Solutions for Bioprotection
Agenda

- Mission statement
- History of continuous innovation
- Unique Value proposition
- Proprietary superior technology
- Product Qualification
- Range of solutions: Mobile / Stationary
- Case studies
- Summary
A majority of hospitals will not meet new regulations.

Regulations push for more stringent standards:

- 2006: regulations in each country
- 2007-2008: new EU regulations
  *(Draft based on German standard VDI 2167)*

- US Facilities Guidelines Institute
  *(used by more than 40 state governments)*
  - Litigation work

- Standard using 4 classes base on activity
- ISO classes, cfu, Recycling rate,

Air quality concerns operating rooms and associated areas
Airinspace
A large and growing footprint of satisfied referenceable customers
What the standards say

- Low bacterial contamination: colony forming units / m³ (cfu/m³)
- Low particulate contamination: ISO classes
- High number of air changes per hour
- Minimum Fresh air level
- Limited Noise level 50 dB(A)
Leading Infection Control solutions against airborne infections risks

MISSION STATEMENT

In a world where air quality is a growing concern with human, environmental and cost implications in multiple sectors, AirInSpace is dedicated to address the threats created by infected or contaminated air.

AirInSpace develops and markets innovative products designed to eliminate airborne contaminants, targeting a wide range of air-treatment applications.

AirInSpace’s mission is to deliver superior air treatment solutions for improved health and well being.
More than a decade of continuous launches of innovative bioprotection solutions in highly demanding environments

<table>
<thead>
<tr>
<th>Year</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>Mir</td>
</tr>
<tr>
<td>2001</td>
<td>ISS</td>
</tr>
<tr>
<td>2003</td>
<td>Immunair S1</td>
</tr>
<tr>
<td>2004</td>
<td>Plasmair T3</td>
</tr>
<tr>
<td>2006</td>
<td>Jetair</td>
</tr>
<tr>
<td>2006</td>
<td>Plasmair T4</td>
</tr>
<tr>
<td>2007</td>
<td>Biocair</td>
</tr>
<tr>
<td>2008</td>
<td>Immunair S2</td>
</tr>
<tr>
<td>2007</td>
<td>Cool Plasmair T2006</td>
</tr>
</tbody>
</table>
The AirInSpace technology combines

• superior germicidal efficacy,
• good particle reduction
• an advantageous pressure-drop profile (low resistance to airflow).

It has no negative side effects and is intrinsically robust and traceable, due to its operating principles.

The benefits are

• better protection against infection and contamination risks,
• a more comfortable and healthy environment,
• lower cost of ownership compared to existing solutions.

Proven solutions for
- Reduction of infection risks
- Compliance with air quality standards for Protected Environments
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The HEPA/MD technology
Vidéo on Airinspace technology
A unique proprietary multi-stage non-thermal plasma technology for bio-protection

Key competitive advantages

- Destruction vs. Filtering of microorganisms
- Large spectrum of efficacy
- Scalability for multiple applications
- Low operational cost
- No drift in efficiency

Original reactor configuration used in space stations
Multiple modes of destruction leads to a large spectrum of activity.
Principles of AirlnSpace’s bioprotection technology

An innovative system for decontaminating and filtering air using a combination of:
- cold Plasma chambers
- amplified electrostatic fields.

I. The Cold Plasma module
   A. Electroporation
   B. Polarization/Electrostriction
   C. Chemical oxidation

II. Amplified electrostatic fields
   This module is composed of several layers of dielectric material sandwiched between porous conductive electrodes that have a novel geometry.

III. Catalytic module
   To prevent emission of any oxidative species, a catalytic converter is used as a final module in the reactor.
## Visualisation of destructive effects

<table>
<thead>
<tr>
<th>Before</th>
<th>Effects</th>
<th>After</th>
</tr>
</thead>
</table>
| ![Image](image1.png) | **Total structural destruction**  
_(Saccharomyces cerevisiae)_ | ![Image](image2.png) |
| ![Image](image3.png) | **Multiple local breakage and membrane thinning**  
_(Pseudomonas fluorescens)_ | ![Image](image4.png) |
| ![Image](image5.png) | **Major explosion of cytoplasm and cell membrane**  
*Large repulsion of cell walls. Cytoplasm material visible*  
_(Micrococcus luteus)_ | ![Image](image6.png) |

**Method:** Electronic microscopy / Cryofractography – ultra-thin sections
### AirInSpace vs HEPA mechanical filters, UVGI technology, Ozone generators, Electrostatic Filters...

