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☐ I have no, real or perceived, direct or indirect conflicts of interest that relate to this presentation.

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Francesco Petrella, MD



BACKGROUND

- Bronchopleural fistula is a pathological connection between the airway (bronchus) and the pleural space that may develop after lung resection
- Its mortality rate ranges from 12.5 to 71.2%
- The clinical effect of impaired bronchial stump healing after anatomic lung resection may culminate in a life-threatening septic and ventilatory catastrophe
- For many patients with empyema, the presence or absence of a fistula makes the difference between recovery, chronicity or death

BACKGROUND



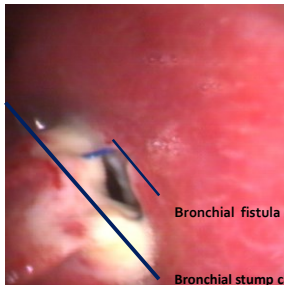
Normal bronchial division



Normal bronchial stump following right pneumonectomy



BACKGROUND



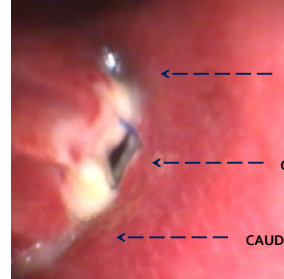
Bronchial fistula caliber (30%)

Bronchial stump caliber

Bronchial fistula in a right main stem bronchus



BACKGROUND



APICAL

CENTRAL

CAUDAL



EXPERIMENTAL STUDY DESIGN



18 GOATS (4): EXPERIMENTAL GROUP (MSC + fibrin glue)

12 GOATS (5): CONTROL GROUP (fibrin glue alone)

GENERAL ANAESTHESIA

DOUBLE LUMEN VENTILATION

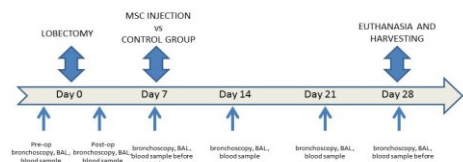
BRONCHIAL STUMP MANUAL SUTURE

VASCULAR LIGATION OR STAPLING

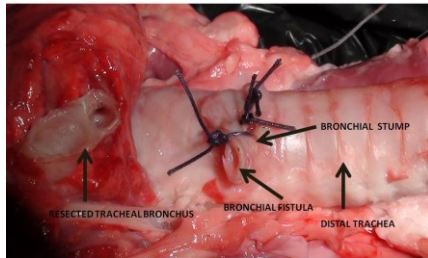


EXPERIMENTAL STUDY DESIGN

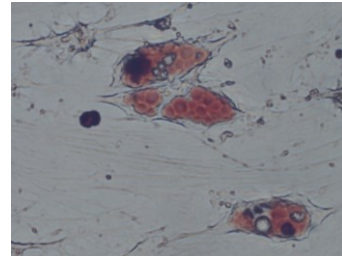
Step-by-step Transplant Procedures



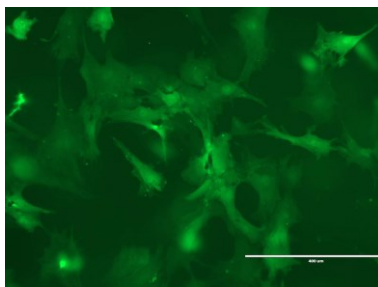
BPF EXPERIMENTAL MODEL



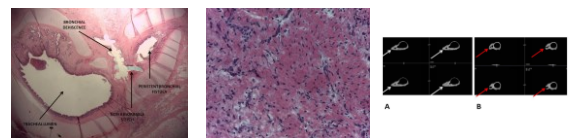
GOAT MSC ADIPOGENIC DIFFERENTIATION



GOAT MSC GROWTH ON MODIFIED GLUE



EXPERIMENTAL RESULTS



EXPERIMENTAL RESULTS

Stem Cell Transplantation Effectively Occludes Bronchopleural Fistula in an Animal Model

Francesco Petrella, MD,* Francesca Toffalorio, MD, PhD,* Stefano Brizzola, DVM, PhD, Tommaso Martino De Pas, MD, Stefania Rizzo, MD, Massimo Barberis, MD, Piergiuseppe Pelicci, MD, Lorenzo Spaggiari, MD, PhD, and Fabio Arosella, DVM, PhD
Departments of Thoracic Surgery, Radiology, Pathology, and Experimental Oncology, Division of Medical Oncology of the Respiratory Tract, European Institute of Oncology, Milan, Italy; and Department of Health, Animal Science and Public Health, Università degli Studi di Milano, Milan, Italy

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CLINICAL EXPERIENCE - BACKGROUND

- 42-year-old male firefighter suffering from early stage malignant mesothelioma
- Post chemotherapy right extrapleural pneumonectomy
- On post-operative day 18, the patient developed BPF
- Permission from the Ethics Committee
- Notification to the Italian drug agency (AIFA)
- Written informed consent from the patient

