Rare leukaemia survival-rate breakthrough

August 13 2013

A pioneering genetic study means that children with a rare subtype of leukaemia have 75% less chance of their leukaemia recurring.

A study by Newcastle University scientists, published online in the *Journal of Clinical Oncology*, has shown that lives have already been saved as a result of identifying children carrying a chromosomal abnormality known as iAMP21, and giving these patients a very intensive treatment regimen.

Overall survival for acute lymphoblastic leukaemia (ALL) patients, a cancer of the white blood cells, is now very high, with up to 90% of children being cured. A minority of patients, however, still do not respond to standard treatment.

A decade ago, the same scientists, funded by the blood cancer charity Leukaemia & Lymphoma Research, discovered the genetic error known as iAMP21. This abnormality occurs when parts of chromosome 21 – one of 23 pairs of chromosomes that contain our genetic instructions – are copied and shuffled around, resulting in extra copies of some genes. The researchers found that this abnormality was present in around 2% of children diagnosed with ALL and that it gave them much greater chance of suffering a relapse.

The team, led by Professor Christine Harrison and Professor Anthony Moorman from the Leukaemia Research Cytogenetics Group, tracked the progress of patients with iAMP21 using samples from clinical trials between 1997 and 2002. They found that more than 80% of patients

with iAMP21 had relapsed, compared to less than for 25% for children overall. The long-term survival for the iAMP21 group was also much lower.

Since 2003, bone marrow samples from every child diagnosed with ALL have been tested for the presence of iAMP21 using a genetic test known as 'fluorescence in situ hybridisation' (FISH), which binds glowing tags to DNA and "lights-up" the abnormal sequences. Children with iAMP21 registered on the UKALL2003 trial, which was funded by Leukaemia & Lymphoma Research and the Medical Research Council, were immediately recommended for treatment using a very intensive protocol.

The results of the UKALL2003 trial show that if children with iAMP21 are treated with intensive chemotherapy they have a dramatically reduced risk of relapse. In addition the proportion surviving for five years or more increased to nearly 90%.

Anthony Moorman, Professor of Genetic Epidemiology at Newcastle University, said: "Although using the presence of genetic abnormalities to guide treatment is not new within childhood leukaemia, such a clear demonstration of its beneficial impact on survival is extremely rare. In time we may be able to design drugs to actually target the iAMP21 abnormality, sparing these children from toxic treatment."

Professor Chris Bunce, Research Director at Leukaemia & Lymphoma Research, said: "By establishing how different genetic abnormalities found in leukaemia cells dictate how well the child will respond to treatment, we can identify high-risk patients early on. These new results demonstrate the huge potential of personalised medicine."

Provided by Newcastle University