<table>
<thead>
<tr>
<th>Feature</th>
<th>Electrostatic filter</th>
<th>UVGI</th>
<th>Ozone generators</th>
<th>HEPA mechanical filters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kills microbes</td>
<td>Not optimal</td>
<td>Superior</td>
<td>Not optimal</td>
<td>Not optimal</td>
</tr>
<tr>
<td>Removes submicron particles</td>
<td>Not optimal</td>
<td>Superior</td>
<td>Not optimal</td>
<td>Not optimal</td>
</tr>
<tr>
<td>Pressure drop</td>
<td>Superior</td>
<td>Superior</td>
<td>Not optimal</td>
<td>Not optimal</td>
</tr>
<tr>
<td>System maintenance cost</td>
<td>Not optimal</td>
<td>Superior</td>
<td>Superior</td>
<td>Not optimal</td>
</tr>
<tr>
<td>Annual energy cost</td>
<td>Superior</td>
<td>Superior</td>
<td>Not optimal</td>
<td>Not optimal</td>
</tr>
</tbody>
</table>

**Legend:**

- **Not optimal**
- **Superior**
**Competitive technologies**

**Plasmer™ patented processes:**
- a. Plasmerisation™: microbe destruction
- b. Plasmerfiltration™: microbe collection

**Actual air decontamination technologies:**

<table>
<thead>
<tr>
<th>HEPA Mechanical Filters</th>
<th>Electrostatic filters</th>
<th>Ozone generators</th>
<th>UV Germicidal Irradiation</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Most commonly used</em></td>
<td><em>Electrostatic precipitation of particles</em></td>
<td><em>Inappropriate in human presence</em></td>
<td><em>UV-based, energy consuming</em></td>
</tr>
</tbody>
</table>
Agenda

- Mission statement
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## Overview of airinspace Qualification Approach

<table>
<thead>
<tr>
<th>QUALIFICATION STEPS</th>
<th>STEP DESCRIPTION</th>
<th>ACHIEVEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHASE I</strong> Technology Validation</td>
<td>Prior laboratory testing of Plasmer™ reactor</td>
<td>✓</td>
</tr>
<tr>
<td><strong>PHASE II</strong> Product Laboratory Validation</td>
<td>Prior laboratory testing of Immunair™</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Prior laboratory testing of Plasmair™</td>
<td>✓</td>
</tr>
<tr>
<td><strong>PHASE III</strong> Product Functional Qualification on site</td>
<td>Functional tests of Immunair™</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Functional tests of Plasmair™</td>
<td>✓</td>
</tr>
<tr>
<td><strong>PHASE IV</strong> Product Clinical Validation (supervised by ethics Committee)</td>
<td>Immunair™ clinical tests</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Plasmair™ clinical tests</td>
<td>✓</td>
</tr>
<tr>
<td><strong>PHASE V</strong> Post surveillance</td>
<td>Product post surveillance program</td>
<td>Ongoing →</td>
</tr>
</tbody>
</table>
airinspace has internal means for One-Pass screening tests

- Bacteriological efficiency
- Particulate efficiency
- Pressure drop

- Electrical behavior
- Airflow rate
- Response to Humidity
- Effects of aging
One-Pass System

- Particle
- Biological
- Ozone

Laboratory completely Temperature and %RH Controlled
Passed validation tests at the most reputable International Research Centers

Outstanding One-Pass Effectiveness

• 99.9 % bacteria elimination
• 99.9 % fungi elimination
• 99.9 – 99.996 % virus elimination
Plasmer™ reactor validated on a wide spectrum of microorganisms

<table>
<thead>
<tr>
<th>Germ type</th>
<th>Species names</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gram+ Bacteria (spores)</td>
<td>Bacillus subtilis</td>
</tr>
<tr>
<td>Gram+ Bacteria (pathogenic)</td>
<td>Staphylococcus aureus</td>
</tr>
<tr>
<td>Gram- Bacteria (pathogenic)</td>
<td>Pseudomonas aeruginosa</td>
</tr>
<tr>
<td>Gram- Bacteria (research)</td>
<td>Serratia marcescens</td>
</tr>
<tr>
<td>Mold (spores - potentially pathogenic)</td>
<td>Aspergillus niger</td>
</tr>
<tr>
<td>Virus</td>
<td>MS2 Bacteriophage</td>
</tr>
<tr>
<td>Virus</td>
<td>Poliovirus vaccine</td>
</tr>
</tbody>
</table>
One pass test with Aspergillus spores confirms high efficiency

