Ossium

The Promise of Bone Marrow Banking

Ossium Health

Ossium Health came out of our search for a better way to preserve organs for transplant

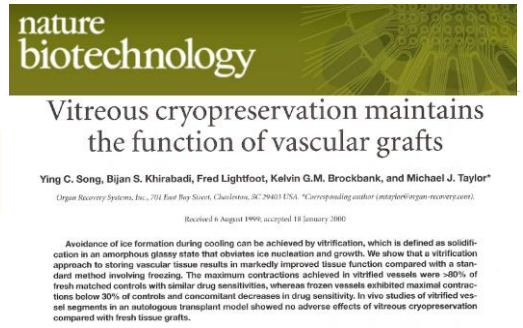
Contents lists available at ScienceDirect

Cryobiology

journal homepage: www.elsevier.com/locate/ycryo

The Grand Challenges of Organ Banking: Proceedings from the first global summit on complex tissue cryopreservation

Jedediah K. Lewis [a, b], John C. Bischof [c], Ido Braslavsky [d], Kelvin G.M. Brockbank [e, f], Gregory M. Fahy [g], Barry J. Fuller [h], Yoed Rabin [i], Alessandro Tocchio [a, b], Erik J. Woods [j, k], Brian G. Wowk [g], Jason P. Acker [j, l, m], Sebastian Giwa [a, n, *]

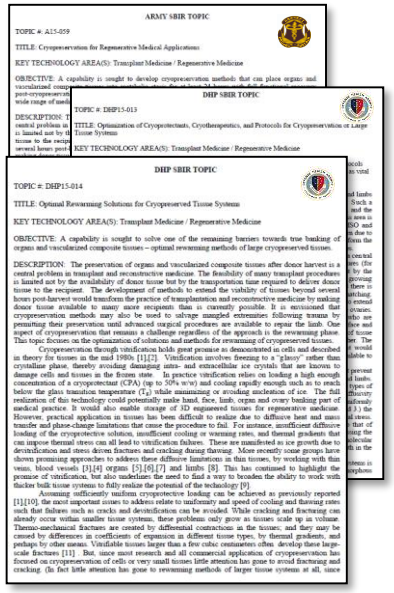


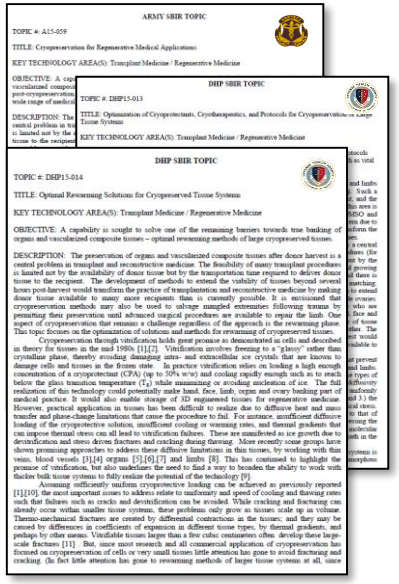
DARPA

NSF

Beta Roadmap Report

SOLVING ORGAN SHORTAGE THROUGH ORGAN BANKING AND BIOENGINEERING





AST | AMERICAN SOCIETY OF TRANSPLANTATION

Organ and Tissue Preservation


We studied cryopreservation techniques used in tissues where long-term preservation was commonplace
NHS CORD BLOOD BANK
HPC, CORD BLOOD
START PRODUCT
RETRIEVAL SITE
UCH
TIME
12 20
DATE
08/6
WEIGHT (g)
VOLUME (ml)
STORE AT:
Umbilical cord blood and autologous bone marrow are cryopreserved thousands of times per year


125,000 patients per year could be treated by bone marrow transplant


Fewer than 10,000 allogeneic bone marrow transplants are performed each year


20,000 blood cancer patients per year search for a donor

No Conventional Match for 45%

5-year survival falls by 1% with every 3 days of wait

Can we find another source of bone marrow?

~30,000

deceased organ and tissue donors in the US each year

But could deceased donor bone marrow be safely used in patients?

