure? It's complex. While we understand the basic hallmarks of cancer, we also know that there are more than 100 different types of cancer and numerous permutations within each of those types.

There are also differences in the same cancer type between patients, and the patient’s own immune system can help or hinder the progression of a cancer. Finding a simple cure, akin to using antibiotics to treat infections, requires a deeper understanding of genetics, how the immune system works and how we age.

Here at the University of Wollongong, the Illawarra Health & Medical Research Institute brings together a network of biologists, chemists, physicists, clinicians and radiologists dedicated to improving our understanding of cancer so that we can develop improved methods of prevention, detection and treatment.

Traditional treatments such as chemotherapy rely on balancing the attack on cancer while minimising damage to healthy tissues and organs, but this can still cause unpleasant side-effects. One outcome of our research in the Illawarra aims to improve patient comfort by reducing the debilitating side-effects of drugs used in chemotherapy.

Another focus of research is the design of new generation drugs to target only cancer cells, by identifying the characteristics that make the cancer cells abnormal. These
drugs either destroy or correct the behaviour of cancer cells. In the future each patient’s cancer could be screened for these characteristics allowing therapy to be customised to the patient.

In the meantime, combination chemotherapy strategies have improved outcomes for several types of cancer. According to the National Cancer Institutes, USA, “Treatment for this disease has become so effective that 80% of patients with metastatic testicular cancer can now be cured. Thirty-five years ago, 95% of these patients died, usually within 1 year of diagnosis”. So in fact, for at least a few types of cancer, there are cures.

Our work continues and this has been facilitated by the generosity of local organisations and donors.

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