Stem Cell Treatments

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Lifetime Probabilities of Hematopoietic Stem Cell Transplantation in the U.S.

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ABSTRACT

Healthcare policies regarding hematopoietic stem cell transplantation (HSCT) must address the need for the procedure as well as the availability of stem cell sources: bone marrow, peripheral blood, or umbilical cord blood (UCB). However, data with respect to the lifetime probability of undergoing HSCT are lacking. This study was undertaken to estimate the latter probability in the United States (U.S.), depending on age, sex, and race. We used data from the Center for International Blood and Marrow Transplant Research, the U.S. Surveillance, Epidemiology and End Results Program, and the U.S. Census Bureau and calculated probabilities as cumulative incidences. Several scenarios were considered: assuming current indications for autologous and allogeneic HSCT, assuming universal donor availability, and assuming broadening of HSCT use in hematologic malignancies. Incidences of diseases treated with HSCT and of HSCTs performed increase with age, rising strongly after age 40. Among individuals older than 40, incidences are higher for men than for women. The lifetime probabilities of undergoing HSCT range from 0.23% to 0.98% under the various scenarios. We conclude that, given current indications, the lifetime probability of undergoing autologous or allogeneic HSCT is much higher than previously reported by others and could rise even higher with increases in donor availability and HSCT applicability.

Adult Stem Cells

Bone Marrow

Marrow
Bone
Cartilage
Tendon
Muscle
Fat
Liver
Brain/Nerve
Blood cells
Heart
All Tissues

Stem Cells from Fat

Bone
Cartilage
Muscle
Nerves

Peripheral Blood

Bone Marrow
Blood cells
Nerves

Hair Follicle

Skin Brain
Smooth Muscle Fat

Gastrointestinal

Esophagus Small Intestine
Stomach Large Intestine/Colon

Placenta

Bone Nerve
Cartilage Muscle Tendon
Bone Marrow Blood vessel

Skeletal Muscle

Skeletal muscle
Smooth muscle
Bone
Cartilage
Fat
Heart

Brain

Brain
Nerves
Blood cells
Muscle
All Tissues
Cornea
Retina
Pancreas
Liver
Heart
Lung
Spermatogonia
Amniotic Fluid
Umbilical Cord Matrix

CORD BLOOD

Various Tissues

David A. Prentice

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ADULT STEM CELLS ARE WITHIN EACH OF US

We all have them.

Adult stem cells exist within every human body and hold the untapped potential to rescue tissues and organs that have been injured by disease. These cells can be collected from excess fat, bone marrow, hair follicles, dental pulp, skeletal muscle and other sources. Cord blood provides yet another source of adult stem cells; these cells have been successfully used to treat many conditions. Scientists are perfecting the ability to prepare donated stem cells to be injected into patients to repair damaged and diseased tissue.

ADULT STEM CELL RESEARCH

- ARTHRITIS
- CANCER
- DIABETES
- PARKINSON'S
- PERIPHERAL ARTERIAL DISEASE

Cell Stem Cell
ISSCR: Report

Patients Beware: Commercialized Stem Cell Treatments on the Web

Patrick L. Taylor,[1] Roger A. Barker,[2] Karl G. Blume,[3] Elena Cattaneo,[4] Alan Colman,[5] Hongkui Deng,[6] Harold Edgar,[7] Ira J. Fox,[8] Claude Gerstle,[9] Lawrence S.B. Goldstein,[10] Katherine A. High,[11] Andrew Lyall,[12] Robertson Parkman,[13] Fernando J. Pitossi,[14] Ernest D. Prentice,[15] Heather M. Rooke,[16,*] Douglas A. Sipp,[17] Alok Srivastava,[18] Susan Stayn,[19] Gary K. Steinberg,[19] Amy J. Wagers,[20] and Irving L. Weissman[19]
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DOI 10.1016/j.stem.2010.06.001

A report by the International Society for Stem Cell Research (ISSCR)'s Task Force on Unproven Stem Cell Treatments outlines development of resources for patients, their families, and physicians seeking information on stem cell treatments.

International Cellular Medicine Society
Off Shore Stem Cell Survey Report

2nd Edition
2010

ICMS

Search of: adult stem cell transplant | Interventional Studies - List Results - ClinicalTrials.gov - Mozilla Firefox

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ClinicalTrials.gov
A service of the U.S. National Institutes of Health

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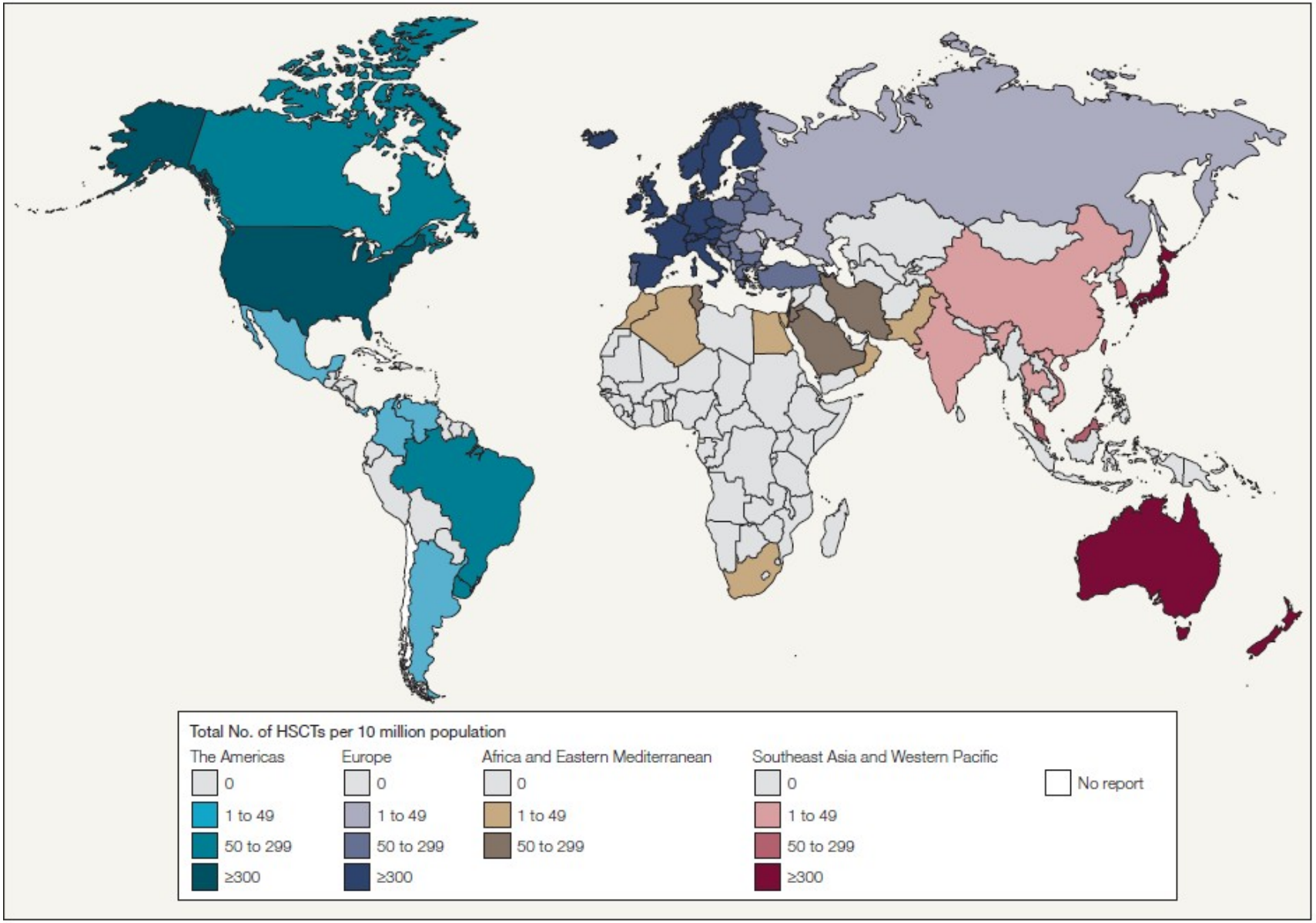
Found 2371 studies with search of: adult stem cell transplant | Interventional Studies

Hide studies that are not seeking new volunteers.
Hide studies with unknown recruitment status.

