Brain cancer boost

A series of steps can improve treatments for these difficult tumours.

"I knew it was serious from the sober demeanor of the medical professionals in the room." That was how US Senator John McCain described his diagnosis of cancer in his 2018 book *The Restless Wave*. "And when someone, I don't remember who, mentioned that it was the same cancer that Ted had, I got the picture."

Ted was Edward Kennedy, McCain's fellow senator. And the cancer was a brain tumour. Kennedy had died in 2009. McCain succumbed last August — just a year after his fateful diagnosis. That's not unusual. Malignant tumours in the brain are among the most feared cancers, partly because they progress rapidly and are so often lethal — killing around half of patients within a year of diagnosis.

Unlike with most other cancers, survival rates for brain tumours have not improved much in recent years, even with the introduction of new treatments such as targeted therapies and immunotherapies. Better treatment for brain tumours is thus a pressing medical need, especially for some devastating childhood forms of the disease.

This week in *Nature*, two papers (pages 234 and 240) report some progress on that front. The positive result is that they detail the first testing in humans of a strategy involving 'neoantigen vaccines'. Patients are given injections of a vaccine that is based on the genetic composition of their specific tumour type, and it is intended to stimulate and boost their own immune defences. This approach has previously shown promise in melanomas. It's the latest type of immunotherapy to be tested in brain cancers, and follows trials with other methods, including viruses targeted against the cancers.

As is highlighted in an accompanying News & Views article (page 170), the vaccines managed to elicit some immune responses in people with brain tumours. But the effect was limited, and the patients still died.

The results emphasize the major anatomical and biological challenges of treating brain tumours. In particular, the brain's delicate, complex structure is protected by the blood–brain barrier, and it is difficult to find cancer drugs that can cross this and have an impact, while limiting their toxic effects on neurons.

The tumours' sensitive location also makes it more difficult to screen and monitor them without resorting to complex surgery. They are often composed of many genetically different cells, helping them to adapt to and elude targeted therapy. And they are considered to be immunologically 'cold' — not recognized or responded to by the body's immune system — which can limit the efficacy of immunotherapies.

"The results emphasize the major anatomical and biological challenges of treating brain tumours."

The new vaccine studies show that supporting treatments such as the steroid dexamethasone can hamper the potency of immune responses. They also suggest that responses can be raised against both mutated and non-mutated tumour-related proteins, and show how these responses can be limited by immune-cell exhaustion.

Given the extent of the challenges involved, the slow pace of progress on brain cancer treatment should not be a reason to be discouraged. Thanks to the generosity of people who enrol in trials, and the determination of researchers and clinicians who continue to collaborate and foster treatment initiatives, we can still gain important insights. The new papers, for example, should shed light on how immune responses develop in people with brain tumours, and what can be done to boost those responses. That is one way to accelerate progress. ■

ANNOUNCEMENT

FAIR data in Earth science

Nature and *Scientific Data* are pleased to endorse the Enabling FAIR Data initiative in the Earth, space and environmental sciences. Funded by the Laura and John Arnold Foundation, and convened by the American Geophysical Union in partnership with the Earth Science Information Partners and the Research Data Alliance, this initiative brings together a network of stakeholders who, through advocacy, policies, infrastructure and services to support data sharing, are working together to facilitate a shift towards open data becoming the default in the Earth sciences. As such, from January 2019, we will require that authors of papers in Earth sciences (and related space and environmental science fields) make supporting data available to others through community repositories where available.

Where such repositories are not available, data sets may be put into general repositories such as figshare, Dryad or Zenodo. We will allow exceptions, for example to protect participant privacy, when authors do not own the rights to the data set or when publication would risk disclosing sites of ecologically sensitive samples. Initially, the policy will be implemented at *Nature*, followed by relevant Nature Research journals. *Scientific Data* will be updating its list of recommended data repositories to help authors from these fields to comply with these new policies.

Establishing data as primary outputs of research, to be shared, cited and credited in their own right, has been a central feature of the drive by Nature Research and Springer Nature to support reproducible research in our journals. A number of funders have made important strides in mandating data sharing, but barriers remain for researchers who face challenges such as finding the right repository, curating data sets so they can be reused, and a lack of standards for curation and incentives for sharing.

We have taken a number of steps to support and incentivize data sharing, from introducing standardized research-data policies and the Research Data Helpdesk, which provides free advice on research-data policies and data repositories, to launching Research Data Support, a paid data-curation service available to authors who have published in any journal. We have also created dedicated forums for data-focused publication, such as *Scientific Data*. This journal already enforces rigorous standards for data deposition, preservation and open sharing that align with many of the aims of the Enabling FAIR (findable, accessible, interoperable and reusable) Data initiative.

But policies, infrastructure and services only go so far. To make data sharing the norm, funders and institutions must shift incentives and recognize and reward data generation, curation and sharing in research assessment. Most of all, it will require researchers to embrace the benefits of data sharing for underlining the integrity and reproducibility of their work, and for the scholarly ecosystem of funders, publishers, repositories, institutions and societies to work in partnership. The Enabling FAIR Data project marks an important step in this collective journey. ■