Extensive research from world class institutions provided proof of concept for deceased donor bone marrow use

Regen Med. 2011 Nov;6(6):701-6. doi: 10.2217/rme.11.89.

Clinical implementation of a procedure to prepare bone marrow cells from cadaveric vertebral bodies.

Donnenberg AD[1], Gorantla VS, Schneeberger S, Moore LR, Brandacher G, Stanczak HM, Koch EK, Lee WA.

Bone Marrow Transplantation

Case Report | Published: 08 April 1998

Bone marrow transplantation from a cadaveric donor

J Kapelushnik, M Aker, T Pugatsch, S Samuel &

Bone Marrow Transplantation **21**, 857–858 (19

ELSEVIER

Transplantation Proceedings

Volume 35, Issue 2, March 2003, Pages 871-872

Immunosuppression

Donor bone marrow infusion in cadaveric renal transplantation

G Ciancio [a]

Bone Marrow Transplant. 1988 May;3(3):211-20.

Alternative donor sources in HLA-mismatched marrow transplantation: T cell depletion of surgically resected cadaveric marrow.

Lucas PJ[1], Quinones RR, Moses RD, Nakamura H, Gress RE.

CYTOTHERAPY
The Journal of Cell Therapy

Development and validation of a procedure to isolate viable bone marrow cells from the vertebrae of cadaveric organ donors for composite organ grafting

Vijay S. Gorantla*, Stefan Schneeberger*, Linda R. Moore, Vera S. Donnenberg, Ludovic Zimmerlin, W. P. Andrew Lee, Albert D. Donnenberg

ELSEVIER

Transplantation Proceedings

Volume 29, Issues 1–2, February–March 1997, Pages 714-715

Immune markers and hematopoiesis of cadaveric bone marrow for transplantation

G. Söderdahl, C. Tammik, M. Remberger, J. Sandberg, G. Tufveson, J. Tollemar, O. Ringdén

Yonsei Medical Journal
YMJ

Donor Bone Marrow Infusion in Deceased and Living Donor Renal Transplantation

Gaetano Ciancio, George W. Burke, Jang Moon, Rolando Garcia Morales, Anne Rosen, Violet Esquenazi, James Mathew, Yide Jin and Joshua Miller

Advances in Hematology

Adv Hematol. 2016; 2016: 6471901.
Published online 2016 Apr 30. doi: 10.1155/2016/6471901

PMCID: PMC4867066
PMID: 27239198

Combined Bone Marrow and Kidney Transplantation for the Induction of Specific Tolerance

Yi-Bin Chen, [1] Tatsuo Kawai, [2] and Thomas R. Spitzer [1,*]

