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## **Hypothermic Machine Perfusion Preservation: a Proof of Concept for Uterus Transplantation.**

### Hypothermic Machine Perfusion for Uterus Transplantation

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## Abstract

**Objective :** To describe the feasibility of Hypothermic Machine Perfusion (HMP) in Uterus Transplantation (UT) to potentially improve the preservation of the uterus to enhance graft preservation in the DBD context.

UT is a new surgical approach to treat absolute uterus infertility, it can be performed after living donation (LD) or after Donation after Brainstem Death (DBD). In DBD context, uterus is typically the last organ removed after other vital organs with the exception of the Baylor team, which removes the uterus first. This key aspect imposes an unavoidable mild temperature ischemia for more than one hour for the uterus during the removal of the vital abdominal and chest organs. In renal transplantation, the perfusion machine reduces the risk of Delayed Graft Function, thus we hypothesize that machine perfusion could result in a reduction of uterus graft dysfunction. The uterus graft dysfunction could be expressed by a low embryo implantation rate, pregnancy loss or vascular pregnancy diseases such as preeclampsia or fetal growth restriction". To date, static cold storage (SCS) of the uterus is the only standard method for preservation prior to transplantation. HMP is an emerging method that could potentially improve the preservation of the uterus to enhance graft preservation in the DBD context.

**Design :** This video article shows all the technical details of using the HMP for uterine transplantation.

**Subjects :** porcine model

**Intervention :** Porcine uterus was retrieved from a DBD domestic animal model and flushed with KPS MP (Bridge To Life<sup>®</sup>) at 4°C. After vascular preparation on the back table, the uterus was perfused by KPS MP through a cannula in the aorta using the Vitasmart device (Bridge To Life<sup>®</sup>) for 18 hours. Then, the uterus was transplanted to the porcine recipient.

**Main Outcome Measures :** The macroscopic appearance of the uterus at the end of HMP and the assessment of the uterus vascularization after transplantation in the recipient compared to native uterus.

**Results :** This video shows the cannulation of the iliac vessels, cooling and removal of uterus on a porcine model, uterus preservation using HMP during 18 hours and then uterus transplantation in a new recipient pig with the reperfusion of the transplanted uterus next to the native, intact uterus of the recipient. The macroscopic appearance of the uterus at the end of HMP appeared viable and was perfectly flushed. The assessment of the uterus vascularization after transplantation in the recipient was similar to native uterus.

## Conclusion

To our knowledge, we describe here for the first time the UT procedure in DBD context on an animal model, and the use of HMP for uterus preservation in UT programs. HMP could allow the duration of cold ischemia to be prolonged without altering the uterine graft, thus increasing the number of uterus grafts available for a greater number of women recipients. Nevertheless, this assertion has to be validated in human context.

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