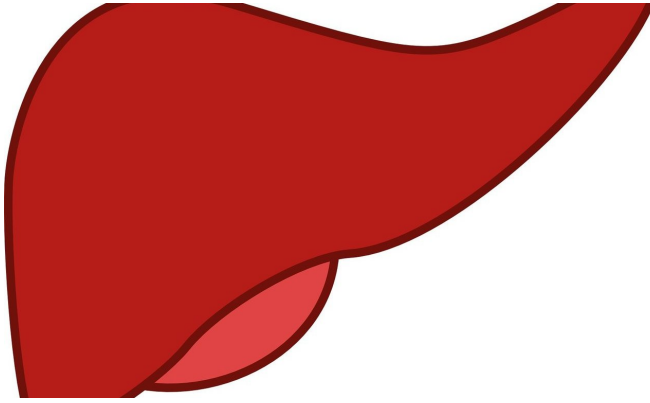


# Split liver transplants could safely help sickest children

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In a review of registry data for more than 5,300 liver transplants performed in children nationwide, Johns Hopkins Medicine researchers identify the type of patient who is most likely to survive a split liver transplant—receiving only part of a donor's liver—with no additional long-term health risks, which could allow for an increase in the availability of organs. A report on the new study is published in the December issue of the journal *Liver Transplantation*.

"Kids dying while on the waitlist is the worst possible outcome," says Douglas Mogul, M.D., Ph.D., medical director of the Pediatric Liver Transplant Program at Johns Hopkins Children Center and assistant professor of pediatric gastroenterology, hepatology and nutrition at the Johns Hopkins University School of Medicine.

Split liver transplants have been performed for nearly 30 years, according to Mogul, and using the liver's natural structure, a split liver transplant can use a 35 to 40 percent section, making split liver transplant ideal for children whose smaller weights accommodate smaller livers. "An SLT essentially could allow two transplants from a single liver,"

says Mogul.

Using data from the Scientific Registry of Transplant Recipients, Mogul, colleague Dorry Segev, M.D., professor of surgery at the Johns Hopkins University School of Medicine, and their teams examined the medical records of 5,345 pediatric patients who had received their first—either split or whole—liver transplant in the United States between March 2002 and December 2015.

"We already knew from previous studies that variables including the donor's age and cause of death along with the health of the recipient can influence outcomes," says Mogul. "But understanding which of these variables could impact the outcomes from transplanting a split liver versus a whole liver could help guide the increased use of split livers and identify which patients will do best after split or whole liver transplants, thereby being more strategic about matching donor organs with recipients."

Using a [statistical analysis](#) that relates variables with an event or outcome, the team looked at the relationship between the type of liver—split or whole—and transplant success after adjusting a number of variables, including many that had previously been reported as influencing organ transplant success. Those variables included organ donor age, cause of death, recipient weight at transplant, underlying disease and how sick the recipient is.

Of the 5,345 pediatric liver recipient records examined, 1,694 or roughly 31 percent received a split liver while 3,651 or roughly 68 percent received a whole liver. Split liver recipients were less likely than whole liver recipients to receive an organ from another pediatric patient, 59 percent versus 83 percent, respectively, and more likely to have received their liver from a donor between ages 18 and 50, 38 percent versus 13 percent, respectively. Split liver recipients were less likely

than whole liver recipients to have a donor who suffered from lack of oxygen, but more likely to have a donor with head trauma.

known as biliary atresia, acute hepatic necrosis or sudden liver death, autoimmune disease and tumor.

On the surface, it appears that split liver transplants fared worse. However, after adjusting the data for donor age, recipient weight, other recipient health problems as well as surgical approach, there was no difference in outcomes for split versus whole liver recipients. More importantly, what the team found was that groups defined by certain characteristics that had the highest overall transplant failure were actually not further negatively impacted by having a split versus whole liver, implying that these sickest children would be good candidates for split livers. "One might anticipate that patients with the highest likelihood of graft failure would do worse if they got a split compared to a whole. But we saw the opposite: These people were not further impacted by getting a split," says Mogul.

"The better understanding of SLT learned from this study and our most recent research is a critical step toward the goal of significantly increasing access to transplantation," says Segev. "If they wanted to, UNOS—the United Network for Organ Sharing, the entity responsible for U.S. organ allocation policies—could institute policies within one to two years that would have huge impacts on children waiting for [liver](#) transplants."

Provided by Johns Hopkins University School of Medicine

Recipients who weighed less than 10 kilograms had higher rates of transplant failures in general, regardless of whether they received split or whole livers; suggesting that body weight less than 10 kilograms may be a factor for considering split liver transplantation. In contrast, recipients who weighed between 10 and 35 kilograms had an overall lower risk of transplant failure, but the failure rate after receiving a split liver was 1.46 times that of receiving a whole liver, suggesting recipients in this weight range should be considered for whole livers.

Overall, Mogul says, waiting children with lower body weights, who were in relatively worse health and whose donor livers spent more time on ice or in transit, had the same potential for a successful transplant with a split liver as they would have with a whole liver. The researchers estimate that 22 children on the liver [transplant](#) list could have benefited from split [liver transplant](#) but instead died while waiting.

"We hope these findings can help guide surgical decision-making and support policy changes that promote the increased use of SLT for selected children," says Mogul. From their study, optimal recipients could include children weighing under 10 kilograms, with a rare disease of the bile ducts

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