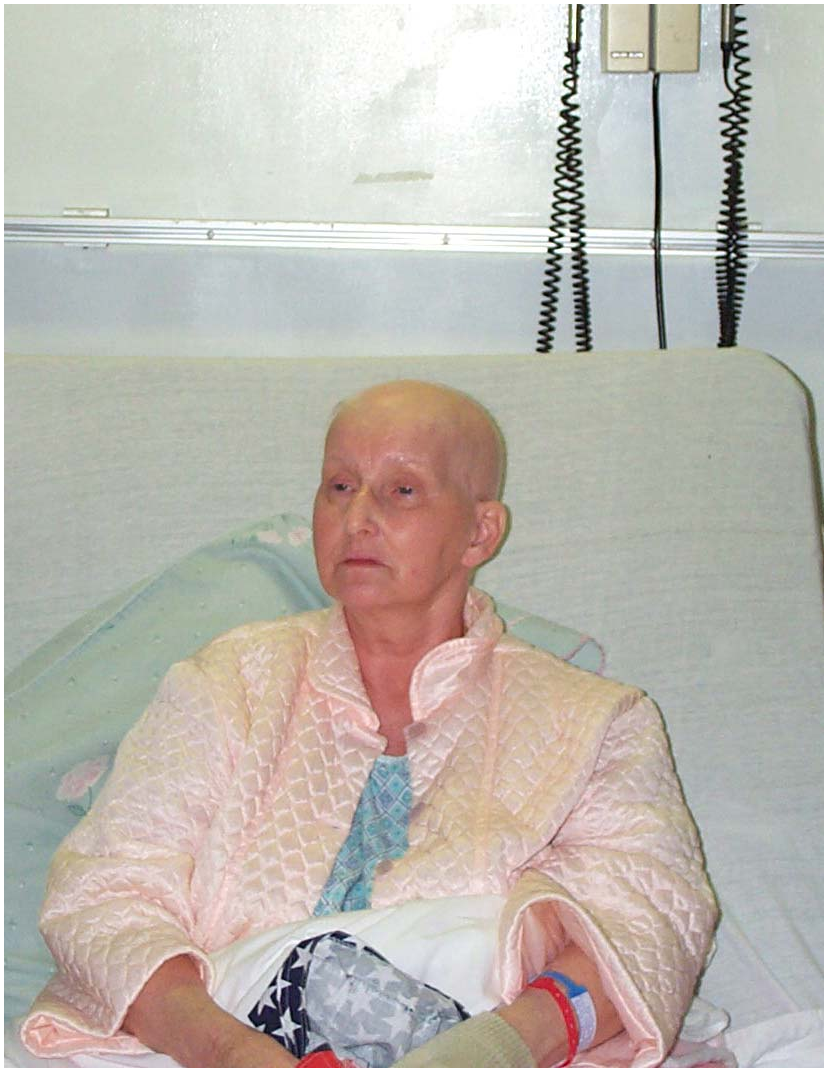
Display Options

Rank	Status	Study
1	Recruiting	**Standard vs High-Dose Trivalent Inactivated Flu Vaccine in Adult Hematopoetic Stem Cell Transplant (HSCT) Recipients** Condition: Adult Stem Cell Hematopoetic Transplant Interventions: Biological: High-Dose Trivalent Inactivated Influenza Vaccine (HD-TIV); Biological: Standard Dose Trivalent Inactivated Flu Vaccine
2	Unknown †	**Stem Cells for Treating Critical Ischemia** Conditions: Critical Limb Ischemia; Ischemic Ulcers Intervention: Procedure: stem cells transplant
3	Recruiting	**Autologous Stem Cell Transplant Followed By Donor Stem Cell Transplant In Treating Patients With Relapsed or Refractory Lymphoma** Conditions: Adult Nasal Type Extranodal NK/T-cell Lymphoma; Anaplastic Large Cell Lymphoma; Angioimmunoblastic T-cell Lymphoma; Burkitt Lymphoma; Extranodal Marginal Zone B-cell Lymphoma of Mucosa-associated Lymphoid Tissue; Nodal Marginal Zone B-cell Lymphoma; Prolymphocytic Leukemia; Recurrent Adult Burkitt Lymphoma; Recurrent Adult Diffuse Large Cell Lymphoma; Recurrent Adult Diffuse Mixed Cell Lymphoma; Recurrent Adult Diffuse Small Cleaved Cell Lymphoma; Recurrent Adult Grade III Lymphomatoid Granulomatosis; Recurrent Adult Hodgkin Lymphoma; Recurrent Adult Immunoblastic Large Cell Lymphoma; Recurrent Adult Lymphoblastic Lymphoma; Recurrent Adult T-cell Leukemia/Lymphoma; Recurrent Childhood Grade III Lymphomatoid Granulomatosis; Recurrent Childhood Large Cell Lymphoma; Recurrent Childhood Lymphoblastic Lymphoma; Recurrent Childhood Small Noncleaved Cell Lymphoma; Recurrent Cutaneous T-cell Non-Hodgkin Lymphoma; Recurrent Grade 1 Follicular Lymphoma; Recurrent Grade 2 Follicular Lymphoma; Recurrent Grade 3 Follicular Lymphoma; Recurrent Mantle Cell Lymphoma; Recurrent Marginal Zone Lymphoma; Recurrent Mycosis Fungoides/Sezary Syndrome; Recurrent Small Lymphocytic Lymphoma; Recurrent/Refractory Childhood Hodgkin Lymphoma; Refractory Chronic Lymphocytic Leukemia; Splenic Marginal Zone Lymphoma; Waldenstrom Macroglobulinemia Interventions: Procedure: peripheral blood stem cell transplantation; Drug: cyclophosphamide; Radiation: total-body irradiation; Drug: carmustine; Drug: etoposide; Drug: cytarabine; Drug: melphalan; Procedure: nonmyeloablative allogeneic hematopoietic stem cell transplantation; Drug: fludarabine phosphate; Drug: mycophenolate mofetil; Drug: cyclosporine; Procedure: autologous hematopoietic stem cell transplantation; Biological: therapeutic autologous lymphocytes
4	Completed	**Trial of Allogeneic Stem Cell Transplants From HLA Compatible, Related and Unrelated Donors After a Myeloablative Preparative Regimen With Hyperfractionated TBI, Thiotepa and Fludarabine For Adult Patients With Lymphohematopoietic Disorders** Conditions: Allogeneic Stem Cell Transplant; Leukemia; Non-Hodgkins; Lymphoblastic Lymphoma; Myelodysplastic Syndrome; Paroxysmal Nocturnal Hemoglobinuria (PNH) Intervention: Drug: cytoreductive regimen followed by a CD34+E- selected allogeneic stem cell transplant
5	Recruiting	**CD34+Selection for Partially Matched Family or Matched Unrelated Adult Donor Transplant** Conditions: Leukemia; Lymphoma; Bone Marrow Failure; Immunodeficiencies; Histiocytosis Interventions: Drug: Full Intensity with TBI; Drug: Full Intensity; Drug: Reduced Intensity; Drug: Reduced Intensity (Fanconi)
6	Recruiting	**Immune Response After Stem Cell Transplant in HIV-Positive Patients With Hematologic Cancer** Conditions: Accelerated Phase Chronic Myelogenous Leukemia; Adult Acute Lymphoblastic Leukemia in Remission; Adult Acute Myeloid Leukemia in Remission;

Figure 1. Global Distribution of Hematopoietic Stem Cell Transplantations (HSCTs) in 2006



Regions are colored by World Health Organization regional office code (see text) (http://www.who.int/about/regions/en/). Transplant rates indicate the number of first HSCTs per 10 million inhabitants in 2006 and are allogeneic and autologous by continental region.



