**Why Use Bone Marrow Stem Cells for Lung Transplant?**

- Get healthy lungs faster
- No waiting for a matching donor
- No chances of lung rejection
- Single surgery for double lungs transplant
- BAmP helps to breathe freely
- No more inconvenient & expensive Extra-Corporeal Membrane Oxygenation (ECMO)

**ABSTRACT:** The 2020 Covid-19 pandemic may cause an increase of lung diseases globally, especially in patients with respiratory problems, thereby increasing the need for lung transplants. Finding matching donors may become difficult. The need for growing "healthy lungs" is important. For patients with damaged lungs and needing transplant, we have developed a method to grow healthy human lungs from patient's own bone marrow stem cells. We added a supporting biodegradable artificial micro-pump (BAmP) during transplant to support patient's respiration until new lungs can function independently.

**Biodegradable artificial micropump (BAmP)**

Tiny pump made of a biodegradable substance which can easily exchange oxygen and carbon dioxide from the blood just like real lungs. BAmP helps patients to breathe properly while the "mini lungs" are growing into adult lungs and can breathe independently. As the "mini lungs" grow, the BAmP will slowly degrade, shrink and be lost. No surgery is required to remove the BAmP.

**Process for Growing ‘Mini Lungs’ from Bone Marrow Stem cells**

- Pelvis Bone (made of legs)
- Bone Marrow Extracted from Hip Bone (colored water in test tube)
- Bone Marrow Stem Cells Extracted from Bone Marrow (red legs)
- Bone Marrow Stem Cells Growing in Number (red legs)
- Bone Marrow Stem Cells Differentiate Into Lung Epithelial Cells (green legs)
- Lung Epithelial Cells (green legs)
- MINI LUNG

**NO MORE ECMO**

- If we transplant only one bad lung, the other good lung will support breathing in the patient when the "mini lung" is growing into the adult lung inside the patient.
- BAmP not required.

**Both bad lungs**

- If we transplant both bad lungs, then we need to insert a BAmP also during transplantation to help in respiration.

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**Scientific Diagram**

- Good Lung
- Bad Lung
- BAmP
- Mini Lung

**Model of Prototype (playdough)**

1 good lung and 1 bad lung

1 BAD LUNG REPLACED BY 1 NEW MINI LUNG

Happy Breathing!

2 BAD LUNGS REPLACED BY 2 NEW MINI LUNGS & BAmP