

## Neonatal Immunizations: Where We Are Today and Where We Might Go

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To simplify an incredibly complex process, an immunization is the deliberate action of making a person immune to an infection or disease. While a person of any age is at risk for acquiring infection, newborns have an immature immune system that puts them at an even greater risk. Is there an opportunity give more immunizations during the neonatal period (the first 28 days of life)? Birth is often a reliable point of healthcare contact and offers a great opportunity for healthcare providers to provide education and early protection for young children through immunization.

Research has shown that approximately 2 million infants under 6 months of age die to due infection with many of those deaths causes by illnesses that are vaccine preventable [1]. While there has been rapid development of vaccines over the past century, neonatal vaccination is currently limited to the Bacille Calmette-Guérin (BCG), hepatitis B (HBV), and polio (OPV/IPV) vaccines. There are many limitations that are current barriers to vaccination in the neonatal period. These include safety studies, efficacy studies, and developing vaccinations compatible with the neonatal immune system.

Reviewing current literature, there are three broad approaches that are being studied regarding neonatal vaccination. First, is the idea of enhancing current vaccines. Many current vaccinations cannot be used in neonates due to a range of deficiencies in both adaptive and innate immunity. Additionally, maternally derived antibodies may also have a suppressive effect on the neonatal immune system. Therefore, current vaccines would need to be reformulated to be efficacious at birth to appropriately address the deficiencies in the immune system. Research will need to look at how to reformulate current vaccination to be not only be safe but compatible in a neonate.

Another approach would be to develop adjuvants, ingredients that help create a stronger immune response, for early life immunization. The idea behind adjuvants is to enhance not only efficacy of vaccination but immunogenicity as well. The use of safe adjuvants in young children would be to enhance the effectiveness of vaccina-

tion boosting the immune response. While this approach does not add to the number of neonatal vaccinations, it can increase effectiveness of currently available neonatal vaccinations.

Finally, there is a growing body of research regarding alternate approaches to vaccine delivery. Injections are not only painful, but may be traumatising for parents watching their young baby in pain. While the pain is obviously temporary, the emotions surrounding injections are real. The use of alternative needle-free vaccine approaches, such as mucosal vaccination, provides an effective, pain-free approach to vaccination. Not only is this approach more appealing for parents, but these types of vaccination can be quickly delivered as well as reducing the risk of injection related infection and other complications.

While there are limitations to the development and use of neonatal vaccinations, these limitations should not be deterrents. There is a heavy loss of life yearly from vaccine preventable illness in neonates. With birth being a very practical point of healthcare contact it is an opportune time for vaccination. Providing appropriate neonatal vaccination may provide earlier protection than the current immunization schedule helping reduce the number of neonatal deaths worldwide.

### Bibliography

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