Carol Franz before & after treatment with her own bone marrow adult stem cells for multiple myeloma.

Cord blood stem cells help meet minority marrow needs

By **David Martin**, CNN

March 1, 2010 10:09 p.m. EST

Nathan Mumford was able to find an adult stem cell match to treat his leukemia with cord blood.

Rep. Chris Smith & Rep. Artur Davis, with Julius Erving (“Dr. J”) and patients successfully treated with umbilical cord blood stem cells.

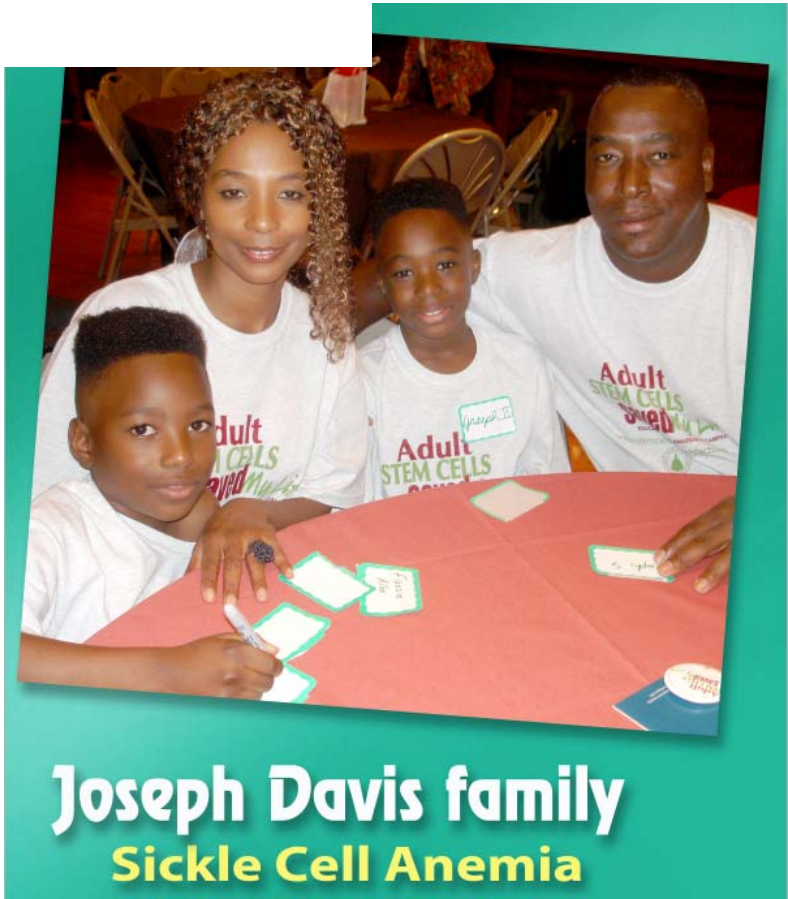
Long-term results of related myeloablative stem-cell transplantation to cure sickle cell disease

Françoise Bernaudin,[1-3] Gérard Socie,[2] Mathieu Kuentz,[3] Sylvie Chevret,[4] Michel Duval,[5] Yves Bertrand,[6] Jean-Pierre Vannier,[7] Karima Yakouben,[5] Isabelle Thuret,[8] Pierre Bordigoni,[9] Alain Fischer,[10] Patrick Lutz,[11] Jean-Louis Stephan,[12] Nathalie Dhedin,[13] Emmanuel Plouvier,[14] Geneviève Margueritte,[15] Dominique Bories,[3] Suzanne Verlhac,[1] Hélène Esperou,[2] Lena Coic,[1] Jean-Paul Vernant,[13] and Eliane Gluckman,[2] for the Société Franç Greffe de Moelle et de Thérapie Cellulaire (SFGM-TC)

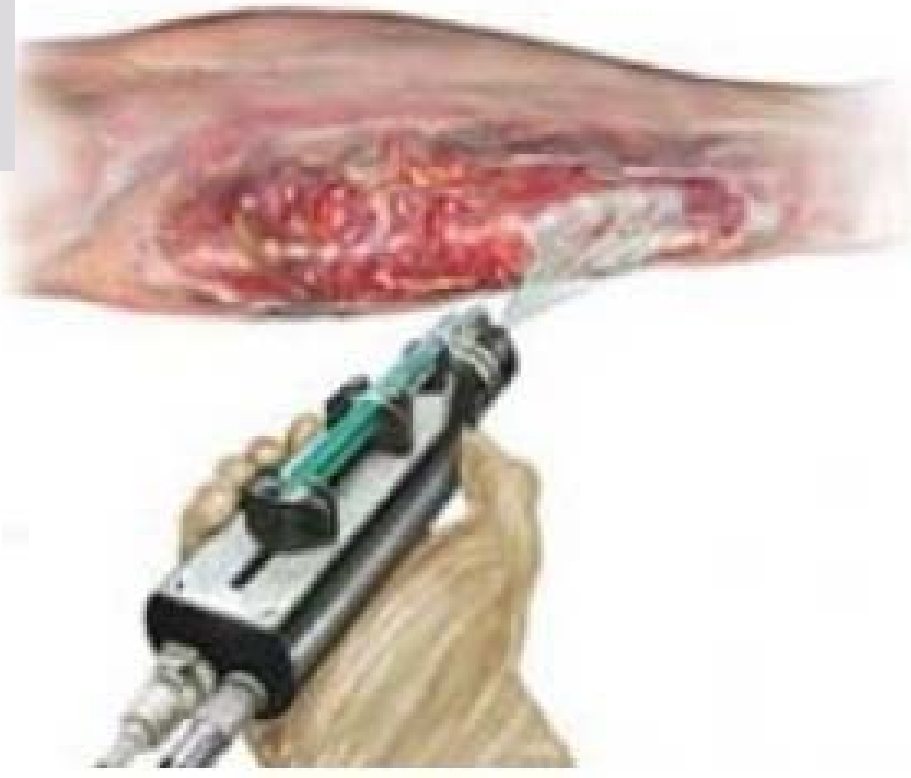
[1]Reference Center for Sickle Cell Disease, Intercommunal Hospital, Créteil; [2]Transplant Unit, St-Louis Hospital, Paris; [3]Hematology Mondor Hospital, [4]Department of Statistics, St-Louis Hospital, Paris; [5]Hemato-Pediatrics Debré Hospital, Paris; [6]Hemato-Pediatrics, Debrousse Hospital, Lyon; [7]Hemato-Pediatrics, Charles Nicoll Hospital, Rouen; [8]Hemato-Pediatrics la Timone Hospital, Marseille; [9]Hemato-Pediatrics, Vandoeuvre Hospital, Na [10]Hemato-Pediatrics, Necker Hospital, Paris; [11]Hemato-Pediatrics de Hautepierre Hospital, Strasbourg; [12]Hemato-Pediatrics Institut de Cancerologie (ICL), St-Etienne; [13]Hematology Pitié Hospital, Paris; [14]Hemato-Pediatrics St-Jacques Hospital, Besançon; and [15]Hemato-Pediatrics, de Villeneuve H Montpellier, France

(Blood. 2007;110:2749-2756)

"Hematopoietic stem cell transplantation (HSCT) is the only curative therapy for sickle cell disease."



