To hear Dr. Norman Sharpless tell it, it’s time to open a new front on the war on cancer. That front, he says, will match the latest cancer treatment advances and lab breakthroughs against a global killer.

Sharpless: Firstly, you have to understand that cancer is not one disease. That misconception dates back to the Naxum administration. Maybe we should have said back then we’re launching a war on cancers. Each cancer requires different treatments. Each has different causes. And because every cancer is different you really can’t talk about a one-size-fits-all approach for even the same type of cancer. What is needed is personalized care. Without that, making progress against the whole batch of cancers is really challenging. We have made some terrific successes against particular cancers, but the entire field of cancer is a big complex problem.

And yet you’re pretty hopeful that we’re nearing a breakthrough for successfully treating more and more types of cancer. What’s changed?

Maybe oncology is the triumph of optimism over experience. Every few years we seem to have the next cure coming, and generally they don’t work out. But there really has been progress. And that’s because we’re starting to feel like we have a sufficiently good scientific understanding of cancer to really make a difference. That’s the thing that’s changed. It used to be that cancer was so mysterious that it was hard to figure out how we were going to beat it, but I think now most oncologists feel we have a path to victory. And one of the parts of that path to victory is big data. Another part is genomics. Sequencing the tumor means understanding of cancer to really make a difference. That’s the thing that’s changed. It used to be that cancer was so mysterious that it was hard to figure out how we were going to beat it, but I think now most oncologists feel we have a path to victory. And one of the parts of that path to victory is big data. Another part is genomics. Sequencing the tumor means understanding a patient’s specific genetic mutations. And even that’s a big data issue. Sequencing the tumor means rounding up a lot of data. There’s no doubt in my mind we’ll be doing more and more sequencing, not less and less. And we’re going to have to process all that data that sequencing generates with something. That’s why we are eager to have our partners of patient data analyzed by Watson.

The World Health Organization predicts that the number of new cancer cases will grow 70 percent within the next two decades. It’s no wonder many of us believe we’re losing the war on cancer.

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How did you first team with Watson?

Through a colleague, Lynda Chin, at MD Anderson. I’m on the external advisory board there. Lynda is the chief innovation officer and a big data wrangler. She was working with Watson and shared with me her excitement about the project. Nine months later, she showed us specifically what they were doing with Watson, and I got it. I could see right away the application that they had in mind was a real killer app. Lynda was programming Watson to read and ingest disparate sources of data on a single patient. Watson would read the chest X-ray, the electrocardiogram, the physician notes from another hospital. It would look at the pathology results too, and it would incorporate all this data – some of it being images, a PDF, and some of it was spoken word. Watson would make sense of it all and tie it up into something an oncologist could review really quickly. Watson would also generate evidence-based treatment options based on its understanding of the problem. So it had this sort of expert adviser capability. That is a real problem in oncology, because we’re drowning in information.

The ultimate goal is probably the easiest.

We’d like to develop an algorithm that uses genomic information, DNA and RNA, to make recommendations on therapy that are better than what a group of humans can. I think that’s an achievable goal. I’m not saying I want Watson to pick your chemotherapy. I want Watson to provide treatment options to help your doctor pick the optimal chemotherapy. I think that’s very doable.

How do you plan to use Watson?

It would involve taking patients – I suspect we’ll be able to take as many as a thousand patients – and assign them to the therapy the old molecular tumor board says X and Watson says Y. Let’s see how often they agree. We would need a well-trained algorithm, one that all the leading cancer centers, including us at the University of North Carolina Lineberger Comprehensive Cancer Center, can feed patient sequencing data into. This would be a really straightforward trial, and I think it would accrue, from a patient’s point of view, very little risk to them. In fact, I think it’d be very appealing to them to have a cognitive computer help their doctors.

What do you hope to achieve from this type of clinical trial?

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If your hypothesis is correct, what would that mean for how we treat cancer patients in the future?

Cancer is not going away, but John Q. Public might be able to have his cancer diagnosed by his physician earlier. He might be able to get more effective treatment that is less toxic to his body. In this way, he stands a much better chance of getting his cancer go away and never come back. Oh, and by the way, this level of care will cost less because giving ineffective therapy is very expensive. We’re going to reduce toxicity. We’re going to save money. We’re going to save lives. The advantages are going to be very obvious.

This is one in a series of articles and infographics brought to you by IBM about innovators who are combining science, technology and ambition to change the world. Wild Ducks is produced by veteran journalists Jeffrey O’Brien and Bernhard Warner and designer Carl De Torres.