Boosting Newborns' Immune Responses

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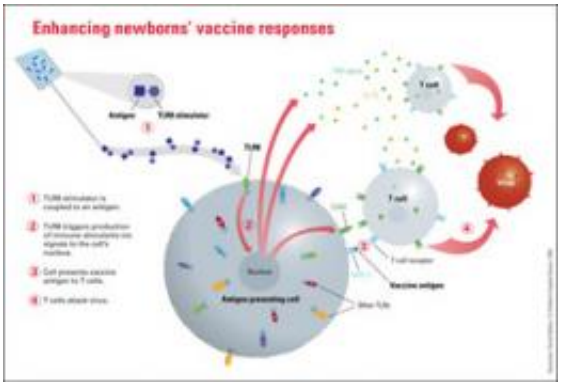

Toll-like receptors (TLRs) on the surface of white blood cells provide a first line of defense against infection. But in newborns, most of them respond poorly -- except for TLR8. Levy and colleagues believe that agents that stimulate TLR8 could be given as vaccine adjuvants to enhance newborns' immune responses.

Newborn babies have immature immune systems, making them highly vulnerable to severe infections and unable to mount an effective immune response to most vaccines, thereby frustrating efforts to protect them. The World Health Organization estimates that more than 2 million newborns and infants less than 6 months of age die each year due to infection. Researchers at Children's Hospital Boston believe they have found a way to enhance the immune system at birth and boost newborns' vaccine responses, making infections like respiratory syncytial virus, pneumococcus and rotavirus much less of a threat.

Ofer Levy, MD, PhD and colleagues in Children's Division of Infectious

Diseases have shown that the newborn immune system functions differently than that of adults, but that one portion of the immune response is fully functional and can be harnessed to boost innate immunity in these tiny infants.

For more than a decade it's been known that people's first line of defense against infection is a group of receptors known as Toll-like receptors (TLRs) on the surface of certain white blood cells. Functioning like an early radar system, TLRs detect the presence of invading bacteria and viruses and signal other immune cells to mount a defense. People have 10 different kinds of TLRs, and Levy's team found that when most of them were stimulated, newborns' immune responses are very impaired -- with one important exception.

One TLR, known as TLR8, triggered a robust immune response in antigen-presenting cells, which are crucial for vaccine responses, suggesting that agents that stimulate TLR8 could be used to enhance immune responses in newborns, perhaps as adjuvants given along with vaccines. With the help of a $100,000 pilot grant from the Bill & Melinda Gates Foundation, Levy's team is now validating their work in human cells and in animal models, and eventually want to test TLR8 stimulators - some of which are already available -- in human babies.

Levy's team is uncovering other differences in the newborn immune system that could lead to additional targets for drugs or vaccines. "As we better understand the molecular pathways that account for newborns' susceptibility to infections, we can leverage them to enhance their immune defenses," Levy says.

The ability to vaccinate newborns -- rather than wait until they reach 2 months of age -- would provide important global health benefits, adds Levy, whose lab is one of the few in the world to specifically focus on vaccination in newborns. "Birth is a point of contact with healthcare

systems," he says. "If you could give a vaccine at birth, a much higher percentage of the population can be covered."

Source: Children's Hospital Boston (news : web)

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