SCID Kids Leading Healthy, Normal Lives 25 Years After 'Bubble Boy'

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(PhysOrg.com) -- Mention the words "bubble boy" and many will recall David Vetter, the kid with big eyes and a thick thatch of dark hair who died 25 years ago after spending almost the entire 12 years of his life in a germ-free, plastic bubble. David was born with severe combined immune deficiency, or SCID, a condition that robbed him of an immune system.

Since David's death however, researchers have refined treatment options for children with SCID, and today, as scientists at Duke University Medical Center report in *The Journal of Pediatrics*, most of them who undergo related donor bone marrow transplants manage to grow up, go to school, and for the most part, lead pretty normal lives.

That conclusion comes from the longest and largest study to date of children with SCID treated at a single center. Led by Rebecca H. Buckley, MD, professor of pediatrics and immunology at Duke, researchers followed for up to 26 years 110 of the 124 surviving SCID children out of the 161 who had come to Duke for bone marrow transplants.

The study involved periodic questionnaires and visits to Duke for reassessment of various aspects of their lives, including immune function , growth, behavior, nutritional needs, mental, physical, and emotional well-being, and any trouble with recurrent infections.

Buckley says the data clearly show that SCID infants who receive a

related donor bone marrow transplant within the first 14 weeks of life are significantly more likely to survive and have fewer problems over time than those who receive transplants later in infancy or who have already developed an infection.

Buckley says the findings underscore the need for SCID testing at birth. “If we can identify children with SCID at birth, we can save more lives. When we transplant these babies prior to the onset of infections, 94 percent survive. But if they are older or if they have already developed an infection, only 71 percent will live.”

There are at least 13 subtypes of SCID, but all arise from genetic mutations that are either inherited or arise in the infant. SCID is described as a rare disorder, but Buckley points out that no one really knows how often it occurs because testing for the condition at birth is not done.

“Babies frequently die from infections, but no one thinks about SCID,” Buckley says, “and autopsies are rarely done any more, so the death certificate simply lists ‘infection’ as the cause.” Buckley believes SCID may actually be as prevalent as PKU, an inherited metabolic disorder that is routinely identified and treated through newborn screening.

Buckley has been advocating for over a decade about the need for routine screening for SCID in newborns. So far, the only states to perform it are Wisconsin and Massachusetts, which are conducting pilot studies.

In the Duke study, 77 percent of the children survived and 86 percent of those were considered healthy by their parents, says Buckley. Still, growing up with a corrected immune system is not always a sunny experience.

Investigators found that 58 percent of the children needed periodic antibody therapy because of inadequate B cell function, and about one-third required antibiotics.

In addition, about 10 percent had some sort of developmental delay, and about 20 percent had attention deficit disorder, often due to the lack of an enzyme called adenosine deaminase, one of the causes of SCID.

Other conditions appearing in a minority of the patients include diarrhea, rashes and HPV infection. Some of the conditions appeared more frequently in certain SCID subtypes than others.

At least two other centers specializing in SCID have recently published long-term outcome data on their patients, but more of Buckley's patients survived and the survivors are healthier, in general, than their counterparts elsewhere.

Buckley, director of Duke's Immune Deficiency Foundation Center of Excellence for Primary Immunodeficiency Diseases and a member of the Institute of Medicine, says the difference may lie in Duke's therapeutic approach.

Unlike other centers, Duke does not use chemotherapy before performing a bone marrow transplant in a SCID infant. "SCID babies do not have any T cells, so they cannot reject a graft. Chemotherapy can harm the lungs, liver, and other organs, and those who receive it may be sterile as adults."

Even though a tissue-matched related donor -- the ideal donor -- is rarely available for these infants (only 16 had them in her series), Buckley was able to use half-matched parental donors in the other 145 by using a process to strip away the donor's T cells from the marrow graft to prevent potentially fatal graft-versus-host disease.

If T cells are not removed from half-matched marrow, the SCID infant would die of graft-versus-host disease -- a reaction of donor T cells against the infant. Removing the T cells from the donor bone marrow also allows omission of immunosuppressive drugs after the transplant, a practice routinely used in many centers.

“Giving a SCID infant drugs to suppress the immune system is counterproductive if you are trying to build a new immune system,” she says.

In the future, other therapies may be possible.

“Gene therapy is likely to be the best option -- if the problems encountered to date can be worked out,” says Buckley. Gene therapy trials were halted in 2003 after some patients developed cancer following the therapy, but new trials that may be safer may start soon.

Provided by Duke University (news : web)