

Society for Cryobiology Abstract Submission Template

IMPORTANT

- 1) Please ensure that you have filled out the **Title, Authors, Affiliations** and **Abstract** sections.
- 2) The maximum number of words allowed in your entire abstract is **500** words. This does not include the Title, Authors and Affiliations. Items 4, 5 and 6 are also excluded from the word count.
- 3) Figures, tables and subheadings are not allowed.
- 4) Authors must declare, at the bottom of the abstract any actual or potential conflicts of interest.
- 5) The source of funding must be declared at the bottom of the abstract.
- 6) Provide any acknowledgments at the end of your abstract.
- 7) Cited references should be included in the body of the text.
- 8) Use the abbreviation Me₂SO, not DMSO
- 9) Save the completed document for upload using **Microsoft Word 2003** or a lower version. Do **NOT** submit templates saved in Word “**docx**” OpenXML format, as these cannot be processed.

Title (The title should be in bold type followed by one return)

Ex Vivo Evaluation of Cold Ischemic Lungs for Transplantation

Authors (Authors should be in normal type followed by one return. Presenter must be marked * in front of his/her name and the corresponding author must underline her/his name in the list of authors)

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Abstract body

IMPORTANT: Your abstract text must fit into the box provided. The font should be Arial 12pt with single line spacing. You may alter these values only to add symbols or superscripts, etc. Use Symbol font for Greek and other special characters.

Do **NOT** include tables or figures. These will be removed before your abstract is published.

Introduction: *Ex vivo* lung perfusion has been developed as a tool to assess donor lungs prior to transplantation. Previous studies have demonstrated that donor lungs can be maintained under stable physiological conditions for several hours. The aim of this study was validation of this approach for quantitative evaluation of donated lungs for transplantation. **Methods:** Lungs were obtained from swine (n=4) and human organ donors (n=2). The human lungs were rejected for transplantation based on *in situ* lung function. Perfusate consisted of RS-I buffer containing 15-16% (v/v) of washed matched human erythrocytes, 6% human serum albumin and 15,000 U/L of heparin at pH 7.6. Perfusion pressure, temperature and lung mechanics were continuously monitored. Lungs were challenged with 100% O₂ for 3 min after achieving steady-state and at the end of the study. Methacholine (0.2-16.4 mg) and salbutamol (125 or 150 ug) were administered via the airways by breath-actuated nebulization. Pulmonary artery and venous gases, and perfusate biochemistry were monitored every 10 minutes and immediately after each nebulization. Lung wet weight was determined at the beginning and conclusion of the study. **Results:** The average cold ischemia time for the swine lungs was 3.7 hrs and 14.5 hrs for the human lungs. Lung weight was increased by 13±3% and 15±14% after perfusion of swine and human lungs, respectively. No changes in perfusate osmolarity, haematocrit, Na⁺, Cl⁻, K⁺ or Ca⁺⁺ concentrations were observed. In contrast perfusate lactate increased progressively throughout perfusion (163±41% in swine and 74±11% in human lungs at 135min post steady-state); and glucose decreased (54±6% in swine and 67±15% in human lungs at 135min post steady-state). In swine the mean lung PaO₂/FiO₂ ratio at steady-state was 525±29mmHg. The PaO₂/FiO₂ ratio in human lungs increased to 579 and 598 mmHg compared to in-situ values of 180 and 229 mmHg. High methacholine doses, 4.1 and 16.4 mg, decreased compliance, increased airway peak pressure and increased airways resistance compared with vehicle controls in porcine lungs. The highest dose resulted in 53±3.4%, 59±4.9% and 106±12% changes, respectively. Additionally, methacholine challenge also induced a dose dependent decrease in pulmonary vein PO₂ and consequently a decrease in perfusion pressure, 26±2.7% and 26±2.9% at dose of 16.4mg respectively. In the human lungs methacholine challenge induced a more pronounced response in lung A as compared to lung B, compliance decrease by 12% and 5.3%, airway peak pressure increased by 23% and 3.2% and airways resistance increased by 115% and 27% respectively at the highest dose tested (4.1mg) compared with the vehicle control. In both porcine and human lungs salbutamol reversed methacholine induced changes. Methacholine challenge did not change pulmonary vein PO₂ and perfusion pressure in human lungs. **Conclusions:** Conditions for evaluation of lungs were established using a short (<4h) cold ischemic porcine model. *Ex vivo* lung evaluation demonstrated that both human lungs that were originally rejected for transplantation actually had acceptable levels of gas exchange for transplant after ≥12h of cold ischemia.