Airinspace reactor one pass test results

<table>
<thead>
<tr>
<th>Total Cols./ft.³</th>
<th>Up</th>
<th>Down</th>
<th>Unit Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>112</td>
<td>1</td>
<td></td>
<td>99%</td>
</tr>
<tr>
<td>90</td>
<td>0</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>104</td>
<td>0</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>100</td>
<td>0</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>128</td>
<td>0</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>134</td>
<td>0</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>144</td>
<td>0</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>194</td>
<td>0</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>168</td>
<td>0</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>264</td>
<td>0</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>219</td>
<td>1</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>216</td>
<td>0</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>225</td>
<td>0</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>210</td>
<td>0</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>200</td>
<td>0</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td><strong>2508</strong></td>
<td><strong>2</strong></td>
<td><strong>99.9%</strong></td>
</tr>
</tbody>
</table>

Source: Harvard School of Public Health – Pr Melvin First

Highest concentrations reachable without agglomeration

Within ‘noise’ of experiment

Airinspace

Source: Harvard School of Public Health – Pr Melvin First
Viral and Bacteria Efficacy Confirmed at Porton Down (UK)

One pass test results on Plasmer reactor

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MS2 bacteriophage (20 nanometers)</td>
</tr>
<tr>
<td>- One pass reduction: 99.9 to 99.996 %</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Bacillus subtilis</td>
</tr>
<tr>
<td>- One pass reduction: 99.9%</td>
</tr>
</tbody>
</table>

Source: Porton Down - Center for Applied microbiology and Research UK Allan Bennett, Head of Biosafety
**Objective:** Validate a solution to quickly and cost effectively transform standard Hospital rooms into protective isolation areas in general, with specific focus on preparation for a pandemic flu outbreak.

**Strategy:**

*Phase 1:* Laboratory “Single-pass” tests with Plasmer™ reactor using the Avian Flu strain H5N2 to validate efficient destruction of the virus.

*Phase 2:* Integration of a Plasmair™ air treatment unit into a Hospital room retrofitted with an air extractor to provide negative room pressure conditions with effective decontamination.
**ALSO VALIDATED ON AVIAN FLU:**
Single-Pass H5N2 testing at the BSL3 Laboratoire de Virologie and Pathogénèse Virale, Lyon France

![Diagram of bio-safety hoods and reactor](image)

Down-Stream Bio-safety hood

Up-Stream Bio-safety hood

Sampler Pump

Reactor

Very high Virus Challenge levels

$1 \times 10^5 \text{ TCID}_{50} / \text{ml}$

---

(PUPH) Professor Bruno LINA,
FRENCH NATIONAL REFERENCE CENTER FOR AVIAN FLU
Total destruction of Airborne H5N2 passing through the Plasmer reactor at 1 m/s is observed.

### Results from Single-pass tests with the Plasmer reactor ON.

<table>
<thead>
<tr>
<th>Run I.D. N°</th>
<th>Challenge level before the reactor TCID(_{50}) /ml</th>
<th>Test level after the reactor* TCID(_{50}) /ml</th>
<th>Percent One-pass reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>100000</td>
<td>0</td>
<td>&gt;99.999</td>
</tr>
<tr>
<td>B2</td>
<td>3162278</td>
<td>0</td>
<td>&gt;99.9995</td>
</tr>
<tr>
<td>B3</td>
<td>100000</td>
<td>0</td>
<td>&gt;99.999</td>
</tr>
<tr>
<td>B4</td>
<td>125893</td>
<td>0</td>
<td>&gt;99.99</td>
</tr>
<tr>
<td>B5</td>
<td>125893</td>
<td>0</td>
<td>&gt;99.99</td>
</tr>
</tbody>
</table>

*In these experiments no virus was detected downstream the reactor.
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AirInSpace range of versatile solutions

• **Mobile Devices**
  - *Immunair S1*
  - *Plasmair T2006*
  - *Cool Plasmair T2006*
  - *Immunair S2* (not released yet)

• **Stationary Systems**
  - *Biocair* (not released yet)
Technology launched in medical market with differentiated mobile solutions

**Immunair S1**
Mobile protective unit for immuno compromised patients

**plasmair**
Mobile sentry unit, reducing the risk of airborne contamination

**coolplasmair**
Decontamination + clean air cooling
Immunair S1 Mobile protective unit for immuno compromised patients
IMMUNAIR: A mobility for a fast and flexible use on site

- Installation in one hour
- Pass doors of 80 cm x 200 cm
- Easy Transport between wards

