

Mayo Clinic News Network

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Intro: On any given day about 15,000 Americans are on the liver transplant waiting list, hoping they can get a lifesaving donor organ in time. It's that kind of statistic that's had doctors looking for alternatives for decades. Now, a new study in the *Journal of Hepatology* reports that Mayo Clinic researchers may have a bioartificial liver ready to do the job for some of those patients. Here's Dennis Douda for the Mayo Clinic News Network.

Video

Audio

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| Total running time [2:50] | /// VIDEO |
| Dr. Scott Nyberg speaking | “The idea of an artificial liver has been around for 50-years. The bio-artificial liver, which means there are living cells within the device, has been a concept since 1987.” |
| Dennis Douda speaking | It's now a concept that's proven to work, according to a new study just published in the <i>Journal of Hepatology</i> . Dr. Scott Nyberg is director of the liver program at the Mayo Clinic Center for Regenerative Medicine and head of Mayo's Artificial Liver program. He and his team have successfully demonstrated their system on pigs with acute liver failure. |
| TITLE: Scott Nyberg, M.D., Ph.D. Mayo Clinic Transplant Surgeon | “In the treatment group, all of the animals survived the therapy, were up walking around with recovered livers at the end of the study.” |
| Dennis Douda speaking | During liver failure ammonia builds up in the bloodstream causing the brain to swell. Other organs to begin to fail. Much like a patient with kidney failure, excess wastes in the blood become toxic. |
| Dr. Scott Nyberg speaking | “If you think about kidney dialysis; this is dialysis for liver disease. The liver is more complicated. It actually does metabolic activities. It detoxifies wastes. It synthesizes proteins.” |
| Dennis Douda speaking | Which why a bio-artificial liver incorporates living cells– in this case, from pig livers - to carry out such vital functions for a patient. |
| Bruce Amiot speaking | “A pig this size, we'd hope to get 200 grams of hepatocytes or more.” |

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| Dennis Douda speaking | Hepatocytes are the liver's primary workhorse cells. Each gram contains about one and a half billion of them. Engineering advances in Dr. Nyberg's lab allow very large, concentrated doses of hepatocytes to be collected and processed for use. |
| Bruce Amiot speaking | "They rock at a slow rate and overnight the hepatocytes will start sticking to each other, form aggregates." |
| Dennis Douda speaking | Essentially forming clusters of 50 to 150 fully functional cells, called spheroids. |
| TITLE: Bruce Amiot Study Co-author | "As long as you keep them warm and fed and ph-controlled, we've can keep them around for days or weeks." |
| Dennis Douda speaking | The spheroids are loaded into a contained chamber. Using high tech filters, the bio-artificial liver routes the patient's blood fluids past the spheroids for processing. As a transplant surgeon, Dr. Nyberg sees how artificial liver therapy could be a solution to the donor organ shortage in some cases. For example, he estimates at least 25-50% of acute liver failure patients could recover, if only they had time. |
| Dr. Scott Nyberg speaking | "And, if we could temporarily support them while their liver regenerates and heals, we could avoid a liver transplant. So, that would be a huge savings of both an organ that could be used for somebody else and avoid a transplant and lifelong immune-suppression for those patients." |
| Dennis Douda speaking | The first human clinical trial could begin as early as next year. For the Mayo Clinic News Network, I'm Dennis Douda. |

Anchor tag: Acute liver failure can be triggered suddenly by several causes, including accidental acetaminophen poisoning, medication reactions, Hepatitis and other viruses or autoimmune disease. Dr. Nyberg says pigs were chosen for the early studies because their metabolism is similar to ours and because they could provide an abundant supply of liver cells.

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