Skin Gun – Spray-On Adult Stem Cells



Int J Artif Organs 2011; 34 (3): 000-000

ORIGINAL ARTICLE

Method for autologous single skin cell isolation for regenerative cell spray transplantation with non-cultured cells

Jörg C. Gerlach[1], Christa Johnen[1,2], Christian Ottoman[3], Kirsten Bräutigam[2], Jörn Plettig[4], Claudia Belfekroun[3], Sandra Münch[3], Bernd Hartmann[3]

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Case report

Autologous skin cell spray-transplantation for a deep dermal burn patient in an ambulant treatment room setting

Jörg C. Gerlach [a,], Christa Johnen [d], Eric McCoy [c], Kirsten Bräutigam [b], Jörn Plettig [d], Alain Corcos [c]*

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Burns (2011), doi:10.1016/j.burns.2011.01.022

Tissue-engineered autologous bladders for patients needing cystoplasty

Anthony Atala, Stuart B Bauer, Shay Soker, James J Yoo, Alan B Retik

Summary

Background Patients with end-stage bladder disease can be treated with cystoplasty using gastrointestinal segments. The presence of such segments in the urinary tract has been associated with many complications. We explored an alternative approach using autologous engineered bladder tissues for reconstruction.

Methods Seven patients with myelomeningocele, aged 4–19 years, with high-pressure or poorly compliant bladders, were identified as candidates for cystoplasty. A bladder biopsy was obtained from each patient. Urothelial and muscle cells were grown in culture, and seeded on a biodegradable bladder-shaped scaffold made of collagen, or a composite of collagen and polyglycolic acid. About 7 weeks after the biopsy, the autologous engineered bladder constructs were used for reconstruction and implanted either with or without an omental wrap. Serial urodynamics, cystograms, ultrasounds, bladder biopsies, and serum analyses were done.

Results Follow-up range was 22–61 months (mean 46 months). Post-operatively, the mean bladder leak point pressure decrease at capacity, and the volume and compliance increase was greatest in the composite engineered bladders with an omental wrap (56%, 1·58-fold, and 2·79-fold, respectively). Bowel function returned promptly after surgery. No metabolic consequences were noted, urinary calculi did not form, mucus production was normal, and renal function was preserved. The engineered bladder biopsies showed an adequate structural architecture and phenotype.

Conclusions Engineered bladder tissues, created with autologous cells seeded on collagen-polyglycolic acid scaffolds, and wrapped in omentum after implantation, can be used in patients who need cystoplasty.

Lancet 2006; 367: 1241–46

Published Online
April 4, 2006
DOI:10.1016/S0140-6736(06)68438-9

See Comment page 1215

Department of Urology and Wake Forest Institute for Regenerative Medicine, Wake Forest University School of Medicine, Winston-Salem, NC 27157, USA
(A Atala MD, S Soker PhD, J J Yoo MD); **and Department of Urology, Children's Hospital Boston and Harvard Medical School, Boston, MA, USA**
(S B Bauer MD, A B Retik MD)

Correspondence to:
Dr Anthony Atala
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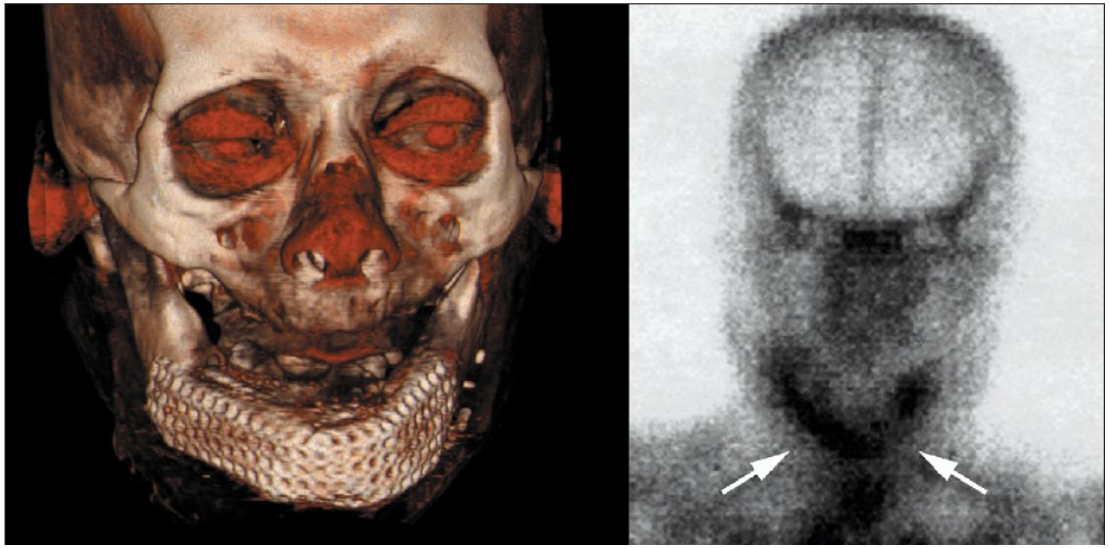
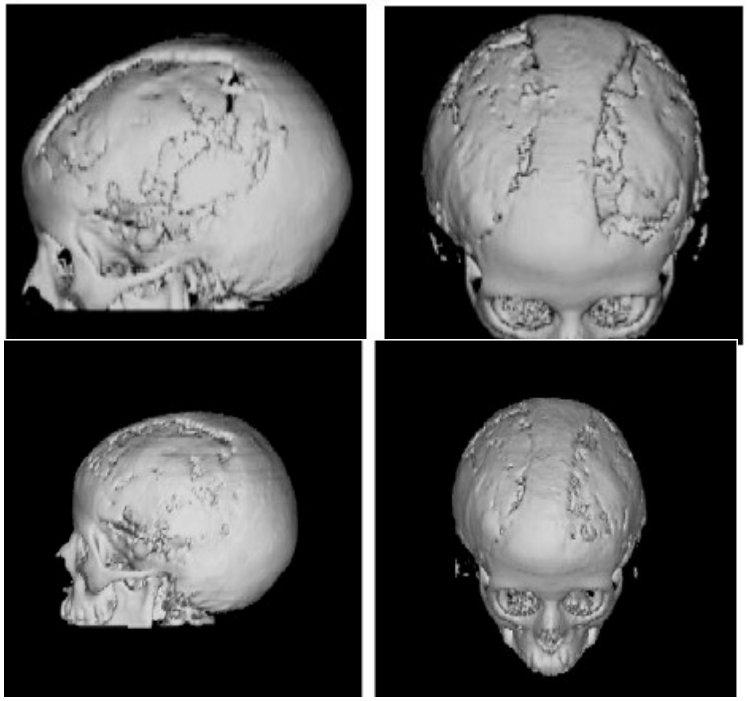
Kaitlyn McNamara had a new functional bladder constructed from her own adult stem cells.



Jaw regrown with adult bone marrow stem cells.

Skull bone grown for 7-year-old girl using adult stem cells from fat.



Therapeutic Microinjection of Autologous Adult Human Neural Stem Cells and Differentiated Neurons for Parkinson's Disease: Five-Year Post-Operative Outcome

Michel F. Lévesque[1,2,3,*], Toomas Neuman[3] and Michael Rezak[2,4]

[1]UCLA School of Medicine and Brain Research Institute, UCLA, Los Angeles, California, USA; [2]Movement Disorders Program, Los Angeles Neurosurgical Institute, Los Angeles, California, USA; [3]Neural Transplantation and Molecular Biology Laboratories, NeuroGeneration, Inc, Los Angeles, California, USA and [4]Feinberg School of Medicine, Northwestern University, Chicago, Illinois, USA

Abstract: *Object.* Neural stem cell-derived neurons offer new cellular therapeutic alternatives for diseases of the central nervous system. Selective neural repair can be particularly valuable in progressive degenerative diseases with discrete cell loss, like Parkinson's disease. Some benefits were previously demonstrated following transplantation of fetal embryonic tissue. This approach, however, carries inherent risks of immunological reactions, infectious transmission, and intractable dyskinesias, in addition to serious ethical concerns.