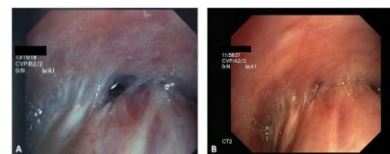


CLINICAL EXPERIENCE - PROCEDURE

- Standard bone marrow aspiration
- Stem cells isolation, expansion and culture (GMP)
- MSC quality controls
- Bronchoscopic implantation
- Post operative care and monitoring
- 6 months clinical, lab and imaging follow up



CLINICAL EXPERIENCE - RESULTS

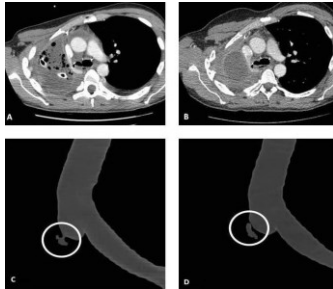


PRE - IMPLANT

POST - IMPLANT



CLINICAL EXPERIENCE - RESULTS



CLINICAL EXPERIENCE



CLINICAL EXPERIENCE

Author	Date	Journal	Site	Cell	Country
Alvarez, PD	Apr, 2008	Thorax	Trachea	ADMSC	
Petrella, F	Jan, 2015	NEJM	Bronchus	BMMSC	
Diaz Agero, PJ	Jan, 2016	Cytotherapy	Bronchus	ADMSC	
Duo KS,	Ap, 2016	Lancet	Esophagus	PRP	

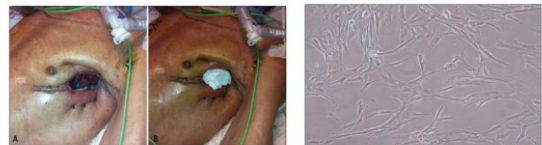


CLINICAL EXPERIENCE

Invited Editorial

Bronchopleural fistula treatment: From the archetype of surgery to the future of stem cell therapy

Lung India • Vol 32 • Issue 2 • Mar-Apr 2015



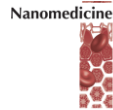
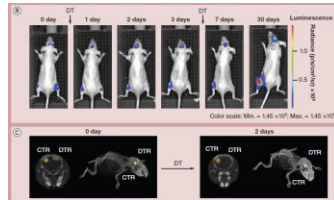
Francesco Petrella¹ and Lorenzo Spaggiari²
¹Department of Thoracic Surgery, European Institute of Oncology, Milan, Italy ²University of Milan School of Medicine
 E-mail: francesco.petrella@ieo.it



ON GOING EXPERIMENTS

Cellular magnetic resonance with iron oxide nanoparticles: long-term persistence of SPIO signal in the CNS after transplanted cell death

Chiara Cianciaruso^{1,2},
Antonella Pagani^{1,3},
Cristina Martelli^{1,4}, Marco
Bacigaluppi⁵, Mario Leonardo
Squadrito^{6,7}, Alessia Lo Dico^{1,4},
Michele De Palma^{6,7}, Roberto
Furlan⁸, Giovanni Lucignani^{6,8},
Andrea Falini^{1,2}, Alessandra
Biffi⁹, Luisa Ottobrini^{3,4} &
Letterio Salvatore Politi^{9,1}



ON GOING EXPERIMENTS

Cellular magnetic resonance with iron oxide nanoparticles: long-term persistence of SPIO signal in the CNS after transplanted cell death

Aim: To study the specificity of cellular MRI based on superparamagnetic iron oxide particles (SPIOs), especially within the CNS.

Conclusion: Due to the *long-term persistence of signal after transplanted cell death*, caution is advised when SPIOs are employed for cell tracking.

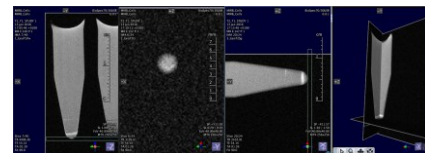


ON GOING EXPERIMENTS

In vitro MRI detection of fluorine-labeled VS. iron-labeled mesenchymal stromal cells: a comparative tracking study

The purpose of our study was to demonstrate that MSC can be labeled both with *iron oxide nanoparticles* as well as with *perfluorocarbon nanoemulsion formulations* without altering cell viability or differentiation and to compare imaging data coming from iron- and fluorine- labelled MSC.

ON GOING EXPERIMENTS



Personal data



ON GOING EXPERIMENTS

Ideal scaffold development for MSC engraftment and then delivery to human damaged tissues



PARTNERSHIPS



ACKNOWLEDGMENTS

Fabio Acocella, Stefano Brizzola Veterinary Medicine, University of Milan

Lorenza Lazzari, Rosaria Giordano, Tiziana Montemurro Cell Factory, Policlinico di Milano

Massimo Barberis, Division of Pathology, European Institute of Oncology

Massimo Bellomi, Stefania Rizzo, Division of Radiology, European Institute of Oncology

Rocco Pastano, Division of Hematology, Bone Marrow Transplant Unit, European Institute of Oncology

Giuseppina Giardina, Marika Zanotti, Department of Experimental Oncology, European Institute of Oncology

Juliana Guarize, Stefano Donghi, Lorenzo Spaggiari Department of Thoracic Surgery, European Institute of Oncology

Antonella Tosoni, Department of Anesthesiology, European Institute of Oncology

Francesca Toffalorio, Department of Thoracic Oncology, European Institute of Oncology



THANK YOU

