Could DNA from a virus millions of years old hold the key to new neuro tumor therapies?

October 28 2016

Dr. Sylwia Ammoun, Senior Research Fellow from Plymouth University Peninsula Schools of Medicine and Dentistry, at work in her laboratory. Credit: Plymouth University

Dr Sylwia Ammoun, Senior Research Fellow at Plymouth University

Peninsula Schools of Medicine and Dentistry, has received backing from children's charity Action Medical Research, to investigate new drug treatments for neurofibromatosis 2 (NF2) - and the secret may lie in sequences of DNA from viruses that are millions of years old.

NF2 is a genetic condition which affects around one in 35,000 people in the UK. It tends to be diagnosed during childhood and early adulthood and results in people developing multiple benign tumours in the nervous system, sometimes as many as 20 to 30 in one place at any one time.

Treatment options for NF2 are limited to radiosurgery and/or invasive surgery. Surgery can be used to remove most tumours, although it carries a risk of causing problems, such as complete deafness and facial weakness. It cannot be used when tumours are located in multiple sites of the nervous system, or in sites where resection would carry too great a risk of fatal neurological complications.

Most people with NF2 eventually develop significant hearing loss, speech impairment, problems with balance and in some cases paralysis.

Dr Ammoun and her colleagues are investigating new drug treatments for NF2 - designed not just to find a way to halt or reverse the progress of the condition, but also to provide patients with a non-invasive reduced-risk therapy option.

In people with NF2, the DNA sequence of a particular gene mutates, and this can be inherited or appear by chance before birth. This results in the inability to produce a tumour-suppressing protein called Merlin.

The research team made an exciting discovery while investigating human tumour cells. They found that certain sequences of DNA which originated from viruses that inserted themselves into human chromosomes millions of years ago and which are normally inactive,

become active in NF2 tumour cells.

"We think that the unusual activity of this DNA may cause NF2 tumour cells to grow," said Dr Ammoun. "We have shown that some drugs, which are used to treat viral infections, seem to block the action of this DNA and slow-down the growth of tumour cells. We are investigating this further to see if we can develop a much-needed new drug treatment for people with NF2."

She added: "We are immensely grateful to Action Medical Research for this vital grant which will help us to move closer to finding the best drug to deal with this pernicious and debilitating condition, and which can rob children and young adults of quality of life at an early age."

Action's Director of Research Dr Tracy Swinfield said: "Thousands of families across the UK are coping with the challenge of caring for a child with a condition for which there is no cure. At Action Medical Research, we believe passionately in supporting studies that aim to find out more about debilitating conditions like NF2, and help doctors develop effective treatments. Dr Ammoun and her team are dedicated to helping children and young people affected by this heartbreaking rare condition. We are delighted to be able to fund this important work."

Dr Robert Belshaw, Associate Professor in Genomics from Plymouth University School of Biomedical and Healthcare Sciences, is a co-applicant and collaborator on this project.

Provided by University of Plymouth