In Conversation
Exchanging views & trading opinions

WITH Jacqueline Toyad

Where is the cure for cancer?
How far have we come in cancer research? Professor Dr Teo Soo Hwang of Carif and Associate Professor Dr Noor Hasima Nagoor of University of Malaya, two players in this battle against cancer, share their views on the current state of cancer research and why they are optimistic that better treatments are on the way.

Carcin isn’t a new disease. In fact, the world’s first evidence of cancer dates back to ancient Egypt in 1500 BC, recorded on a papyrus, documenting eight cases of tumours occurring on the breast. However, it remained a rare disease as a majority of the world’s population were dying from infectious diseases, from the common cold to a plague, never surviving long enough to develop cancer.

And so, with our doctors and scientists succeeding over thousands of years at treating a range of diseases and discovering methods of prevention against them, we are living longer, literally increasing our risk of cancer. In 1900, the average life expectancy was 47 years of age; today, it is over 85. And the fact that some cancers are related to lifestyle choices – such as a rich diet, smoking and alcohol abuse, or associated with exposure to chemicals and radiation within modern manufacturing plants or emitted by modern appliances and vehicles – does make it all seem like cancer is a modern disease that emerged only in the last 50 years.

But there are cancers that are related instead to our genetic profiles. These kinds of cancer – at least 90% of breast cancer and 80% of ovarian cancers – may not be preventable, but thanks to the scientists who have focused on genetic studies, 90% of both these cancers are curable if detected early.

Professor Dr Teo Soo Hwang, chief executive of Carif (Cancer Research Initiatives Foundation), is determined to improve screening strategies as well as identify new therapies for the less popular cancers – the cancers pharmaceutical companies rarely take on but that are prevalent in countries outside their primary markets.

Associate Professor Dr Noor Hasima Nagoor, deputy head of University of Malaya’s Institute of Biological Sciences’ genetics and molecular biology/microbiology divisions, is studying the synergy between newly discovered anti-cancer compounds and known compounds and working on developing a cancer drug that can target specific cancer cells without endangering a patient’s normal cells.

We bring them both together in conversation to learn just how far away we are from a cure for cancer and if we are any closer to understanding this enigmatic ailment that comprises up to 200 diseases (according to www.cancerhelp.org.uk).

Jacqueline Toyad: What areas of research are you focusing on currently?

Dr Noor Hasima Nagoor: I am looking at two broad areas of cancer – one is looking at the new anti-cancer treatments. This part of my research is in collaboration with the chemistry department in UM that is working with plants that have a history in the treatment of diseases. We isolate compounds and give them to me and I check out whether they have any anti-cancer properties. The other one is more recent which involves micro RNA (miRNA). This is a new macromolecule and along with DNA and proteins, that is essential for all known forms of life. They were established as being related to cancer in 2002.

Dr Teo Soo Hwang: Within Carif, I direct the Malaysian breast cancer genetic study and this is the largest study of breast cancer in Southeast Asia. With 1,390 breast cancer patients in this study, the main objectives are to first understand what genes drive cancer; second, to understand how those genes result in increased risk; and the third is to develop better therapies for breast cancer.

But within Carif, we also have three other research programmes. The first two are on oral cancer and nasopharyngeal cancer, two of the most common head and neck cancers with 80% of the worldwide incidents in Asia. Particularly for oral cancer, 50% of patients die within the first two years. So it’s very urgent we identify new therapies. It’s also very urgent that we do this in Malaysia as in Asia because these are the cancers that the pharmaceutical industry will not be investing in because they are not relevant to their primary market. So this is where we’re trying to make an impact.

What’s the progress been like?

Teo: We’ve filed two patents. We’re developing vaccines that we hope will prevent occurrences. One of the major reasons why patients fail is because the first therapy that they have, be it surgery or radiotherapy or chemotherapy, may work to a limited extent but the cancer may recur and that’s when you have less options available. So, what we’re developing, and we think we’ve got a fairly good lead on this… we have genes that we know drive oral cancer and nasopharyngeal cancer and we’re developing a way in which we can stimulate the immune system so that when it’s given to a patient after they’ve been treated, it will prevent the recurrences. In a sense, we hope not just to treat the cancer but also prevent it from happening again. That’s a major area of focus for us.

The fourth area of work is on natural products and we collaborate with about 10 different organisations with Malaysia, including Dr Hasima.

What are the major challenges you face?

Teo: One of our advantages as an independent non-profit is that we can work very well with many different organisations. Collectively, we have probably the largest collection of natural products in the country. We have something like 5,000 extracts that are derived from more than 2,500 species in Malaysia and this is very exciting because Malaysia is the 10th most biodiverse country in the world. It hasn’t been easy to tap that biodiversity for compounds that actually work in the clinic. Out of the 5,000 extracts, we have 500 that have anti-cancer activity and an extract has something like 100 to 2,000 compounds, out of which you then need to identify which of these kill cancer cells. And even after you’ve identified the one that kills cancer cells, out of 10,000 compounds that kill cancer cells in a dish in a laboratory, only one would be effective as a cancer drug in a patient.

Every time there is any mention of the discovery of a plant or herb having anti-cancer properties, you’ll see the public rush out to buy supplements, the vegetable or fruit or whatever it is in hope of trying to lower their chances of getting cancer or helping their loved ones who already have cancer. How do you feel about this?

Hasima: When somebody loves has cancer, you’re so desperate. Anything that you read… you would not even read between the lines, you just read “compound may cure cancer” and you tell yourself, I’m going to try it and see if it works. That’s why it’s very important.
that scientists in Malaysia do not report anything until they have reached the level of clinical trials or they know exactly how that compound works.

