

Is a cure for cancer finally within reach?

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If you had told me even 5 years ago that a cure for cancer was within reach and perhaps achievable within our lifetime – I would have been very sceptical. While we have made significant progress in our fight against cancer over the past few decades – for example the overall five-year relative survival rate for leukemia patients has more than quadrupled since 1960, from 14 percent to 60 percent – the progress has been made up of small incremental steps in the right direction. Yet, the ability to truly cure cancer patients has eludes us – with the exception of those fortunate patients who are diagnosed at an early stage in their disease.

So what has changed? Our increasingly sophisticated research tools and technologies have facilitated a deeper understanding of the mechanisms underlying the disease process. The term cancer is an umbrella term for a large group of diseases, with many different causes and characteristics. We have also become much better at differentiating between various cancer types and subtypes in order to identify the most appropriate course of treatment. Importantly, we are beginning to have a fuller understanding of how cancer can grow and spread without being detected by the immune system. The body’s immune system which can detect and react to a small bacterium does nothing to stymie the growth of a tumour – why is that? We are starting to get answers, and answers can lead to new treatments.

From December 9-12th, the world experts in cancer research and drug development will gather in Atlanta for **The American Society of Hematology conference** – referred to as **ASH**. With more than 17,000 members from almost 100 countries – ASH is the largest professional society dedicated to conquering blood diseases. A large part of the conference will be devoted to discussing new developments in the treatment of blood cancers. Representatives from the largest to the smallest companies, from Pharma to biotechnology companies involved in blood cancer will be in attendance.



So what is new? We have entered the era of immune oncology – harnessing the power of the patients’ immune system to fight cancer. We now know that cancer cells can use a series of checks and balances to override the checkpoints of the immune system to evade detection. By understanding these mechanisms – scientists and drug development experts can develop new treatments to un-blind the immune system and direct its action towards the cancerous cells. In contrast to chemotherapy – which aims to kill all fast growing cells – these new, sophisticated therapeutics aim to use the body’s own defence mechanisms to more specifically target and eliminate cancer cells.

Has it worked? We’re getting there! This year saw the approval of two truly breakthrough, highly innovative treatments: chimeric antigen receptor T-cell, known as CAR-T, represent a completely new way of treating individual cancer patients. CAR-Ts are living cells – they are genetically engineered versions of the patients own cells that have been reprogrammed such that they can recognise and kill the patients cancer cells – switching on the immune system. In contrast to standard chemotherapy which can be produced in bulk – CAR-T is prepared for each individual patient. The excitement is not about the complex nature of the product but that it has led to real long term cures for some patients.

Dr. Carl June from the University of Pennsylvania did an excellent job of explaining the technology and its potential in this short documentary: <https://www.youtube.com/watch?v=h6SzI2ZfPd4>.

In July of this year, the FDA approved the first CAR-T (Novartis) and the second was approved in October (Gilead/Kite Pharmaceuticals) and more will follow in the coming years.



While the CAR-T technology could be likened to taking the patients cells and teaching them to recognise and kill the cancer cells – much like training an army to recognise the enemy – checkpoint inhibitors work by flicking the on/off switches of the immune system such that the mask is removed from the cancer cells and they become visible to the immune system.

Several checkpoint inhibitors are already on the market and providing benefits for patients who have run out of other options. Several more are in development. Not everyone responds to these new treatments but those that do respond tend to have a lasting remission, with some patients remaining cancer free for years.

The delegates attending this year's ASH conference will be excited to learn new ways to use these treatments and those in development to take cancer cures to the next level. Doctors are still figuring out how best to use these new tools to better help the patients without increasing the side effects. Maybe we need to use more than one immune switch to really

unmask the cancer cells – perhaps we need a cocktail of these new treatments together. There are many questions to be answered.

The days of the ASH conference will be busy. There are over 25,000 active cancer related clinical trials ongoing. This includes trials to study the potential benefits of new cancer treatments, approved treatments in new indications (other forms of cancer) and ways to optimise the benefits for patients and minimise the side effects. Large pharma company Merck, is running 225 trials to study various combinations of immune oncology treatments. The other large pharmaceutical companies and biotech companies are not too far behind. There are at least 650 investigators driven/company sponsored immune oncology combination studies ongoing.

The race is on to identify the right combination of drugs which will lead to cures for cancer patients. There is undoubtedly more work to be done but the advent of this wave of immune oncology treatments has injected a new energy, enthusiasm and hope into the industry, prompting billions of R&D dollars to be spent in the search for the elusive cure for cancer – running 25,000 trials is very expensive.

Now if I was asked whether I believe that there will be a cure for cancer in our life time – I would respond with a tentative 'yes'.