5+ clinical doses per deceased donor

X

30,000 donors each year

=

150,000+ doses of BM per year

That's a lot of bone marrow, virtually all of which was going unused

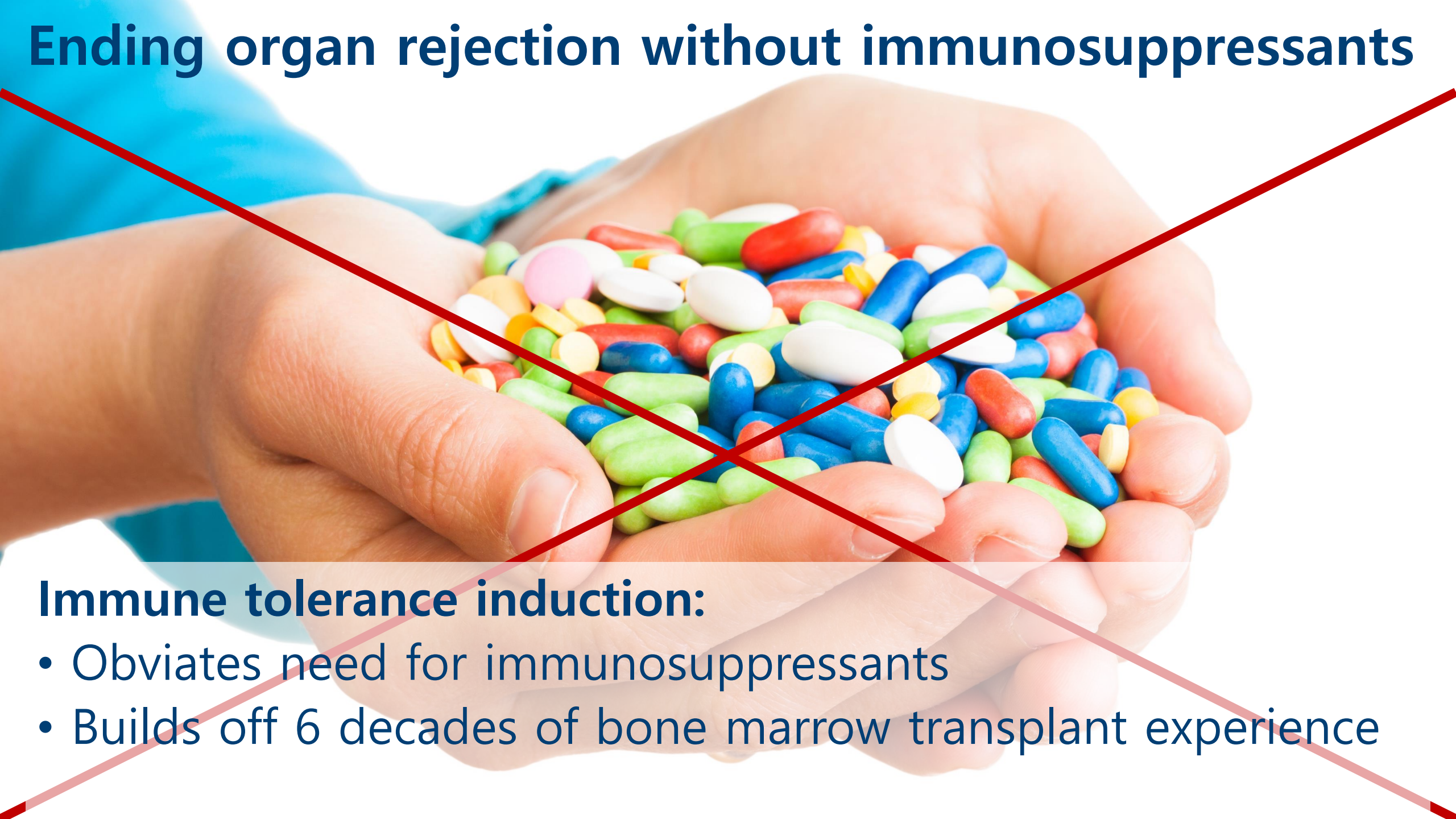
What could we do with it all?


