Status Update
February 8, 2016

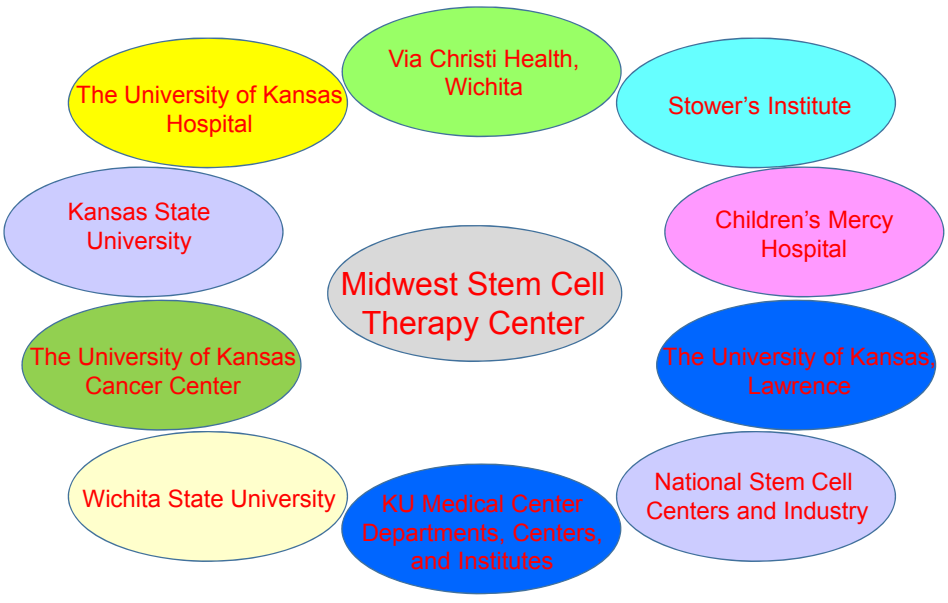
Buddhadeb Dawn, M.D.
Director, Midwest Stem Cell Therapy Center

Maureen and Marvin Dunn Professor
Director, Division of Cardiovascular Diseases
Director, Cardiovascular Research Institute
University of Kansas Medical Center

KU Midwest Stem Cell Therapy Center — The University of Kansas

The University of Kansas Hospital

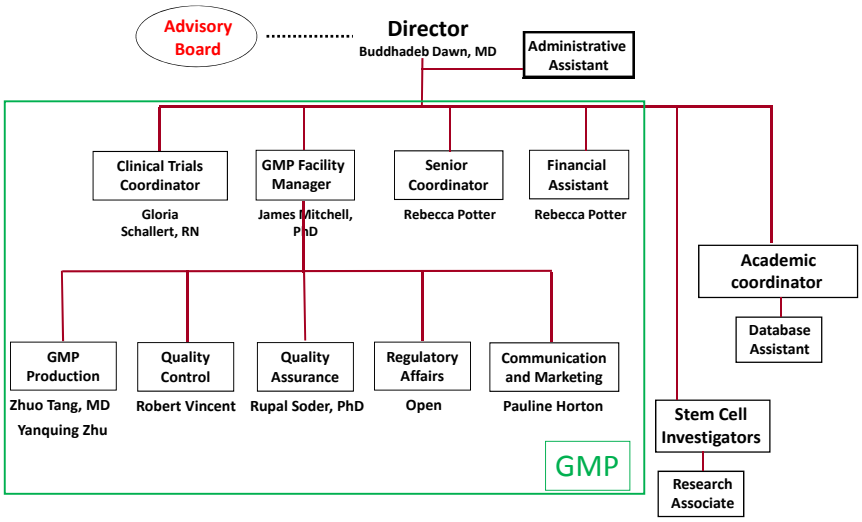
Stem Cell Hub



Objectives of the Center - I

- To *advance* adult, cord blood and related stem cell research and therapies for *patient treatment*
- To serve as a *core facility* to produce clinical grade stem cells
- To initiate *clinical trials* with adult, cord blood, and related stem cells

