

# Celebrating Excellence IN LUNG TRANSPLANTATION



Since the first successful lung transplant in 1983, Canada's world-renowned surgeons have pioneered new techniques now adopted internationally. They continually pursue ground-breaking research and innovate to achieve paradigm-shifting, world-first milestones. Today, funding from Cystic Fibrosis Canada (CF Canada) continues to support improvements in transplantation processes and outcomes through its research programs and Transplant Centre Incentive Grants.

Over 650 individuals with cystic fibrosis (CF) received lung transplants in Canada between 1988 and 2015.<sup>1</sup> Today, the probability of surviving 1 year after lung transplant is almost 90% and 10 years is 50%.<sup>2</sup>



Dr. Shaf Keshavjee

Serial discoveries in the research laboratory have been successfully translated into remarkable innovations in the care of CF patients. These range from improvements in preservation and surgical technique to major life saving advances in artificial lung support and gene therapy to improve lung function and decrease long term rejection.

Dr. Shaf Keshavjee, Director, Toronto Lung Transplant Program

I am filled with gratitude for the new lease on life that my double lung transplant has given me, and for the generosity of my donor and their family! I managed to survive with my original CF lungs for over 56 years. Each decade transplant technology and procedures improved. I have lived long, yet am still young enough to survive and overcome the ordeals required for transplant. The support and care from family and so many friends has made this journey not a lonely affair as well.

Wally Speckert, double lung transplant recipient



Wally Speckert, surrounded by his collection of CF-related devices and medications no longer required following his successful double lung transplant

In 2013, CF Canada partnered with the Canadian Institutes for Health Research (CIHR) to support the **Canadian National Transplant Research Program (CNTRP)**, comprising 86 researchers tackling 7 projects, to increase access to transplantation and improve survival and quality of life post-transplant. The CNTRP is supported by \$37M from health charities, government agencies and industry partners.

- 1988** World's first successful double lung transplant for CF
- 1989** A novel solution is developed for improved lung preservation and becomes the standard in current practice worldwide<sup>3</sup>
- 2008** First prospective clinical trial of the Toronto Ex Vivo Lung Perfusion (EVLP) system begins
- 2009** In preclinical studies, gene therapy repairs injured human donor lungs ex vivo<sup>4</sup>
- 2010** World's first organ repair centre is established at Toronto General Hospital
- 2011** Toronto EVLP trial demonstrates the feasibility of transplanting high-risk donor lungs that have undergone EVLP<sup>5</sup>
- 2012** First successful lung transplant following remote EVLP and transport to a distant hospital for transplantation<sup>6</sup>
- 2015** World's first successful triple lung-liver-pancreas transplant is performed on a CF patient
- 2016** Surgeons in Toronto complete a double lung transplant *6 days after* removing both lungs from an individual with CF<sup>7</sup>
- 2017** Study demonstrates lung preservation beyond 12 hours is safe, allowing greater flexibility in planning surgeries<sup>8</sup>
- Preclinical studies show ex vivo gene therapy in donor lungs prior to transplantation is safe and effective<sup>9</sup>

- THESE MILESTONES BRING US CLOSER TO:**
- ✓ personalized medicine to treat and repair donor lungs
  - ✓ a clinical trial of gene therapy in lung transplantation
  - ✓ the potential to use a greater proportion of donor lungs
  - ✓ organ repair centres
  - ✓ greater flexibility in planning surgeries

**References:** 1. Canadian CF Registry; 2. Stephenson, A.L. et al. (2015) *J Heart Lung Transplant*. 34(9):1139-45; 3. Keshavjee, SH et al. (1989) *J Thorac Cardiovasc Surg* 98(4):529-34; 4. Cypel, M. et al. (2009) *Sci Transl Med* 1(4):4ra9; 5. Cypel, M. et al. (2011) *N Engl J Med* 364(15):1431-40; 6. Wigfield, C.H. et al. (2012) *Am J Transplant* 12(10):2838-44; 7. Cypel, M. et al. (2017) *J Thorac Cardiovasc Surg* 153(4):e67-e69; 8. Yeung, J.C. et al. (2017) *Lancet Respir Med* 5(2):119-124; 9. Machuca, T.N. et al. (2017) *Hum Gene Ther* [Epub].