Fold for transport

Unfold and deployed over the patient bed

Deployed with transparent curtains
IMMUNAIR: Mobile Protection for immunocompromised patients
Immunair is built upon a “Room in Room” Concept

Uniform Purified air flow

>100 Air Changes per Hour under Immunair

Circa 20 Air Changes per Hour in the room

Inlet
Performance and ergonomy validated through functional and clinical test

Functional Tests :

- **Saint-Antoine** (service des brûlés, Pr MIMOUN)
- **Necker** (service d'immuno-hématologie, Professeur FISCHER, S. CHALLIER)
- **Saint-Louis** (service d'hématologie, Professeur GLUCKMAN, Professeur GISSELBRECHT, Professeur DEROIN, Docteur ROUVEAU)
- **IGR** (service de réanimation oncologique, Pr NITENBERG, Dr CHACHATY)
- **Saint-Antoine** (service d'hématologie, Pr NAJMAN, Docteur JL POIROT)
- **Trousseau** (service d'hématologie, Professeur LEVERGER)

Patient evaluation – Clinical test supervised by Ethics committee :

- **Necker** (service d'immuno-hématologie, Pr Fischer)
- **Trousseau** (service d'hématologie, Pr Leverger)
- **Saint-Louis** (service d'hématologie, Pr Baruchel)
- **Hôtel-Dieu – Clermont-Ferrand** (service d'hématologie, Pr Déméocq)
- **La Pitié-Salpêtrière** (service d'hématologie, Pr Vernant)
Excellent performance Under Actual Hospital conditions

- Absolute bio decontamination under flow
- High speed decontamination
- Efficiency demonstrated against extreme contamination

Bacteria under Immunair
- > 300 cfu/m$^3$
- 300 cfu/m$^3$
- 10 cfu/m$^3$
- 5 cfu/m$^3$

Fungi under Immunair
- 285 cfu/m$^3$
- 10 cfu/m$^3$
- 5 cfu/m$^3$

Source: MSIS report on tests conducted at Hospital NECKER in July 2002
**Immunair™ Clinical Validation over a One Year Period**

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Necker</th>
<th>Trousseau</th>
<th>Saint-Louis</th>
<th>Clermont-Ferrand</th>
<th>Pitié-Salpétrièr e</th>
<th>Accumulated test periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Terminated</td>
<td>Terminated</td>
<td>Terminated</td>
<td>Terminated</td>
<td>Terminated</td>
<td></td>
</tr>
<tr>
<td>Usage Duration (Months)</td>
<td>5</td>
<td>3,5</td>
<td>1,5</td>
<td>1,5</td>
<td>1,5</td>
<td>13 months</td>
</tr>
<tr>
<td>N° of Days Used (Days)</td>
<td>147</td>
<td>110</td>
<td>37</td>
<td>37</td>
<td>38</td>
<td>369 Days</td>
</tr>
<tr>
<td>N° of Sampling Days</td>
<td>40</td>
<td>31</td>
<td>12</td>
<td>13</td>
<td>13</td>
<td>109 Days</td>
</tr>
<tr>
<td>N° of Micro-Biological Air Samples</td>
<td>420</td>
<td>280</td>
<td>180</td>
<td>120</td>
<td>104</td>
<td>1104 Samples Taken</td>
</tr>
</tbody>
</table>
**Immunair™:** Clinical Efficacy supported by thorough statistical analysis

<table>
<thead>
<tr>
<th></th>
<th>Level of efficacy</th>
<th>Statistical confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Under IMMUNAIR</strong></td>
<td>&lt; 1 CFU/m³</td>
<td>99 %</td>
</tr>
<tr>
<td></td>
<td><em>Fungi</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 10 CFU/m³</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Total Flora</em></td>
<td></td>
</tr>
<tr>
<td><strong>In Surrounding Room</strong></td>
<td>&lt; de 67 % vs corridor <em>Total Flora</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; de 45 % vs corridor <em>Fungi</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 67 % vs corridor <em>Total Flora</em></td>
<td>95 %</td>
</tr>
<tr>
<td></td>
<td>&lt; 45 % vs corridor <em>Fungi</em></td>
<td>95 %</td>
</tr>
</tbody>
</table>
Immunair is adopted by key opinion leaders in home market

Intensive Care unit, Pr. DUROCHER. Calmette, Lille, France

Intensive Care, Heart Surgery. Pr. LASKAR. CHU Dupuytren, Limoges, France
IMMUNAIR, adopted by key opinion leaders in home market