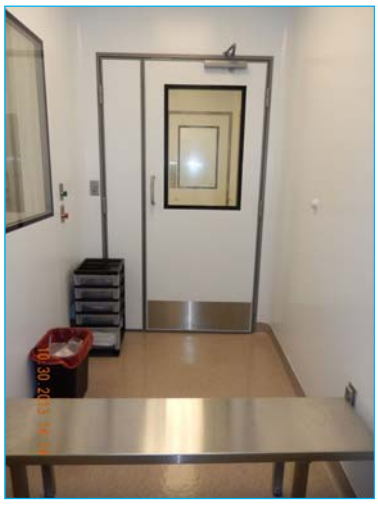
MSCTC Organizational Chart



MSCTC Staff

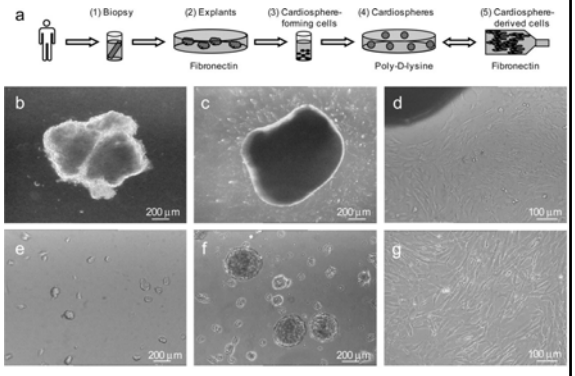
MSCTC Advisory Board

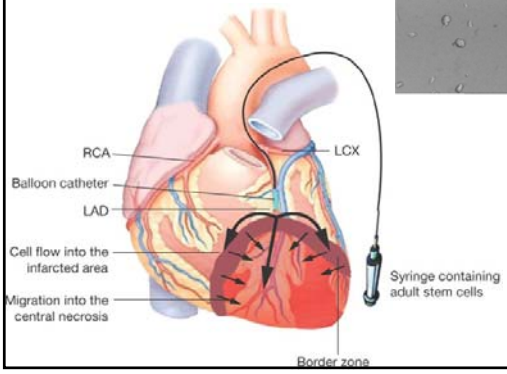
Good Manufacturing Practice Facility



Current Clinical Trials

ALLSTAR: Heart-derived stem cells for patients with heart attack



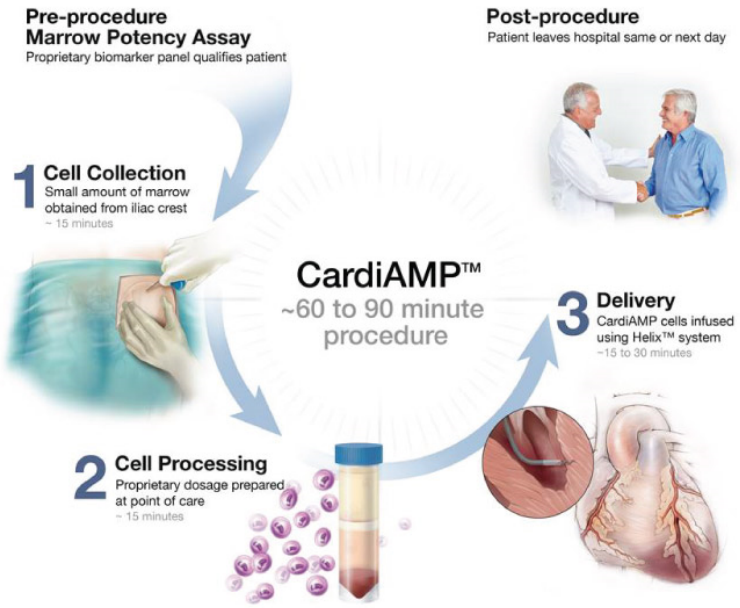


PreSERVE AMI: Bone marrow-derived CD34+ cells for patients with heart attack

Future Clinical Trials of Heart Repair

- CardiAMP
  - Selected autologous bone marrow mononuclear cells delivered intramyocardially to repair cardiac tissue in patients with heart failure
  - Initial evaluation of clinical study requirements underway by KU
  - CDA has been signed

CardiAMP



Future Clinical Trials of Heart Repair

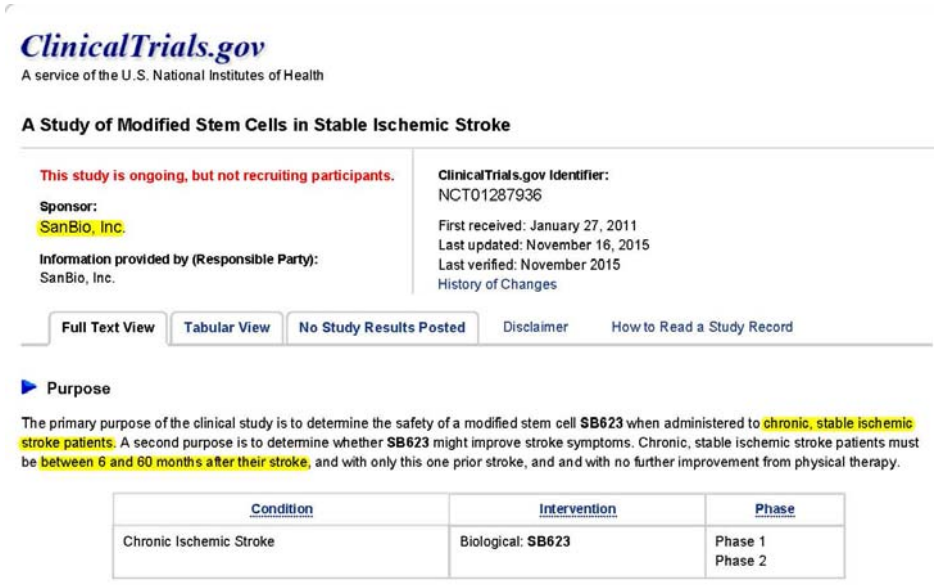
- EXCELLENT
  - Multicenter Phase III study of cardiac repair in patients with heart attack and reduced heart function
  - Peripheral blood CD34+ stem cells will be expanded in a proprietary StemXpand automated cell processing system and injected using a helical needle
  - Collaboration with CellProthera
  - Possible long-term stem cell manufacturing for supply in US if site approved
  - Site visit tentatively mid to late summer