Methods. Cortical and subcortical tissue samples were obtained during neurosurgical procedures. Neural stem cells were isolated and expanded *in vitro* for several months. Safety, differentiation and functional studies were performed during the expansion phases. Nine months after harvesting, autologous cell suspensions containing differentiated dopaminergic and GABAergic neurons were microinjected unilaterally in a patient with advanced Parkinson's disease. 18F-dopa PET studies and neurological evaluations were performed serially (pre/post-operatively).

Results. Over the next 36 months, the overall Unified Parkinson's Disease Rating Scale (UPDRS) improved by 81% while "on" medication and 83% while "off" medication. At five-years post-operatively, clinical motor scores returned to baseline. At three and twelve months post-operatively, 18F-dopa PET studies showed a 55.6% and 33.2% increase in dopamine uptake in the implanted left putamen.

Conclusions. Adult neural stem cells derived from a patient's cerebral tissue can become a source of differentiated neurons, useful for grafting in the treatment of Parkinson's disease. The combined GABAergic and dopaminergic cells produced a long lasting motor improvement. This approach has the potential to make neural stem cell therapy acceptable and available to a large number of patients.

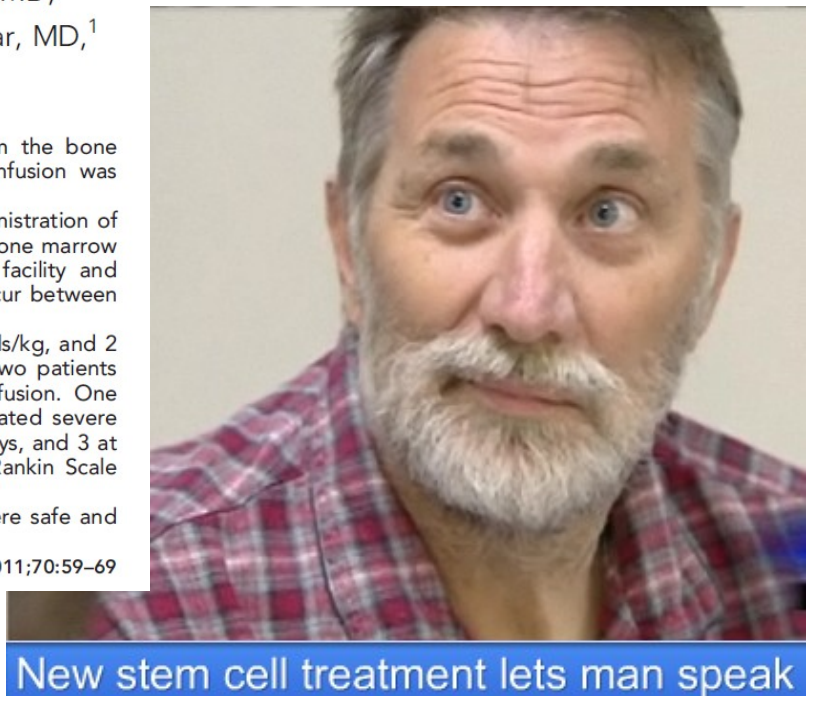
Dennis Turner.
Treated for Parkinson's with his own brain adult stem cells.

Intravenous Autologous Bone Marrow Mononuclear Cells for Ischemic Stroke

Sean I. Savitz, MD,[1] Vivek Misra, MD,[1] Mallik Kasam, PhD,[1] Harrinder Juneja, MD,[3] Charles S. Cox, Jr, MD,[2] Susan Alderman, RN,[1] Imo Aisiku, MD,[1] Siddhartha Kar, MD,[1] Adrian Gee, PhD,[4] and James C. Grotta, MD[1]

Objective: Cellular therapy is an investigational approach for stroke. Mononuclear cells (MNCs) from the bone marrow reduce neurological deficits in animal stroke models. We determined if autologous MNC infusion was feasible and safe in patients with ischemic stroke.
Methods: We conducted an open-label prospective study of a bone marrow harvest followed by readministration of autologous MNCs in 10 patients, 18 to 80 years old, with acute middle cerebral artery ischemic stroke. Bone marrow was aspirated from the iliac crest, and MNCs were separated at a Good Manufacturing Practices facility and administered intravenously up to a maximum of 10 million cells/kg. The harvest and infusion had to occur between 24 and 72 hours after stroke. Patients were monitored for 6 months.
Results: Bone marrow aspiration was successfully completed in all patients. Eight received 10 million cells/kg, and 2 received ≥7 million cells/kg. There were no significant adverse events related to harvest or infusion. Two patients had infarct expansion between enrollment and harvest and underwent hemicraniectomy after cell infusion. One patient died at 40 days due to a pulmonary embolism related to the stroke. There were no study-related severe adverse events. Median National Institutes of Health Stroke Scale score was 13 before harvest, 8 at 7 days, and 3 at 6 months. At 6 months, all surviving patients had shifted down by at least 1 point on the modified Rankin Scale compared to day 7. Seven of 10 patients achieved a Barthel Index ≥90.
Interpretation: This study suggests that a bone marrow harvest and reinfusion of autologous MNCs were safe and feasible in acute stroke patients.

ANN NEUROL 2011;70:59–69



Roland Henrich suffered a stroke and was treated within 24 hours with his own bone marrow adult stem cells. Within 11 days after treatment he showed no signs of paralysis and said his first word since the stroke.

Neurorehabil Neural Repair OnlineFirst, published on September 30, 2009 as doi:10.1177/1545968309347685

Olfactory Mucosal Autografts and Rehabilitation for Chronic Traumatic Spinal Cord Injury

Carlos Lima, MD,[1] Pedro Escada, MD,[1] José Pratas-Vital, MD,[1] Catarina Branco, MD,[2] Carlo Alberto Arcangeli, MD,[3] Giovanna Lazzeri, MD,[3] Carlos Alberto Santana Maia, MD,[4] Clara Capucho, MD,[1] Armando Hasse-Ferreira, MD,[1] and Jean D. Peduzzi, PhD[5]

Neurorehabilitation and Neural Repair
XX(X) 1–13

DOI: 10.1177/1545968309347685
http://nnr.sagepub.com
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Olfactory Mucosa Autografts in Human Spinal Cord Injury: A Pilot Clinical Study

Carlos Lima, MD[1]; José Pratas-Vital, MD[2]; Pedro Escada, MD[3]; Armando Hasse-Ferreira, MD[2]; Clara Capucho, MD[3]; Jean D. Peduzzi, PhD[4]