Pediatric Intensive Care unit.
Professor HUBERT. Necker, Paris

Pediatric Onco-Hematology
Professor BARUCHEL. Saint Louis, Paris
Immunair™ covers a wide range of applications

- **Flexible and Cost Effective ward Extension**
  - Hotel Dieu, Clermont Ferrand; Meaux Hospital; Saint Antoine Paris; Saint Louis, Paris

- **Protection of fragile patients in Intensive Care Units**
  - Dupuytren Hospital, CHU Limoges; Necker Hospital, Paris; Calmette Hospital, CHRU Lille

- **Protection of fragile patients not prioritized for admission into clean rooms**
  - Trousseau Hospital, Paris; Pitié Salpêtrière Hospital, Paris

- **Protection of patients during construction work**
Illustration of the cascades of protections afforded by Immunair™ in real conditions

- Corridor: 30 ± 50 CFU/m³
- Room: 17 ± 40 CFU/m³
- Immuneair: 0.1 ± 0.4 CFU/m³
- Necker: 115 ± 145 CFU/m³
- Trousseau: 16 ± 35 CFU/m³
Technology launched in medical market with differentiated mobile solutions

**Immunair**
Mobile protective unit for immuno compromised patients

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Mobile sentry unit, reducing the risk of airborne contamination

**coolplasmair**
Decontamination + clean air cooling
Plasmair™: Mobile sentry unit

Reduction of infection risk
Plasmair T2006 and Immunair S1 in the Hospital of Montpellier (Hematology ward)
Flexibility of installation and performance for any type of application

- Destruction of microorganisms
- High air flow treated
- Silent
- Aéraulique optimisée

Level of performance:
Bacteriologic class: B100/B10/B5
Particles class ISO8/ISO7/ISO6
Decontamination Kinetic CP20/CP10/CP5

Dimensions
Height 194 cm
Width 94 cm
Depth 57 cm
Indicative weight 85 kg

Technical Characteristics
Max. consumption 750 VA
Noise level 700 m3/h 41 dB(A) - 1000 m3/h 47 dB(A)
Air flow 700 to 2000 m3/h (for Plasmair, 1500 m3/h for CoolPlasmair)

Regulation
Marquage CE
Class 1 Medical Device
Versatile and cost effective solution for both Aseptic and Sceptic Protection
Cool Plasmair™ provides safe and reliable protection across a wide range of environments

Applications

- Intensive Care
- Operating Theaters
- Plastic Surgery
- Dental Practice
- Retirement Home
- Functional Tests
- Neonatology
- Burnt Unit
- Emergency Room
- Convalescent Home
- Geriatric Ward
- Infectious Disease
- Pneumology
- Dermatology
- Interventional Radiology
A proven technology: more than 35 scientific studies

- Most recent:
  - Center for Applied Microbiology Research (Porton Down, UK)
  - Harvard School of Public Health, (Boston, USA)
  - Ecole Normale Supérieure de Lyon (Lyon, France)
  - Multicenter clinical study: Necker, Trousseau, Clermont-Ferrand, La Pitié Salpêtrière, Saint-Louis. (France)
  - Saint Louis Hospital (Paris, France)
  - Necker Hospital (Paris, France)
PLASMAIR™: Versatile Mobile protection to cost effectively comply with increased safety standards
**Plasmair™:** mobile and cost effective solution

- **Mobility:**
  - Easy to deploy
  - Adapted to all situations
  - Quick answer to infection

Decontamination of a room in less than one hour.

- **Cost-effective solution:**

<table>
<thead>
<tr>
<th>System Type</th>
<th>Cost (in terms of dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventilation system</td>
<td></td>
</tr>
<tr>
<td>(class IV)</td>
<td>100</td>
</tr>
<tr>
<td>Ventilation system</td>
<td>60</td>
</tr>
<tr>
<td>(class III)</td>
<td></td>
</tr>
<tr>
<td>Plasmair™ system</td>
<td>20</td>
</tr>
</tbody>
</table>

Easy maintenance
Airinspace plasma technology inside for biodestruction of microorganisms and particle reduction
Plasmair performance results from the unique combination of 3 factors

- Aerolics scheme to promote mixing: Coanda effect, inlet / outlet surfaces ratio, blowing angle, unit height

- Particulate and broad-range biological one-pass efficiency of reactor

- High recycling rate: throughput up to 2000 m³/hr
Superior kinetics of decontamination through better mixing with airinspace solution

Optimized Airflow pattern to ensure:

- Prevent re-suspension due to turbulence
- Fast room decontamination
- Reduction of stagnant air zones
Particulate performance at High Throughput setting: Levels and Kinetics ensured for >0.5µm particles

