Genetic markers hope for new brain tumor treatments

June 15 2012

Researchers at The University of Nottingham have identified three sets of genetic markers that could potentially pave the way for new diagnostic tools for a deadly type of brain tumour that mainly targets children.

The study, published in the latest edition of Lancet Oncology, was led by Professor Richard Grundy at the University's Children's Brain Tumour Research Centre and Dr Suzanne Miller, a post doctoral research fellow in the Centre.

It focuses on a rare and aggressive cancer called Central Nervous System primitive neuro-ectodermal brain tumours. Patients with CNS PNET have a very poor prognosis and current treatments, including high dose chemotherapy and cranio-spinal radiotherapy are relatively unsuccessful and have severe lifelong side-effects. This is particularly the case in very young children.

Despite the need for new and more effective treatments, little research has been done to examine the underlying causes of CNS PNET, partly due to their rarity. The Nottingham study aimed to identify molecular markers as a first step to improving the treatments and therapies available to fight the cancer.

The Nottingham team collaborated with researchers at the Hospital for Sick Kids in Toronto, Canada, to perform an International study collecting 142 CNS PNET samples from 20 institutions in nine

countries.

Professor Richard Grundy said: "Following our earlier research we realised that an international effort was needed to bring sufficient numbers of cases together to make the breakthrough we needed to better understand this disease or indeed diseases identified in our study. The next step is to translate this knowledge into improving treatments."

By studying the genetics of the tumours, they discovered that instead of one cancer, the tumours have three sub-types featuring distinct genetic abnormalities and leading to different outcomes for patients.

They found that each group had its own genetic signature through subtle differences in the way they expressed two genetic markers, LIN28 and OLIG2.

When compared with clinical factors including age, survival and metastases (the spread of the tumours through the body), they discovered that group 1 tumours (primitive neural) were found most often in the youngest patients and had the poorest survival rates. Patients with group 3 tumours had the highest incidence of metastases at diagnosis.

Ultimately, the research has identified the two genetic markers LIN28 and OLIG2 as a promising basis for more effective tools for diagnosing and predicting outcomes for young patients with these types of brain tumours.

The research was funded by the Canadian Institute of Health Research, the Brainchild/Sick Kids Foundation and the Samantha Dickson Brain Tumour Trust.

Chief Executive of Samantha Dickson Brain Tumour Trust, Sarah Lindsell, said: "As the UK's leading brain tumour charity, and the largest

dedicated funder of brain tumour research, we are delighted that our investment has led to such significant success. It is great to see that understanding of these tumours is improving – this is desperately needed given the poor outcomes for children with this tumour. Samantha Dickson Brain Tumour Trust is proud to have been instrumental in this work."

Provided by University of Nottingham