35,000 U.S. organ recipients per year

Organ rejection is common

Immunosuppressants lead to infection

Ending organ rejection without immunosuppressants



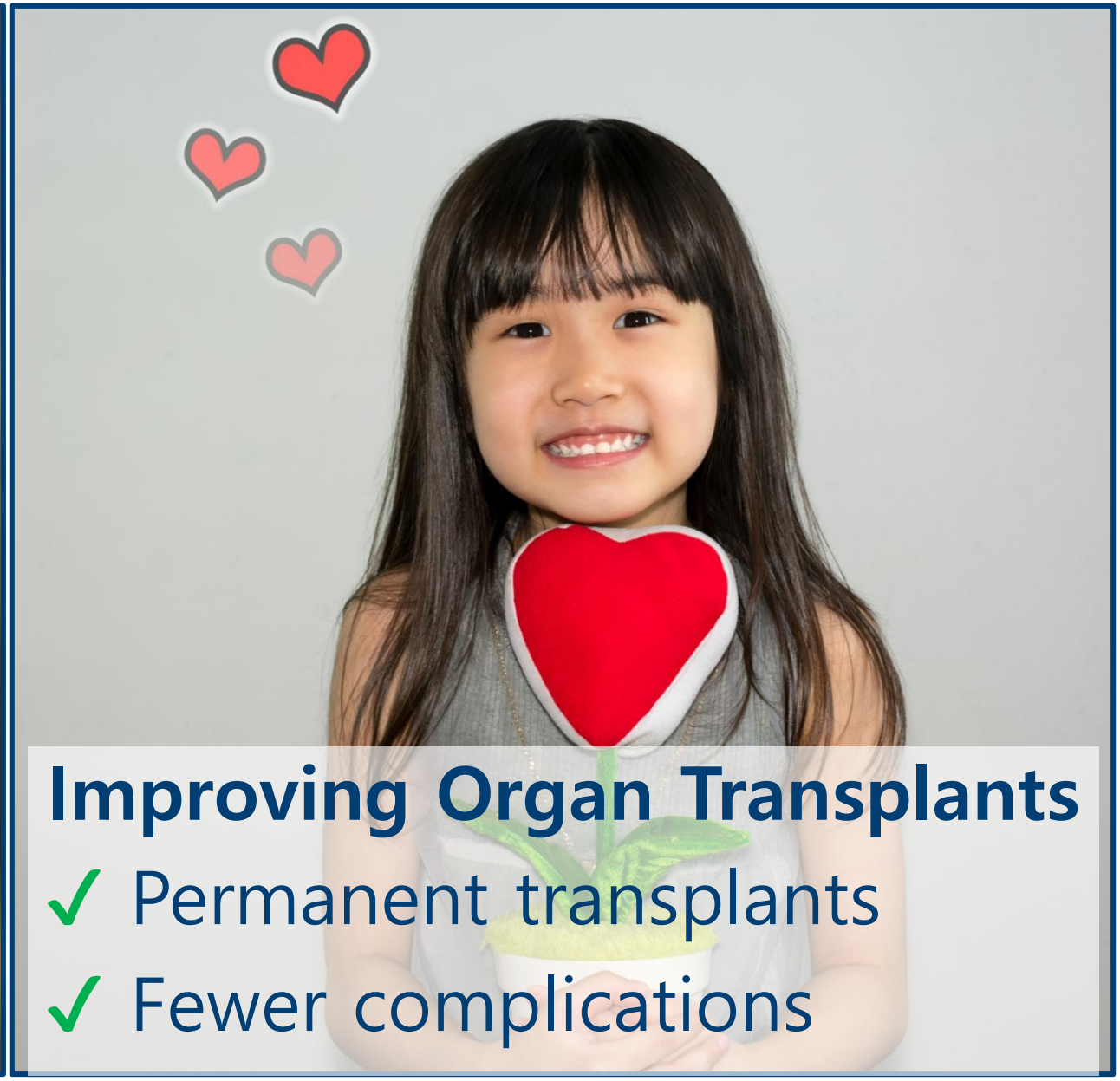
Immune tolerance induction:

- Obviates need for immunosuppressants
- Builds off 6 decades of bone marrow transplant experience