Tests Conditions: Room volume: 60m³ – Plasmair Throughput: 17 ACH
Biological performance at High Throughput setting: Levels ensured for Total Mesophilic Flora

Tests Conditions: Room volume: 60m³ – Plasmair Throughput: 17 ACH
**Plasmair: One Product, Several Applications**

- Operating Theaters
- ICU
- Pharmacy
- Sterilization rooms

**IMMUNAIR**
- Haematology
- Oncology
- Preparation labs

**SEPTAIR** (under development)
- Infectious diseases
Agenda

• Mission statement
• History of continuous innovation
• Unique Value proposition
• Proprietary superior technology
• Product Qualification
• Range of solutions: Mobile / Stationary
  • Case studies
• Summary
Validation in Implantology Dental Practice

Kinetics of décontamination with Plasmair™
In Operating Room

Source: Implantology Practice, Pr Nahmani, 40 m³ Room, April 2004
Publications concerning the Plasmair

• a. Journal of Hospital Infection, Elsevier Ltd., Prospective survey of indoor fungal contamination in hospital during a period of building construction, November 2007. 18 month prospective study in Dijon University Hospital hematology unit during a period of construction.

• b. Infection Control and Hospital Epidemiology, The Society of Healthcare Epidemiology of America (SHEA), Decreasing Airborne Contamination Levels in High-Risk Hospital Areas Using a Novel Mobile Air-Treatment, October 2007. Study at Saint Antoine Hospital and University Hospital in Besançon involving operating room and pediatric hematology ward.

• c. Journal of Hospital Infection, Elsevier Ltd., Reduced Fungal contamination of the indoor environment with the Plasmair system (AirInSpace), December 2006. Prospective study in Dijon University Hospital adult and pediatric hematology units.

• d. American Journal of Infection Control, The Association for Professionals in Infection Control (APIC), Evaluation of a new mobile system for protecting immune suppressed patients against airborne contamination, September 2007. 2 Studies at Necker Children's Hospital, Paris, Immuno-Haematology Pediatric Service Department; and Rennes University Hospital, Rennes, France in the pediatric hematology wing.
Immunair S2
Immunair S2 in Medica Trade Show (Germany)
Immunair S2 in Medica Trade Show (Germany)
Video of deployment of the immunair S2
Immunair™ : un dispositif applicable à de nombreuses situations cliniques

Positionnement médical d’Immunair en Onco-Hématologie au sortir de l’étude clinique multicentrique :

- Aplasies lourdes post-chimiothérapie
- Aplasies post-greffe (autogreffes / allogreffes)
- Aplasies médullaires idiopathiques
- Déficits immunitaires post greffes
- Alternative aux chambres à flux
- En sortie précoce de bulle

Autres indications :
Effectives :
- Protection des patients ID pendant travaux ou maintenance
- Réanimation
Biocair™ IF: The immunair performance applied to a stationary solution

- For ID patients in Hyper protected sectors
- Low speed unidirectional flow for operating theatre
**The Biocair™ concept:**
unidirectional flow ceiling for high risks zones

- Plexiglas apron
- ½ plénums
- Electrical box
- Reactor box
- Maintenance access
**Easing maintenance access**  
*Short time of maintenance*

Phase 1: Insertion of the reactor

Phase 2: Switching the rack

Phase 3: Closing air stream

Phase 4: Closing maintenance trapps
Biocair™ SL: The airinspace safety applied to operating theaters

- May 2006 Saint Louis Hospital decides to set up an Operating Theater equipped with AirInSpace biocair hygienic ceiling
Biocair SL

- Iso 5, B1
- 10000 m³/H
- V > 0.24 m/s
Advantages of the Biocair™ SL solution

• Destruction of Microorganisms
  (Unlike mechanical filters)

• Total operating costs reduced
  (Plasmer reactor pressure drop being constant)

• Robustness of performance
  (Easing the problem of tightness)

• Gains de maintenance et de productivité
  (airinspace diffusers don’t use filters so it reduces the number of maintenance in the room)
Case studies
Controlling infection risk in Intensive Care Unit

Issue
Excessive contamination levels in Intensive Care Unit

Objective
Maintain ISO 7 air purity standards in ICU in order to reduce cross-contamination risk

Solution
Deployment of Plasmair bioprotection sentinels

Result
ISO 7 standards assured

Advantages
Ease and rapidity of deployment
No construction required
Service was able to continue to function without interruption

