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Ground-breaking study tests whether rejected livers can be made viable for transplantation

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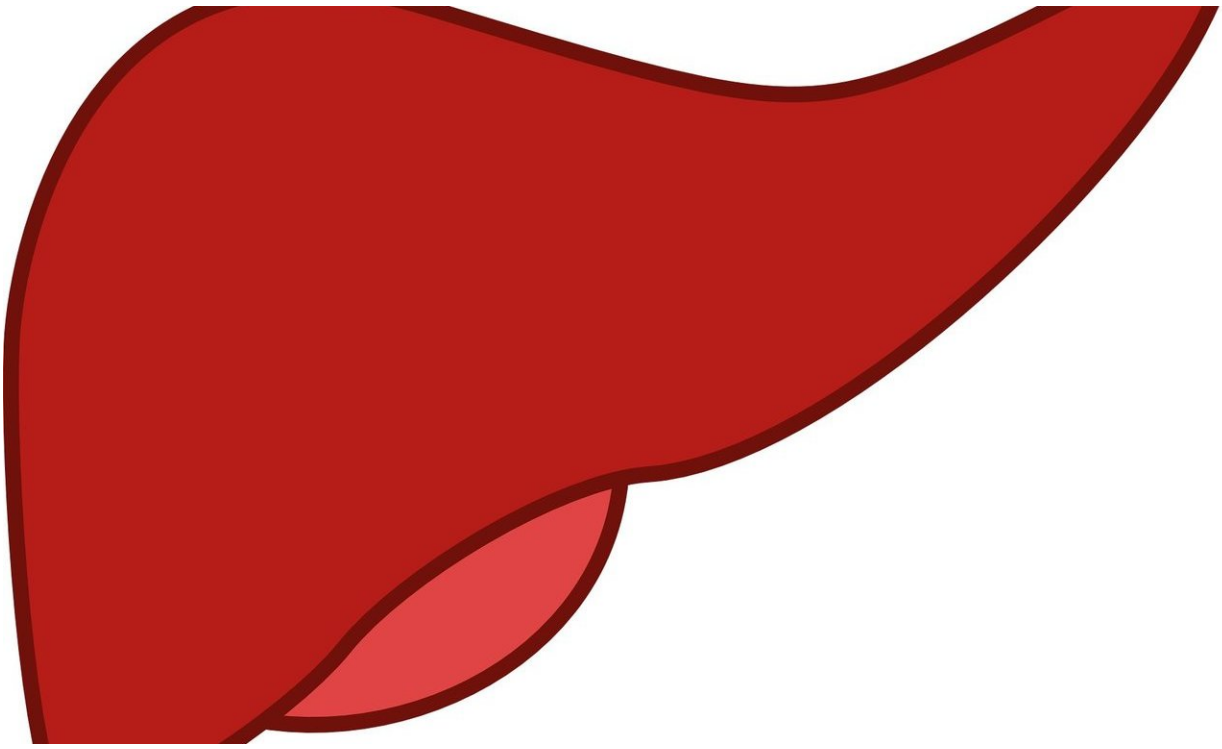

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A ground-breaking study is underway at the University of Birmingham and Queen Elizabeth Hospital Birmingham to establish if livers that have been rejected for transplantation can be made viable by using a liver

perfusion machine.

Scientists are hopeful that machine perfusion could be a major breakthrough that would save more lives and reduce liver transplant waiting lists by increasing the number of available viable organs for transplantation.

The study is using a normothermic liver perfusion machine on rejected donor livers to then maintain them at body temperature and supply the organs with oxygenated blood, medications and nutrients—much like a patient on life support.

If deemed viable, the livers will then be transplanted into patients who have been recruited to the Viability Testing and Transplantation of Marginal Livers (VITTAL) study, which is being conducted by experts from the University of Birmingham's Centre for Liver and Gastrointestinal Research in the Institute of Immunology and Immunotherapy, University Hospitals Birmingham NHS Foundation Trust's Queen Elizabeth Hospital Birmingham, and NIHR Birmingham Biomedical Research Centre.

Over 20 patients are taking part in the trial, the result of which are expected to be published by early 2019.

Livers can be kept in on the machine for 24 hours, and the process could enable the treatment and repair of organs as needed.

Dr. Simon Afford, of the University of Birmingham's Institute of Immunology and Immunotherapy, said: "This is the first of its kind clinical trial designed to objectively assess the function of declined livers using machine perfusion, followed by the transplantation of these viable grafts.

"It is hoped that the trial will identify a proportion of discarded organs that can be successfully transplanted, generating data that will provide objective and validated information that can be used to inform UK policy and practice that would in turn govern the decision-making process involved in the acceptance and use of what would otherwise be considered as high-risk donor livers."

Liver transplantation is a highly successful treatment for end-stage liver disease, which kills 11,000 people a year in England. Deaths from liver disease have soared by 40 per cent in a decade and continue to rise, while the average age of death from liver disease (currently 59 years) continues to decrease.

The researchers said that their latest figures show that of 621 patients on the waiting list for a liver transplant in the UK in April 2015, 22 per cent died or were removed from the list due to deteriorating health.

University of Birmingham Honorary Professor Darius Mirza, Consultant Transplant Surgeon at University Hospitals Birmingham NHS Foundation Trust, said: "Over the past 50 years, transplant techniques and outcomes have greatly improved and five-year survival rates of 70 per cent to 80 per cent mean that transplantation has become the mainstay of treatment for an increasing number of patients with chronic liver disease, metabolic disorders, acute liver failure and cancer.

"As such, the demand for donor livers greatly exceeds supply and approximately 20 per cent of patients die while awaiting transplantation.

"In the UK, it is predicted that the incidences of end-stage liver disease and hepatocellular carcinoma will increase substantially during the next decade, exacerbating the existing shortage of donor livers."

Hynek Mergental, Honorary Senior Lecturer at the University of

Birmingham and Consultant Surgeon at University Hospitals Birmingham NHS Foundation Trust's Liver Unit, said: "Making the most of available livers is a priority for those working in the area of transplantation.

"Another benefit of the machine perfusion is the possibility to keep the livers up to 24 hours outside the human body, extending the times by two to three folds compared to ice-box storage.

"This would make the logistics of a transplant much easier, allowing surgical teams to be prepared and ready and ultimately make the whole process safer for the recipient patient.

"The longer preservation times and potential for greater organ numbers raise the real prospect of addressing the challenge of growing transplant waiting lists."

The VITTAL study, the protocol for which has been published in *BMJ Open*, is the next stage of research following a trial called COPE (Consortium for Organ Preservation in Europe), published in *Nature* in April, which measured biomarkers of liver damage in livers that had been perfused.

More information: H. Mergental et al. Transplantation of Declined Liver Allografts Following Normothermic Ex-Situ Evaluation, *American Journal of Transplantation* (2016). DOI: 10.1111/ajt.13875

Viability testing and transplantation of marginal livers (VITTAL) using normothermic machine perfusion: study protocol for an open-label, non-randomised, prospective, single-arm trial. *BMJ Open*. 2017 Nov 28. DOI: 10.1136/bmjopen-2017-017733.

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