

The Skeptik, 2017, Vol. 3. No. 1. Pgs. (11-13).

## **On Some Paradoxes in Liver Transplantation**

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**Abstract:** This article describes some paradoxes in liver transplantation in both animals and human models.

1. Paradox: Cold rinse with Ringer lactate solution (RLS) vs. warm rinse RLS solution:

Post and co-authors showed for the first time (in 1995) in the rat model that warm rinse with Ringer lactated solution at 37 degrees of Celsius through portal vein compared to cold RLS (just to liver reperfusion with blood) protected hepatic graft function (1). This results indicated that the first minute of reperfusion could have strong impact on the overall results of transplantation in the rat (1, 2).

Therefore, we always used 30 mL of warm RLS for washing rat livers just prior to reperfusion with oxygenated Krebs-Henseleit solution in my Laboratory of Perfused Organs. (Here is some some joke situation from my Lab.: During writting MS I came to check reperfusion experiment. I saw how liver function was deteriorating. One PhD student made a mistake and instead of warm RLS used 4 0 C degrees RLS).

It should be noted that warm rinse with Ringer lactate at 37 C degree markedly reduced Kupffer cells activation (2). The use of this warm solution is enable to improve membrane fluidity (3).

2. "Oxygen paradox":

Minor and co-authors showed that nonparenchymal cell injury and ATP stores can overcome "oxygen paradox" upon reperfusion by persufflation of the rat liver during cold storage (4). Nonparenchymal cell injury can also be overcame by glycine, acidotic pH, and by Carolina rinse in the rat model (5).

Beneficial effects of oxygen persufflation was also found in the pig model of liver transplantation (6).

3. Rewarming ischemia vs. Cold ischemia paradox:

It is well known that during liver cold preservation stores of ATP are decreasing with the preservation time. This makes liver succseibility to rewarming ischemia (7). Baron and co-authors found that rewarming ischemia had negative effect on severe recurrent hepatitis C (SRHC) after liver transplantation in humans. Cold ischemia did not corellated with (SRHC), but rewarming ischemia correlated with it (8) .

#### 4. pH Paradox:

Currin and co-authors showed for the first time that perfusion of ischemic livers with acidotic pH had beneficial effects on rat livers (9). Thus, a rapid increase of pH rather than reoxygenation accounted for tissue injury after reperfusion of ischemic liver (4,5, 9).

The above findings were confirmed in human liver transplantation model. Actually, serum acidification facilitated hemodynamic recovery following liver transplantation (11).

#### 5. Ischemic preconditioning paradox:

Ischemic preconditioning of human livers have several beneficial effects (see for Review 11). However, these protective effects were compromised by recent findings of Koneru and co-authors (12).

Other paradoxes in liver transplantation are beyond of this paper.

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