Two Problems

Treating Blood Cancers

- ✓ More matches
- ✓ Faster transplants



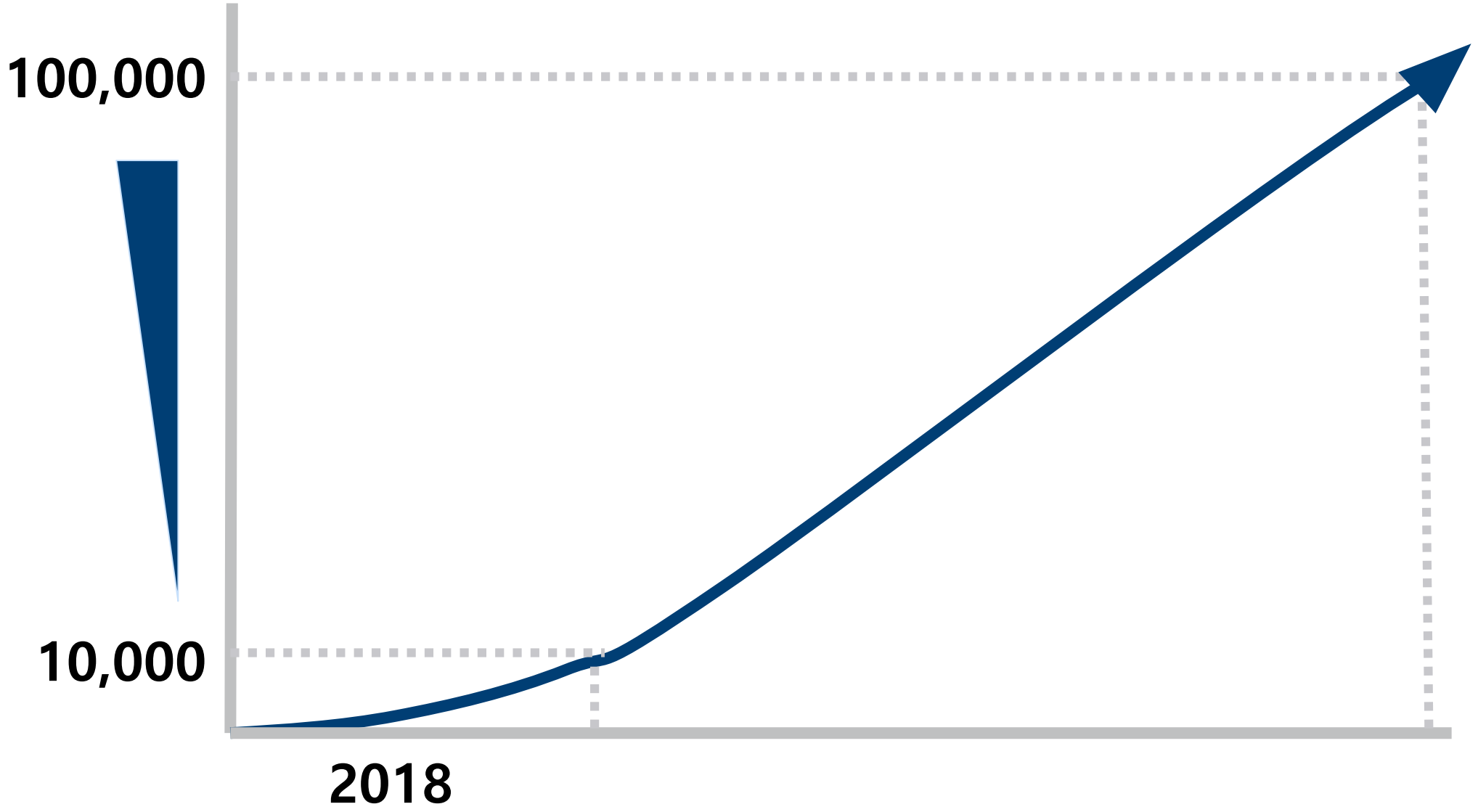
Improving Organ Transplants

- ✓ Permanent transplants
- ✓ Fewer complications

Two Problems : One Solution

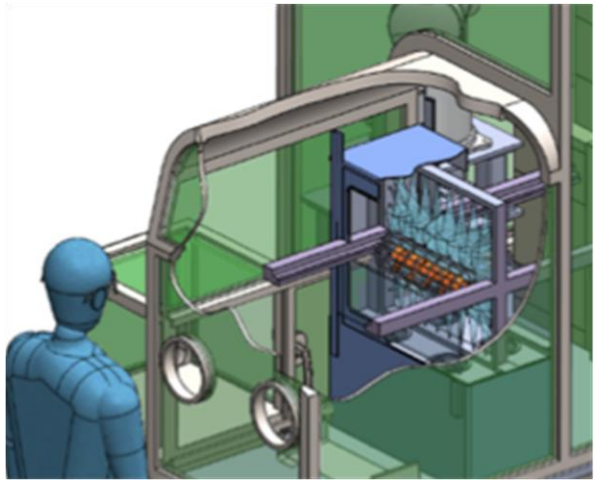
Banking bone marrow from organ donors

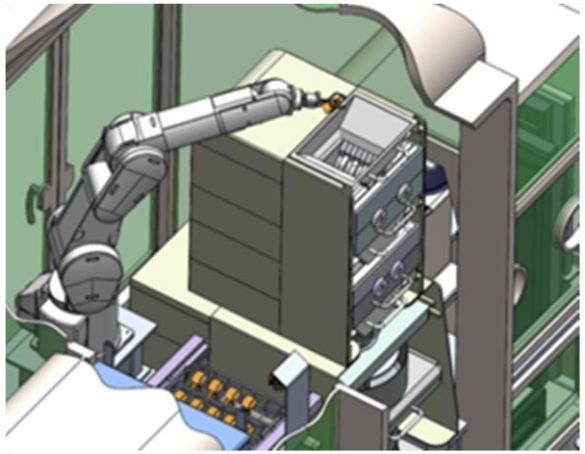
Ossium's bank aims to scale to more than 100k donors over the next several years