Avicenne Hospital – Avicenne, Bichat Hospital – Paris, Grenoble Hospital – Grenoble…
Decontamination in Operating Theatres

**Issue**
Excessive contamination in operating theatre

**Objective**
Decontaminate (to ISO 7 standards) operating theatre

**Solution**
Installation of Plasmair biodecontamination sentinel

**Result**
Plasmair decontaminated the operating theatre and provided a cooling effect for comfort of patients and personnel

**Advantage**
Ease of installation and operation of Plasmair solution

*Bigorre Clinic – Tarbes, La Colline Clinic – Geneva, Bourg St Maurice Hospital…*
Flexible and Economical extension of Isolation Ward

**Issue**
Insufficient Capacity in transplant recovery isolation ward

**Objectives**
Creation/extension of a post-transplant recovery unit in order to meet demand for increased transplant activity

**Solution**
Normal hospital rooms transformed into isolation ward with deployment of Plasmair

**Results**
Hospital was able to rapidly increase transplant capacity and respond to rising demand of pacemaker implantations

**Advantages**
Cost efficient creation of a protected zone quickly, without construction

*Cochin Hospital – Paris, Arras Hospital – Arras, Trousseau Hospital – Paris…*
Protection of immunocompromised patients from construction-related contamination

**Issue**
Increase in contamination risk in isolation ward due to construction in the hospital

**Objective**
Protect fragile patients undergoing immunity-decreasing treatments during construction in the hospital

**Solution**
Patients put into sectors protected by the PlasmAir medical device

**Results**
Medical Team was reassured that fragile patients protected from increased contamination risk caused by construction

**Advantages**
- Minimal disturbance of patients and medical personnel
- Mobility of the system enabled caregivers to easily move the location of the protected sector

*Lucien Hussel Hospital – Vienne, Dijon Hospital – Dijon*
Increase operating theatre capacity in days

**Issue**
Insufficient surgery capacity to keep up with demand

**Objective**
Creation of new operating theatre for pacemaker implantation

**Solution**
Transformation of a normal hospital room into operating theatre with Plasmair ensuring ISO 7 air quality standards

**Result**
Substantial increase in surgery capacity for pacemaker implants

**Advantages**
- Rapid deployment of Plasmair system (without construction) to respond to demand
- Air quality standards scrupulously respected
- Competitive pricing

*St Philibert – Lomme*
Create a safe environment for pharmaceutical and infant formula preparation

**Issue**
Contamination of infant formula bottles due to inefficient air-conditioning system

**Objective**
Create ISO 7 environment appropriate for infant formula preparation area

**Solution**
Installation of Plasmair biodecontamination sentinel

**Result**
Plasmair effectively offset the contamination produced by the air conditioning system and created a decontaminated zone for the preparation of infant formula

**Advantage**
Rapid solution which enabled the service to function continually
No construction involved

Ambroise-Paré Hospital – Boulogne-Billancourt, Auxerre Hospital – Auxerre…
Agenda

• Mission statement
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Where AirInSpace solutions have made a difference

- Controlling Infection risk in Intensive Care Unit, Operating Theaters and Hematology wards
- Ensuring Compliance with Air Quality Standards
- Protection of patients from construction-related contamination
- Increase Hospitals effective capacity in a flexible, fast and cost effective way
Some of AirInSpace’s other clinical references

Professeur Gisselbrecht, Service d’Hématologie, Hôpital Saint Louis, tel: +33 1 42 49 92 96

Professeur Leverger, Service d’Hématologie, Hôpital Trousseau, tel: +33 1 44 73 60 62

Professeur Fisher, Service d’Immuno Hématologie, Hôpital Necker, tel: +33 1 44 49 48 22

Professeur Najman, Service d’Hématologie, Hôpital Saint Antoine, tel: +33 1 49 28 26 21

Professeur Demeocq, Service d’Onco Hématologie, CHU Clermont-Ferrand, tel: +33 4 73 750 750

Professeur Baruchel, Service d’Onco Hématologie, Hôpital Saint Louis, tel: +33 1 42 49 97 31

Docteur Challier, Laboratoire de Parasito – Mycologie, Hôpital Necker, tel: +33 1 44 49 49 61

Docteur Poirot, Laboratoire de Parasito – Mycologie, Hôpital Saint Antoine, tel: +33 1 43 28 2000 post 2185

Docteur Allard, Service d’Hématologie, Hôpital de Meaux, tel: +33 1 64 35 38 38

Mme Petit, Direction des Equipements, Hôpital Robert DEBRE, tel +33 1 40 03 24 18