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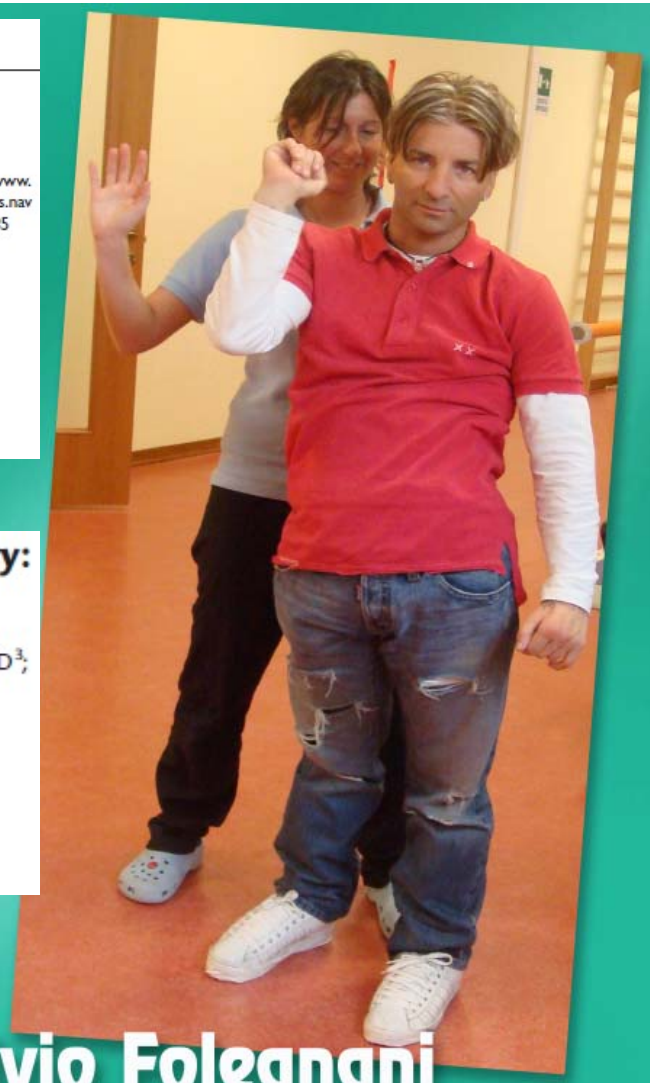
J Spinal Cord Med. 2006;29:191–203 ber 6, 2005



Silvio Folegnani
Complete Quadriplegic Spinal Cord Injury

Bone Marrow Transplantation (2010) 45, 111–116

www.nature.com/bmt

ORIGINAL ARTICLE

Autologous peripheral blood CD133+ cell implantation for limb salvage in patients with critical limb ischemia

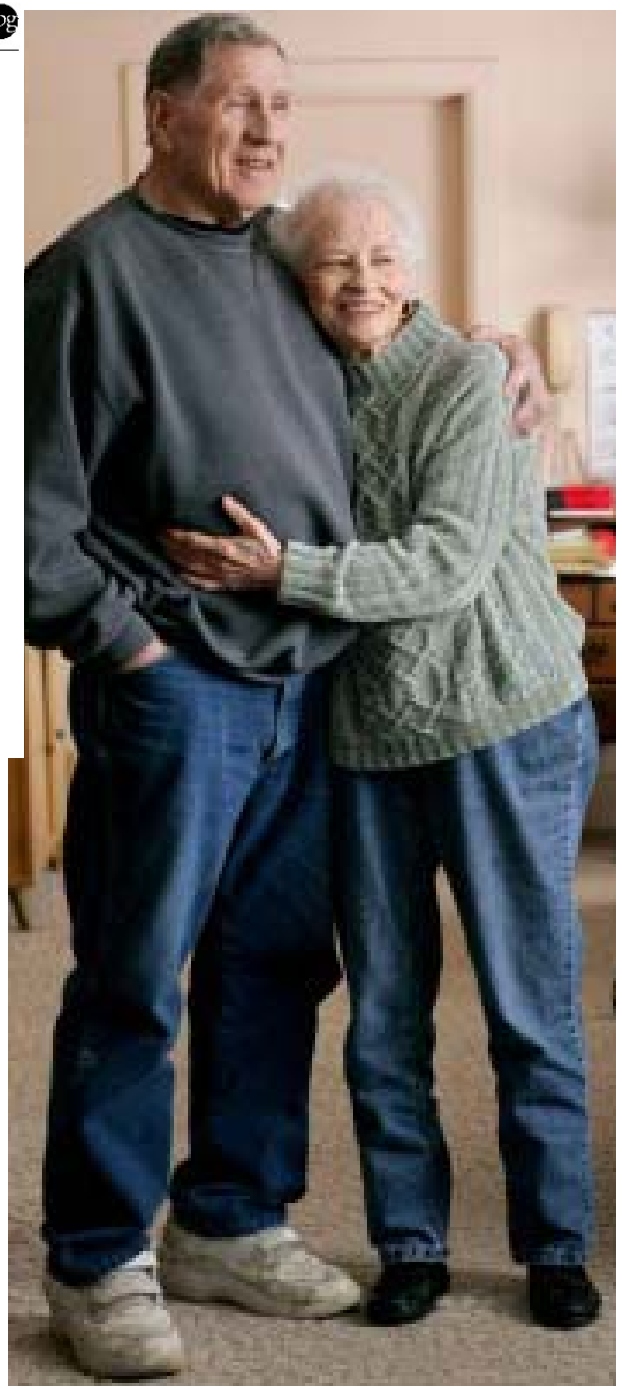
RK Burt[1], A Testori[1], Y Oyama[1], HE Rodriguez[2], K Yaung[1], M Villa[1], JM Bucha[1], F Milanetti[1], J Sheehan[3], N Rajamannan[4,5] and WH Pearce[2]

[1]*Division of Immunotherapy, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA;* [2]*Department of Vascular Surgery, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA;* [3]*Department of Radiology, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA;* [4]*Department of Cardiology, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA and* [5]*Department of Pathology, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA*

We report the safety and feasibility of autologous CD133+ cell implantation into the lower extremity muscles of patients with critical limb ischemia, whose only other option was limb amputation. Nine patients participated in the study: seven patients suffering from arteriosclerosis obliterans, one with thromboangiitis ob-

Introduction

Initial presentation of peripheral arterial disease (PAD) is intermittent claudication with pain in the calf, thigh or buttock that is elicited by exertion and relieved with a few minutes of rest. Over time, the disease progresses to critical



Helen Thomas, 80, was treated for peripheral artery disease with her own adult stem cells. The transplant saved her leg from amputation.

EUROPEAN SOCIETY OF CARDIOLOGY®

European Journal of Heart Failure (2010) **12**, 721–729
doi:10.1093/eurjhf/hfq095

The acute and long-term effects of intracoronary Stem cell Transplantation in 191 patients with chronic heARt failure: the STAR-heart study

