The patient outcomes are conclusive. The details of these differences explain why Belzer UW® Cold Storage Solution achieves significantly higher graft survival rates than HTK.

**Different solutions. Different outcomes.**

**THE DIFFERENCE MATTERS.**
**Research Evidence**

| **Hydroxyethyl Starch (Pentafraccion)** | This oncotic agent “plays a key role in preventing tissue edema, and HTK does not contain it when compared to... UW hydroxyethyl starch [HES].”

Lactobionic Acid (as Lactone) and Raffinose Pentahydrate | “Various impermeants have been used to sustain the oncotic gradient across the cell membrane and prevent edema. ... UW pioneered the use of lactobionate and raffinose...Lactobionate remains the impermeant choice of having been successfully used in preservation solutions other than UW, being critical to the success of UW, and for its proposed iron chelation properties (cf. oxygen-free radicals).”

HTK? “…the efficiency of the solution is also strongly dependent on the presence of antioxidants and protective agents. HTK composition is poor in these agents when compared to the other solutions.”

| **Adenosine** | In a study of human liver endothelial cells (HLEC), Dr. Hermann Janssen compares Belzer UW with HTK: “Overall, there was a statistically significantly higher content of intracellular ATP in UW-preerved HLEC compared to CS and HTK.” What this means to liver cells is that: “…we concluded from our data that the significantly higher ATP level in UW-preserved HLEC in each interval of ischemia and reperfusion was a major contributing factor to reducing the preservation injury as confirmed by LDH [Lactate dehydrogenase] release and MTT reduction. [MTT=mitochondria to reduce 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide]

This finding gave evidence that, particularly in long-term ischemia, a high intracellular ATP level was beneficial in the preservation of HLEC.”

| **Glutathione** | “Both reduced glutathione and allopurinol in UW solution demonstrated substantial protective effects against reactive oxygen species upon ischaemia and re-perfusion.”

| **Allopurinol** | “…UW contains numerous active agents to replenish energy and scavenge oxygen radicals which are not found in HTK…”

| **Thermal capacity** | “Heat capacity is significantly higher for UW than for HTK... Prolonged preservation in UW solution results in a better renal function and less tissue damage compared with HTK, possibly due to improved cooling and better cell viability of the graft.”

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1,2,4 “Compared Efficacy of Preservation Solutions in Liver Transplantation: A Long-Term Graft Outcome Study from the European Liver Transplant Registry”; René Adam et al. American Journal of Transplantation, February 2015

3 “Organ Donation and Transplantation After Cardiac Death”; edited by David Talbot and Anthony M. D’Alessandro, Oxford University Press, 2009

5 “UW is Superior to Celsior and HTK in the Protection of Human Liver Endothelial Cells Against Preservation Injury”; Hermann Janssen et al.; Liver Transplantation, December 2004


7 Hydroxyethyl Starch-Based Preservation Solutions Enhance Gene Therapy Vector Delivery Under Hypothermic Conditions; D. Henry Scot, et. al. Gene Therapy of Liver Disease with Lentiviral Vectors; Pascal van der Wegen, 2009 Erasmus Universiteit Rotterdam


**Belzer UW® Cold Storage Solution (UW Solution)**

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