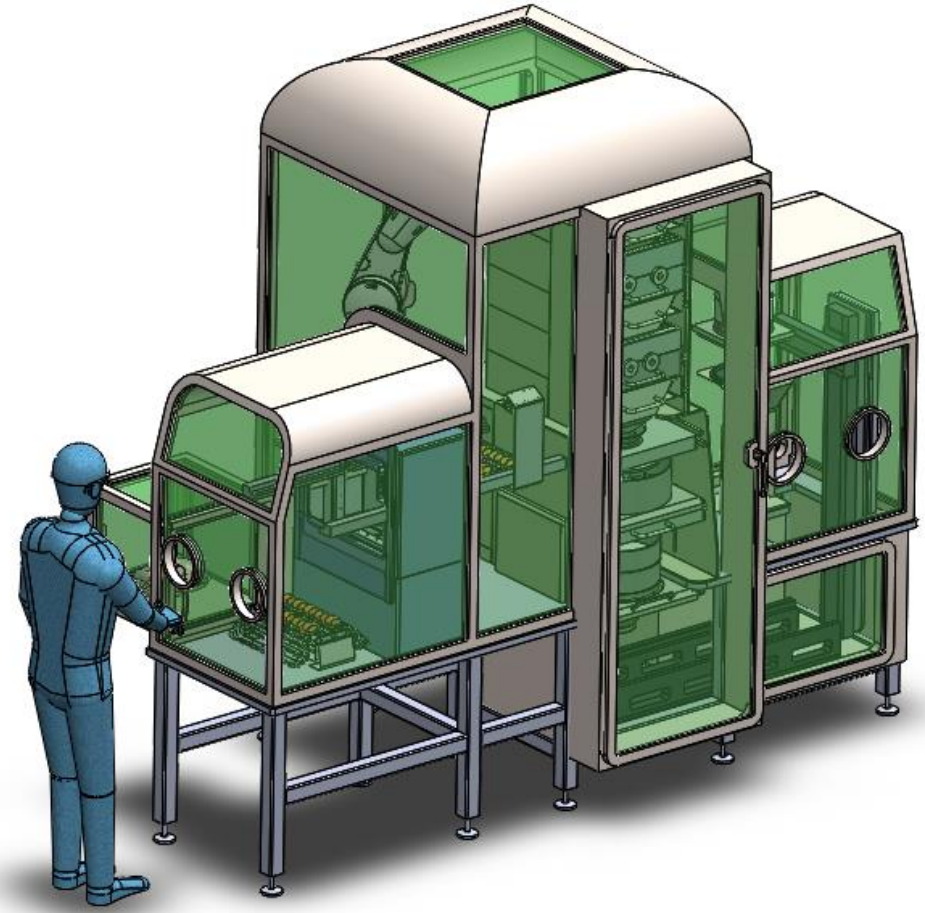


How do we scale?

