

## Vaccine-acquired rotavirus infections in undiagnosed infants with SCID

We know that live viral vaccines should not be given to immunodeficient children; but what if the diagnosis hasn't been made yet? Many children with immunodeficiency are apparently normal at birth, and are protected for some time by mother's transplacental antibodies. A recent paper<sup>1</sup> described infection by the vaccine strains of rotavirus in 3 children unsuspected at the time of having 3 different forms of SCID.

One child developed pneumonia at 2 weeks of age; her white cell count was 4300 with 11% lymphocytes (do you remember what normal values would be for an infant?) but this was apparently not followed up. She received rotavirus vaccine at 2 and 4 months. At 5 months she was hospitalized with severe diarrhea. Absolute lymphocyte count was 38/ $\mu$ L (normal at that age is 3900 to 9000). Adenosine deaminase was undetectable in her white blood cells. She was treated with "pegylated" adenosine deaminase (modified with PEG, polyethylene glycol, for better pharmacodynamics).

The second child presented with shock, diarrhea, and dehydration 6 days after his second rotavirus vaccine shot. Lymphocyte count was 19%, 1767/ $\mu$ L absolute. ADA was normal, but there was a mutation in the common gamma chain of the IL-2 receptor. He did well after two efforts at transplantation with haploidentical peripheral blood stem cells.

The third, who was born to consanguineous (blood relatives) parents presented with diarrhea and weight at the 3<sup>rd</sup> percentile after his first rotavirus shot. He was very ill. ADA was normal, but he was found to have a homozygous mutation in the *RAG1* recombination activating gene. He received a transplant of haploidentical bone marrow from a related donor, and then a second when the first did not take.

The authors point out that immunodeficiency is not currently screened for in newborns, but it can be. All newborns now have blood spots dried onto paper (Guthrie cards) and they have shown that the DNA from such cards may be screened for the presence of "excision circles" which are the DNA excised from the genome during DJ and V-DJ recombination. These are readily detected in spots from normal kids and absent in all forms of SCID. Several states are currently looking into the application of such technology.

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<sup>1</sup> Patel, NC, et al. 2010. Vaccine-acquired rotavirus in infants with severe combined immunodeficiency. *New Engl J Med* **362**: 314-9.