Bodo-Eckehard Strauer*, Muhammad Yousef, and Christiana M. Schannwell

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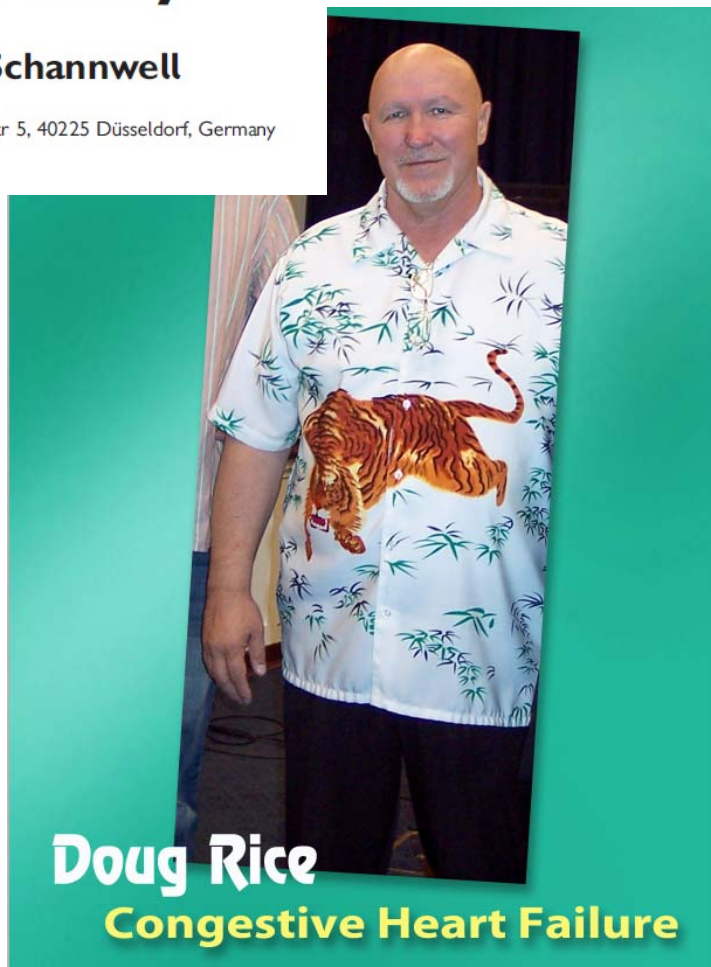
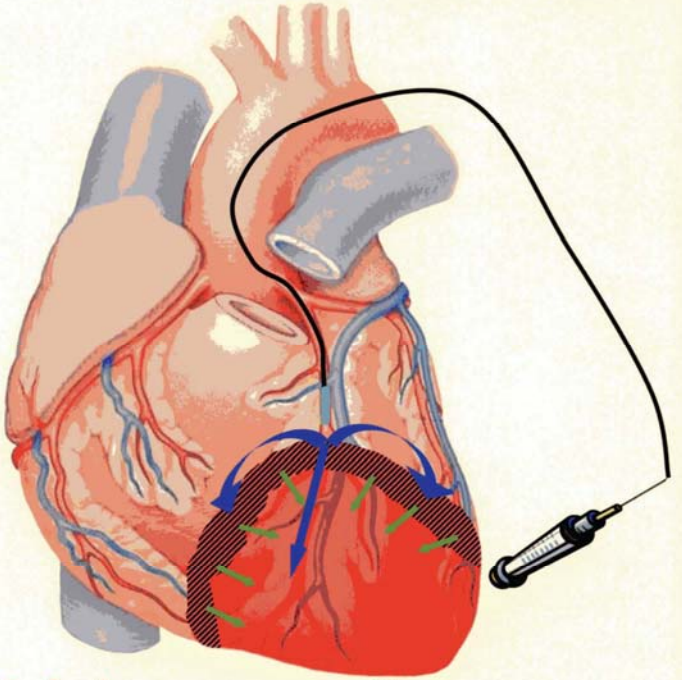
Received 11 February 2010; revised 12 April 2010; accepted 16 April 2010



Strauer, Ott, Schannwell (Hrsg.)

Adulte Stammzellen

Therapiemöglichkeiten bei Herz- und Kreislauferkrankungen



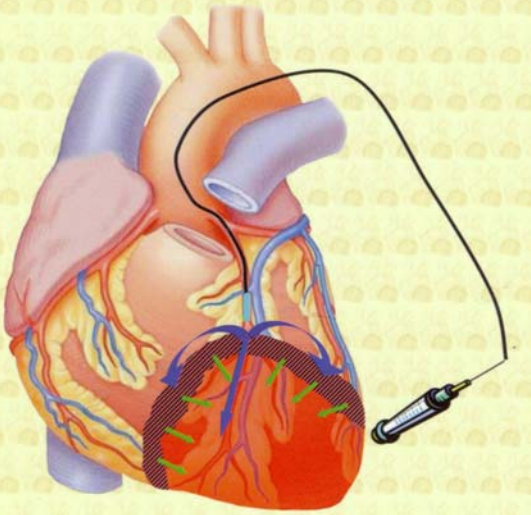
Adult stem cells

Potential therapies in cardiac and vascular diseases

d|u|p düsseldorf university press

Prof. Dr. Bodo Eckehard Strauer (ed.)

The Decade of Adult Stem Cells in Heart Diseases



10 Jahre Düsseldorfer Stammzelltherapie

- von der Erstbeschreibung zur klinischen Praxis

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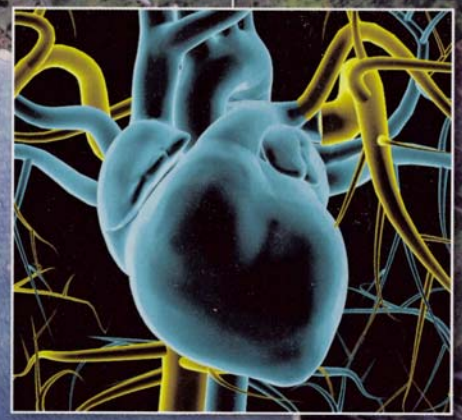
What if you could do this after a heart attack?



ATLANTA – Emory University physicians are revolutionizing heart care by using a patient's own stem cells to restore damaged heart muscle after a heart attack. It's one of hundreds of treatments developed at Emory, where doctors don't just practice medicine, they advance it. For more information, visit www.emoryheart.org.

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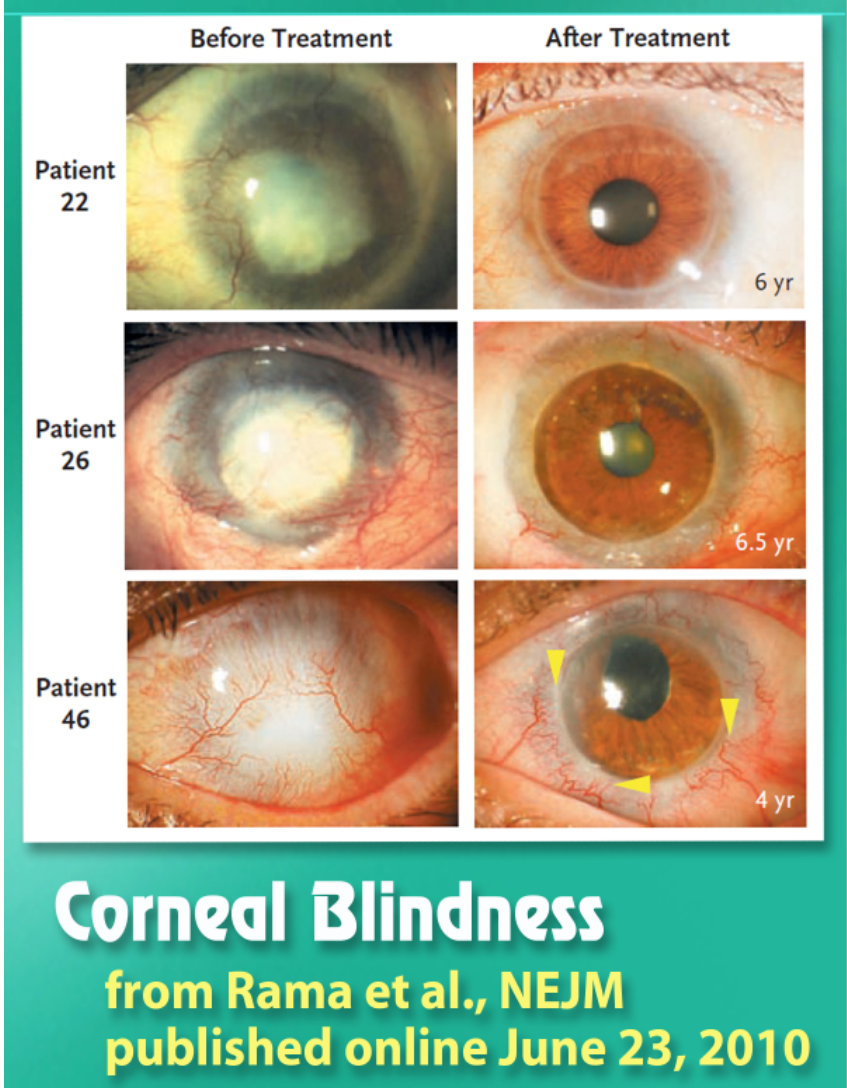
The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Limbal Stem-Cell Therapy and Long-Term Corneal Regeneration

Paolo Rama, M.D., Stanislav Matuska, M.D., Giorgio Paganoni, M.D., Alessandra Spinelli, M.D., Michele De Luca, M.D., and Graziella Pellegrini, Ph.D.

