Birth brain defect could be treated with vitamin supplement

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(PhysOrg.com) -- Pioneering research published today suggests that a vitamin supplement taken during pregnancy could prevent hydrocephalus - one of the common forms of birth brain defect.

Scientists at The University of Manchester and Lancaster University say laboratory tests have shown that administering a combination of vitamins (tetrahydrofolate and folinic acid), dramatically reduces the risk of hydrocephalus.

Dr Jaleel Miyan, who led the research in Manchester's Faculty of Life Sciences, said: "Hydrocephalus is a condition arising from an abnormal build-up of fluid within the chambers of the brain.

"This fluid build-up - usually caused by a blockage in the fluid's pathway due to trauma, infection or abnormal development - is associated with an increase in the pressure on the brain resulting in brain damage. When this happens, doctors can relieve this pressure only by performing surgery.

"Our studies have revealed that hydrocephalus is associated with a change in the composition of the cerebrospinal fluid and it is this chemical change that prevents normal growth of the brain cells resulting in arrested brain development. This occurs prior to any brain damage due to raised pressure."

The findings of the study, funded by Association for Spina Bifida &

Hydrocephalus (ASBAH) and published in the Journal of Neuropathology and Experimental Neurology, led the team to examine ways of stimulating cell division to encourage normal brain development.

Dr Miyan explained: “A combination of tetrahydrofolate and folinic acid - both naturally occurring substances - stimulated brain cell growth and had a significant positive effect on brain development in laboratory experiments on rats and reduced the incidence of hydrocephalus.

“In laboratory experiments, the combined folate supplement works at any stage during pregnancy which means that it may be effective even if it is commenced after the diagnosis of hydrocephalus is made at an 18 to 20 week pregnancy scan.

“We believe that the combination folate supplement could be given to a woman whose fetus had been scanned and shown to have hydrocephalus, to improve brain development and perhaps rescue the child from hydrocephalus. We have yet to carry out experimental studies in the laboratory to test whether treatment at later stages of development, including after birth, would lead to improvement in the condition.

“These are really exciting findings. However it is novel work showing, somewhat controversially, that cerebrospinal fluid is not a liquid which simply cushions the brain and carries chemicals around it. It is actively produced and transported and plays an essential biological role in developing the brain.”

Women who are planning on becoming pregnant are already encouraged to increase their daily intake of another folate - folic acid - to help prevent birth defects, such as spina bifida and anencephaly.

Dr Miyan added: “Folic acid - which is a synthetic substance - helps to

preserve existing brain cells, but it doesn't promote brain cell growth. However, since there is strong evidence that folic acid prevents birth defects, women who are planning on becoming pregnant should continue to take their folic acid tablets."

Andrew Russell, ASBAH Chief Executive, said: "Hydrocephalus can cause severe disability and learning difficulties, so the possibility of prevention through a specific vitamin supplement is exciting. ASBAH is helping with this ground-breaking research because many babies born with hydrocephalus today survive, but with a lifelong disability. However, a lot of further work is still needed to prove this approach is effective, through clinical trials."

The combined folate supplement is not currently available. Further studies are underway to translate this important laboratory finding so that patients can benefit from it. The team is actively seeking support from pharmaceutical companies to produce a stable form of the combination supplement and to explore the possibility of starting clinical trials in women pregnant with babies diagnosed with hydrocephalus.

More information: The paper 'Addressing a folate imbalance in fetal cerebrospinal fluid can decrease the incidence of congenital hydrocephalus.' is published online.

Provided by University of Manchester