Mr Ancellin, Ingénieur Biomédical, CHU Poitiers, tel: +33 5 49 44 44 44

Dr Berthelot, PH Hygiène, CHU Saint Etienne, tel: +33 4 77 12 09 08
AirInSpace Technology validated by numerous Laboratory Studies

1) Report N°861-03
Testing the Efficiency of a Commercial Air Purification System against Bacterial and Viral Aerosols
Allan Bennett
October, 24th 2003
Health Protection Agency, Porton Down – UK

2) Report N°949-05
Testing the Efficiency of a Commercial Air Purification System against Bacterial and Viral Aerosols
Sara Speight
April, 6th 2005
Health Protection Agency, Porton Down – UK

3) Scientific Report on Single-pass Biological Viability using an AirInSpace Plasmer Reactor
Melvin W. First
October, 27th 2005
Harvard School of Public Health, Harvard, USA

4) Report No. 04182006-1
Testing Efficiency of a Commercial Air Purification System against Avian Flu Aerosols
Vincent Moules, Vance Bergeron
April, 19th 2006
Institut Fédératif de Recherche Laennec – Laboratoire de Virologie et Pathogénèse Virale – CNRS UMR 5537
Ecole Normale Supérieure de Lyon - Laboratoire de Physique - CNRS UMR 5672
Lyon – FRANCE

5) Report N°39-06
Testing the Efficiency of a Commercial Air Purification System against Bacterial and Viral Aerosols
Laura O'Donoghue
June, 19th 2006
Health Protection Agency, Porton Down – UK

6) Report N°49-06
Testing the Efficiency of a Commercial Air Purification System against Bacterial and Viral Aerosols
Laura O’Donoghue
September, 15th 2006
Health Protection Agency, Porton Down – UK
Airinspace range of solutions provides unique value to Health Care facilities

- Airinspace medical equipments have been clinically validated and are becoming best practices in numerous University hospitals:
  - Saint Louis hospital, Pr Gluckman – Baruchel - Gisselbrecht
  - Necker hospital, Pr Fisher
  - Trousseau hospital, Pr Leverger
  - Saint Antoine Hospital, Pr Gorin

- More than 75 hospital customers in France

- More than 80% of historical customers have repurchased airinspace products
Field test validation by reknown users

“This system showed its incontestable effectiveness on the fungal and microbial flora.”

“This air treatment system was tested under strict supervision and its deployment in our system would be adapted for the protection of patients in acute aplasie.”

Professor André Baruchel
Oncohaematology Department
St Louis Hospital

“The microbiological protection (fungus less than 1 UFC/m3) supplied by the Immunair system is very satisfactory and responds to a healing of acute aphasies after chemotherapy of hemopathy and solid juvenile tumours.”

“Concerning children and their parents, this system is regarded as more adapted to everyday life and allows for contact that is indispensable for children who are isolated for long periods of time.”

Professor François Demeocq
Oncohaematology Department
Hotêl-Dieu Hospital
"After having tested the Immunair system, I have a very favorable opinion concerning the effectiveness of the device for the prevention of fungicidal infections and the prevention of infection risk in general."

"Our level of confidence in the Immunair system allows us to anticipate the utilisation of this device in all of our current applications."

*Professor Alain Fischer*  
*Immunohaematology Department*  
*Necker Children’s Hospital*

"In the conditions tested in usage in the service, the effectiveness level suggests that the system could be tested for the replacement of clean rooms."

"The level of effectiveness is sufficient to use this system for an early exit of a sterile bubble."

"Of course, only a long-term utilisation of the system would allow us to know if it could one day replace sterile bubbles for all of their applications."

"The utilisation of the system in reanimation for a patient was completely satisfactory."

*Professor Guy Leverger*  
*Oncohaematology Department*  
*Armand Trousseau Hospital*
AirInSpace advisory board and scientific committee

- **Pr. Eliane Gluckman**  
  Hematologist, Saint Louis Hospital, Paris.

- **Dr. John H. Markels**  
  Vice President, Europe, Middle East and Africa Operations at Merck & Co., Inc.

- **Dr Eckhard Polzer**  
  Former CEO and Chairman of Dornier Medical International.

- **Pr Melvin First**  
  Emeritus Professor, Harvard School of Public Health.
SAFE AIR, BETTER HEALTH
Why we must treat the air?

Both inside and outside air is polluted by:

- Biocontaminants
- Particules
- Gaz

This pollution can be:

- Natural
- From Human
- From the industry
Airborne contamination depending on activity