Like in my case, I'm waiting for a few more experiments in animal models before I can see if it's effective. Then if we patent it and we can carry out clinical trials, that's the type of work I would report my findings.

Tee: I take a slightly different approach from Hasima. I believe that you have a compound that is interesting, that's been isolated from a plant, it's fine to report it. It gives people hope that there is cancer research happening in this country. But you have to provide a balanced view and state that out of 10,000 compounds, only one will work effectively. Most compounds fail because they kill the patient before they kill the cancer and we still have a lot to do but this looks promising.

I think it is important that we document how we are doing something to discover better drugs. Reporting it is fine but with a balanced view.

Hasima: Which sometimes the media doesn't do.

Tee: It isn't always the media's fault though, sometimes we scientists are overly enthusiastic [laughs].

Cancer is so multifaceted, from the various complications in diagnosing to treatments.

Hasima: Cancer cells originate from one cell. It can just be one nucleotide change and it can start a cancer cell. But once a cell has gone wrong, it triggers so many stress signals, so many pathways, and everything is inter-related.

There are actually three major genes - one is YCC gene, the other is a tumour suppressor gene and the third is an apoptotic gene. And all three actually interact and so when any one of these will affect a tumour suppressor gene and that could affect an apoptotic gene and these are characteristics of cancer - abnormal mitosis, non-stick growth or anti-apoptotic, which means it doesn't die at all. So all these genes control these three properties of cells so that's why you get these cancer cells in such an uncontrolled manner.

But now we actually understand how that one cell can 'go wrong', as you say.

Hasima: Yes.

Tee: There are two reasons why we are not succeeding in finding a cure for some types of cancer. The first is that there are only some small differences between a cancer cell and a normal cell and most drugs kill cancer cells, no problem. But they also kill the normal cells.

The second is that many people we see as cancer as one disease. When we talk about breast cancer, people think it is one disease but breast cancer is at least five diseases, each of which need to be treated in different ways. Let me give you an example - one lump the size of a 1 cm mm contains approximately one billion cells and that one billion are not all the same. The drug that we use may only kill one million of those cancer cells and not the remaining 999 million cells. Even if you killed off the majority of cells, you may leave a thousand, a relatively tiny amount but those may have some properties that enable them to escape the drug. We are then in the first place and they can go on and repopulate itself.

Hasima: My team and I have also identified that certain cancers which are prevalent in Malaysia - oral cancers and breast cancer. We have two compounds extracted from a wild ginger plant and research that we have conducted shows that the compound may be more effective for oral and the other for breast. What we have done is to look at how we can couple our compound with another protein that can actually specifically target the tumour cells.

At the moment I am collaborating with a research group from Russia and they have a patented protein that can actually specifically target tumour cells. I can't talk about it in great detail because we have an MOU, but what I can tell you is that we are coupling our compound with that protein. Its receptor will only work on tumour cells which means that it will only bind with tumour cells and therefore, the drug will only kill the cancer cells. So that's what we are doing. It is being done now to see if the cancer cells can be killed by the compound.

Tee: I suppose it'll be good to give you an example of how cancer research has developed over the years. If you talk about when the first immune system monoclonal antibody was discovered as a principle and when we now have the ability to modulate the immune system by injecting an antibody that targets cancer or injecting something that stimulates the immune system to target that cancer in our current therapies, many cancer cells have been approved. We now can take blood samples from a patient and purify out the cells that go and target those cancers. And in vivo, in the lab, amplify it so that when given back to the patient, it can improve the care and so on.

And because there have also been advances in radiotherapy, we were able to cure cancer more effectively. So from my point of view, I think that while there are many challenges remaining for cancer research, it's really an area of optimism. I think the next 10 years in particular is going to be critical for any cancer researchers.

Hasima: The major breakthrough in cancer to me has been of course the cervical cancer vaccines, which is preventive and the other therapeutic, which stops recurrence.

Tee: I feel that one of our major focuses should be to target specific cancer types and look for therapeutic vaccines. We need to identify markers on the cancer cells that could be targeted for vaccines. To me that would be the greatest breakthrough.

Hasima: I would say that one of the first things we'll get better at is identifying who to screen in order to be more effective. Because we understand more about how the cancers develop, we will become more effective in understanding how to prevent them.

Tee: I would say that one of the first things we'll get better at is identifying who to screen in order to be more effective. Because we understand more about how the cancers develop, we will become more effective in understanding how to prevent them. However, we do need the population to take charge. Right now, it doesn't seem as if the risks factors we already know about is having an impact on our population.

Hasima: We know smoking causes cancer but 45% of Malaysian males smoke. We have a time bomb about to happen in 10 to 15 years because they are going to get lung cancer. The population needs to take responsibility for their habits and smoking is a big one.

Tee: Obesity is a major problem. It is true that 50% of the population are obese; we are going to almost effectively double our risks for cancer across many cancer types including colorectal cancer, endometrial cancer, breast cancer and so on.

I'm not sure what needs to happen for that to come about but I see that as a major thing we should be aiming towards.

Hasima: Society does play an important role.I think currently the general public don't really understand that cancer is not just one disease.

Tee: There are 100 types of cancer which have been categorised so it's very important. I hope the message of cancer treatment is now also looking at the immune system, immunotherapy.

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Would you say that in this people or cancer fight, we should be hopeful? Yes, we're that much closer.

Hasima: Definitely.