Potential new drug for childhood leukaemia

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Nearly 40% of children with leukaemia whose disease returns after treatment could benefit from a drug designed to treat colon, skin and lung cancer.

Clinical trials are planned after scientists at Newcastle University successfully used selumetinib in mice to treat leukaemia carrying a common set of genetic faults.

Acute lymphoblastic leukaemia (ALL), the most common childhood cancer, is caused by out-of-control growth of abnormal white blood cells, leading to a breakdown of the immune system. Around nine in 10 children with ALL will now survive their disease long-term, but the outlook for children whose cancer comes back after initial treatment is much poorer.

Relapse

Working with scientists in Glasgow and Berlin, the Newcastle researchers screened DNA taken from 206 children diagnosed with leukaemia between 2001 and 2012 whose disease had relapsed after chemotherapy. The leukaemias of nearly 40% of patients had errors in a set of genes linked to 'Ras proteins', which are responsible for relaying chemical signals within the cell. The 'Ras pathway' plays a pivotal role in telling the cell how to grow, divide and die properly. If the Ras pathway is faulty and constantly 'switched on', it stimulates the cell to keep creating new cells and can lead to cancer.

The researchers, funded by blood cancer charity Leukaemia & Lymphoma Research, found that the presence of a faulty Ras pathway in leukaemia cells was linked to early relapse, resistance to chemotherapy and spread of leukaemia to the central nervous system. The findings are published in the journal *Blood*.

The scientists turned to a cancer drug called selumetinib, which has been designed for other cancers to inhibit the 'MEK protein', a key protein in the Ras pathway. After successful targeted killing of leukaemia cells in cells isolated in the laboratory, the drug was tested on mice with leukaemia that contained the faulty Ras pathway. Selumetinib produced dramatic reductions in the number of cancer cells in the mice with limited side-effects.

Dr Julie Irving, who led the research at Newcastle University, said: "New drugs are desperately needed for children with ALL who relapse after their chemotherapy. Our findings show that selumetinib could be very effective at treating a substantial proportion of these children. The drug actually targets faults specific to the leukaemia cells, limiting damage to healthy cells and debilitating side-effects."

Dr Matt Kaiser, Head of Research at Leukaemia & Lymphoma Research, said: "This hugely promising research is a great example of the potential of personalised medicine in treating childhood leukaemia. Using the latest technologies to screen children who have specific genetic faults driving a relapse, we can start to identify the most effective treatments available. And by understanding the biological drivers, we can look beyond traditional disease boundaries for potential cures."

Provided by Newcastle University