This article (10.1056/NEJMoa0905955) was published on June 23, 2010, at NEJM.org.



Nate Liao was successfully treated for a fatal genetic skin disease with donor adult stem cells.

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Bone Marrow Transplantation for Recessive Dystrophic Epidermolysis Bullosa

John E. Wagner, M.D., Akemi Ishida-Yamamoto, M.D., Ph.D., John A. McGrath, M.D., Maria Hordinsky, M.D., Douglas R. Keene, B.S., Megan J. Riddle, B.A., Mark J. Osborn, Ph.D., Troy Lund, M.D., Ph.D., Michelle Dolan, M.D., Bruce R. Blazar, M.D., and Jakub Tolar, M.D., Ph.D.

ABSTRACT

BACKGROUND

Recessive dystrophic epidermolysis bullosa is an incurable, often fatal mucocutaneous blistering disease caused by mutations in *COL7A1*, the gene encoding type VII collagen (C7). On the basis of preclinical data showing biochemical correction and prolonged survival in *col7*$^{-/-}$ mice, we hypothesized that allogeneic marrow contains stem cells capable of ameliorating the manifestations of recessive dystrophic epidermolysis bullosa in humans.

From the Blood and Marrow Transplant Program, Department of Pediatrics (J.E.W., M.J.R., M.J.O., T.L., B.R.B., J.T.), Center for Translational Medicine (J.E.W., B.R.B., J.T.), and the Departments of Dermatology (M.H.) and Laboratory Medicine and Pathology (M.D.), University of Minnesota, Minneapolis; the Department of Dermatology, Asahikawa Medical College, Asahikawa, Japan (A.I.-Y.); St. John's Institute of Dermatology, King's College London (Guy's Campus), London (J.A.M.); and Microimaging Center, Shriners Hospital for Children, Portland, OR (D.R.K.). Address reprint requests to Dr. Wagner at the Division of Pediatric Hematology/Oncology and Blood and Marrow Transplantation, University of Minnesota, Mayo Mail Code 366, 420 Delaware St. SE, Minneapolis, MN 55455, or at wagne002@umn.edu.

Drs. Blazar and Tolar contributed equally to this article.

N Engl J Med 2010;363:629-39.

Claudia Castillo had a complete new trachea grown using her own adult stem cells. The transplant saved her lung and she is now doing well.

Clinical transplantation of a tissue-engineered airway

Paolo Macchiarini, Philipp Jungebluth, Tetsuhiko Go, M Adelaide Asnaghi, Louisa E Rees, Tristan A Cogan, Amanda Dodson, Jaume Martorell, Silvia Bellini, Pier Paolo Parnigotto, Sally C Dickinson, Anthony P Hollander, Sara Mantero, Maria Teresa Conconi, Martin A Birchall

Summary

Background The loss of a normal airway is devastating. Attempts to replace large airways have met with serious problems. Prerequisites for a tissue-engineered replacement are a suitable matrix, cells, ideal mechanical properties, and the absence of antigenicity. We aimed to bioengineer tubular tracheal matrices, using a tissue-engineering protocol, and to assess the application of this technology in a patient with end-stage airway disease.

Methods We removed cells and MHC antigens from a human donor trachea, which was then readily colonised by epithelial cells and mesenchymal stem-cell-derived chondrocytes that had been cultured from cells taken from the recipient (a 30-year old woman with end-stage bronchomalacia). This graft was then used to replace the recipient's left main bronchus.

Findings The graft immediately provided the recipient with a functional airway, improved her quality of life, and had a normal appearance and mechanical properties at 4 months. The patient had no anti-donor antibodies and was not on immunosuppressive drugs.

Interpretation The results show that we can produce a cellular, tissue-engineered airway with mechanical properties that allow normal functioning, and which is free from the risks of rejection. The findings suggest that autologous cells combined with appropriate biomaterials might provide successful treatment for patients with serious clinical disorders.

Lancet 2008; 372: 2023–30

Published Online November 19, 2008 DOI:10.1016/S0140-6736(08)61598-6

See **Comment** page 2003

Department of General Thoracic Surgery, Hospital Clinic, Barcelona, Spain (Prof P Macchiarini MD, P Jungebluth MD, T Go MD); **Fundació Clínic, Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), Barcelona, Spain** (P Macchiarini); **CIBER Enfermedades Respiratorias, Universitat de Barcelona, Barcelona, Spain** (P Macchiarini); **Bioengineering, Politecnico di Milano, Milan, Italy** (M A Asnaghi MSc,

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Adult Stem Cells Help Create Synthetic Windpipe, Save Cancer Patient

by David Prentice
July 8, 2011

A cancer patient has received the **first synthetic windpipe transplant**. The new windpipe was created **using the patient's own adult stem cells** which were seeded onto a synthetic scaffold to grow the new tissue. According to his doctors, the patient–36-year-old Andemariam Teklesenbet Beyene, a father of two–no longer has cancer, will be released from the hospital today, and is expected to have a normal life expectancy.

Professor Paolo Macchiarini, of Karolinska University Hospital and Karolinska Institute, led the 9
Huddinge, Stockholm. Professor Macchiarini also led the
windpipe, which included Professor Alexander Seifalian from
ed and built the nanocomposite tracheal scaffold, and
at produced a specifically designed bioreactor used to seed
ells from bone marrow.

Tracheobronchial transplantation with a stem-cell-seeded bioartificial nanocomposite: a proof-of-concept study

Philipp Jungebluth, Evren Alici, Silvia Baiguera, Katarina Le Blanc, Pontus Blomberg, Béla Bozóky, Claire Crowley, Oskar Einarsson, Karl-Henrik Grinnemo, Tomas Gudbjartsson, Sylvie Le Guyader, Gert Henriksson, Ola Hermanson, Jan Erik Juto, Bertil Leidner, Tobias Lilja, Jan Liska, Tom Luedde, Vanessa Lundin, Guido Moll, Bo Nilsson, Christoph Roderburg, Staffan Strömblad, Tolga Sutlu, Ana Isabel Teixeira, Emma Watz, Alexander Seifalian, Paolo Macchiarini

Summary

Background Tracheal tumours can be surgically resected but most are an inoperable size at the time of diagnosis; therefore, new therapeutic options are needed. We report the clinical transplantation of the tracheobronchial airway with a stem-cell-seeded bioartificial nanocomposite.

Methods A 36-year-old male patient, previously treated with debulking surgery and radiation therapy, presented with recurrent primary cancer of the distal trachea and main bronchi. After complete tumour resection, the airway was replaced with a tailored bioartificial nanocomposite previously seeded with autologous bone-marrow mononuclear cells via a bioreactor for 36 h. Postoperative granulocyte colony-stimulating factor filgrastim (10 µg/kg) and epoetin beta (40 000 UI) were given over 14 days. We undertook flow cytometry, scanning electron microscopy, confocal microscopy epigenetics, multiplex, miRNA, and gene expression analyses.

Lancet 2011; 378: 1997–2004
Published Online November 24, 2011 DOI:10.1016/S0140-6736(11)61715-7

See **Comment** page 1977

Advanced Center for Translational Regenerative Medicine (P Jungebluth MD, S Baiguera PhD, K-H Grinnemo MD, Prof P Macchiarini MD), **Cell**

ıe trachea were the patient's own, there has been no
t is not taking (anti-rejection) drugs."

ın adult stem cells and a synthetic scaffold is a tremendous
gans for transplant within a short period of time. As Prof.

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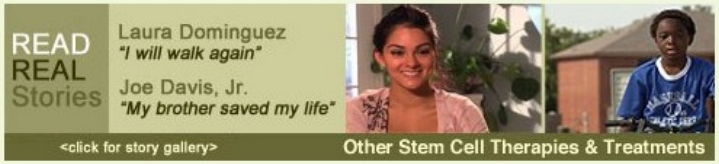

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