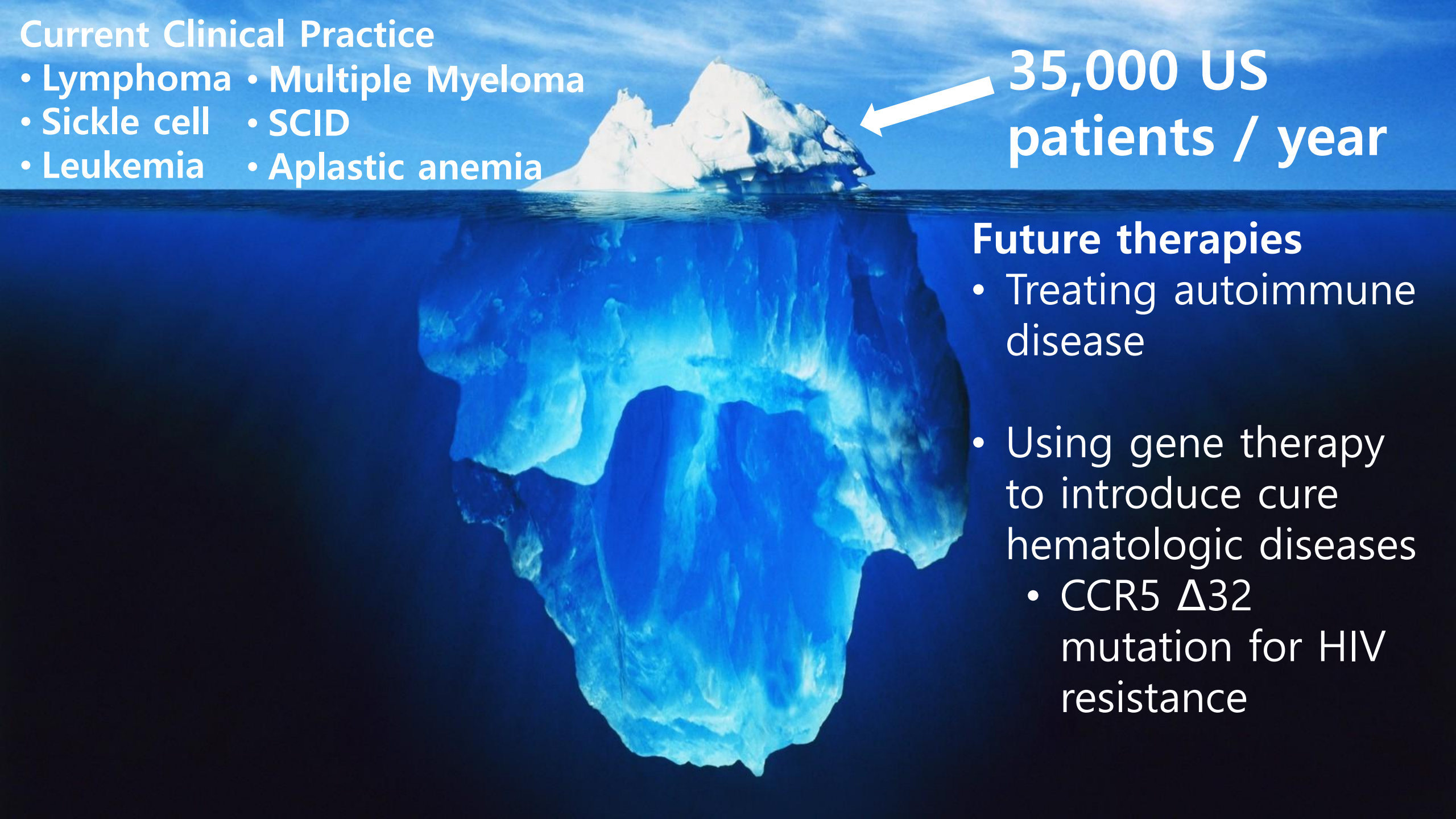
In time, Ossium will manufacture Maxwell for 3-hr automated processing without cleanroom requirement







- Can deployed almost anywhere
- Minimal footprint and training required
- “Plug and play” technology
- One operator runs multiple processes simultaneously

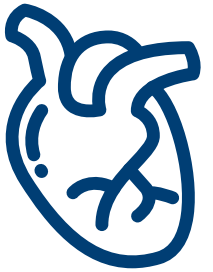

Current Clinical Practice
• Lymphoma • Multiple Myeloma
• Sickle cell • SCID
• Leukemia • Aplastic anemia
35,000 US patients / year
Future therapies
• Treating autoimmune disease
• Using gene therapy to introduce cure hematologic diseases
• CCR5 Δ32 mutation for HIV resistance

How many patients' lives can Ossium save or improve?

33,000 per **year**

2,700 per **month**

90 per **day**




Reimagining immunity...
A wet, organic, information processing system
The human immune system can be repaired, rebooted, and reengineered