

What About The Children?



RESEARCH SUMMARY

Mother's milk programs offspring's cognition.

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It is well known that mother's milk provides immunological advantages for the newborn. The reason for this is that the milk contains immunological factors that benefit the newborn in fighting infection. However, some of these factors are found normally in the adult's brain. This paper documents the finding that these factors in mother's milk can affect the development of the offspring's brain, particularly in the area of the hippocampus.

A key factor in the immune response is Tumour Necrosis Factor- α (TNF- α) a cytokine (a cytokine being a small protein made by cells in the immune system). It is also found in the brain. But what does it do there?

One way of finding out is to create TNF- α gene-knockout mice and subject their offspring to cognitive tests. Cognitive function was tested on these offspring using standard water maze and fear-conditioning tasks. Clearly, for ethical reasons, this type of work cannot be carried out with humans, so the authors have used mice.

More detailed knockout studies enabled mice to be bred with either TNF- α deficiency in their nervous system, or in their immune system. Only mother mice with no TNF- α in the immune system had the effect of improving the cognition of their offspring in the tests.

The enhanced cognition, indicated from this research, was specifically linked with spatial memory, but also other types of memory. The region of the brain responsible for this is the hippocampal dentate gyrus. This is an unusual region in that it shows continuous neurogenesis, that is, it can continually grow new brain cells. Growth of new brain cells is likely to enhance cognition. If these growing cells can be killed, there should be a reduction in cognition. A toxic compound, ganciclovir, is known to kill proliferating cells when injected into the dentate gyrus. This treatment, when applied, did reduce the cognitive advantage in offspring from the mothers with no TNF- α . These experiments have therefore identified the hippocampal dentate gyrus as the cognition site affected by TNF- α .

The conclusion was that reduced levels of cytokines (like TNF- α) in the mother's milk improve the offspring's cognitive functions into adulthood. What these authors are suggesting is that this process of immune factors being transmitted through breast milk, and that in turn affecting cognition, may be a common pathway in all mammals.

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