Future Direction of Liver Transplantation

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@LiverSensible

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Learning Objectives of the Morning Sessions

• To discover the evolution of the Multi-Organ Transplant Program
• To gain knowledge of future innovations surrounding liver transplantation
• To have an increased understanding of new technologies related to kidney and heart transplantation
What I See In The Future
The Future of Medicine

- Artificial Intelligence in Medical Decision Support
- Virtual Reality Applications
- Redesigned Hospital Experience
- Recreational Cyborgs
- Virtual-digital Brains

By Bertalan Mesko, MD, PhD
Stem/Progenitor Cells in Liver Development, Homeostasis, Regeneration, and Reprogramming
Current achievements and future perspectives in whole-organ bioengineering
Current Status of Hepatocyte Transplantation

**TABLE 1.** Liver conditions where hepatocyte transplantation has been used clinically

- Inborn errors of metabolism
  - Crigler-Najjar syndrome type 1
  - Familial hypercholesterolemia
  - FD deficiency
  - Glycogen storage disease type I
  - Infantile Refsum’s disease
  - Progressive familial intrahepatic cholestasis type 2 (PFIC2)
  - Urea cycle defects
    - Ornithine transcarbamylase deficiency
    - Argininosuccinate lyase deficiency
    - Carbamoylphosphate synthase type 1 deficiency
    - Citrullinemia
- Acute liver failure
  - Drug
  - Viral
  - Idiopathic
  - Mushroom poisoning
  - Postsurgical
  - Acute fatty liver of pregnancy
- Acute on chronic liver failure
  - Alpha 1 antitrypsin deficiency
  - Viral
  - Alcohol

**Diagram:**
- Unused donor liver tissue
  - Portal vein branches cannulated, liver perfused with collagenase at 37°C to digest ECM
  - Fatty liver use NAC as antioxidant
  - Hepatocytes purified by repeated centrifugation
    - Quality of isolated hepatocytes assessed (cell number, viability, microbiology)
      - Fresh
      - Cryopreserved using CRF pro
      - Thawed for
      - Hepatocytes suspended in Transplant Me

**HEPATOCYTE TRANSPLANTATION**

**Intraportal infusion (percutaneous)**
- Catheter through umbilical vein (in newborn)
- Hickman line in inferior mesenteric vein

**Main Criteria**
- Fresh or cryopreserved hepatocytes
- Cell viability should be >60%
- ABO blood group compatible
- Up to 10⁸ cells per infusion
- Portal pressure monitoring
- Repeated up to 5-10% liver mass
- Immunosuppression – tacrolimus & steroids

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Patients With Cirrhosis and Denied Liver Transplants Rarely Receive Adequate Palliative Care

<table>
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<th>N</th>
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<tr>
<td>Alive (at end of study period)</td>
<td>9 (8.8)</td>
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SW, social worker; UAH, University of Alberta Hospital.
Burden of Disease and Cost of Chronic Hepatitis C Virus Infection in Canada
The Globalization of Fatty Liver Disease
Prevalence and Impact on World Health
Questions

#CoffeeGoodForLiver

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