Future Clinical Trials for Stroke

ACTIsSIMA

- Modified adult bone marrow stem cells (SB623) for patients with motor deficiency following an ischemic stroke
- US Biotech company sponsoring trial
- Study to start in near future

ACTIsSIMA



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

A Study of Modified Stem Cells in Stable Ischemic Stroke

This study is ongoing, but not recruiting participants.

Sponsor:
SanBio, Inc.

Information provided by (Responsible Party):
SanBio, Inc.

ClinicalTrials.gov Identifier:
NCT01287936

First received: January 27, 2011
Last updated: November 16, 2015
Last verified: November 2015
History of Changes

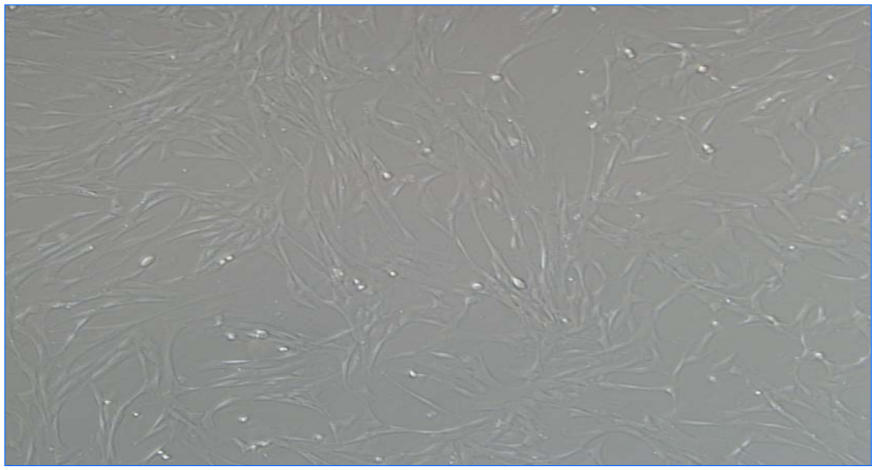
Full Text View | Tabular View | No Study Results Posted | Disclaimer | How to Read a Study Record

Purpose

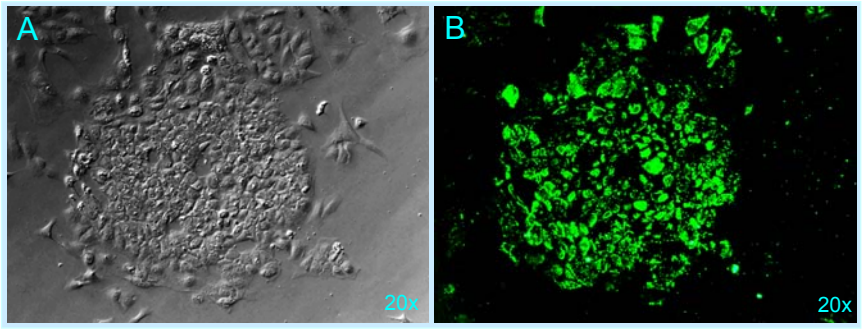
The primary purpose of the clinical study is to determine the safety of a modified stem cell **SB623** when administered to chronic, stable ischemic stroke patients. A second purpose is to determine whether **SB623** might improve stroke symptoms. Chronic, stable ischemic stroke patients must be between 6 and 60 months after their stroke, and with only this one prior stroke, and and with no further improvement from physical therapy.

Condition	Intervention	Phase
Chronic Ischemic Stroke	Biological: **SB623**	Phase 1 Phase 2

Umbilical Cord-derived Mesenchymal Stem Cells (UC-MSCs)



Human iPS Cells



bright-field

Tra-1-81 (green)

Areas of Research Focus

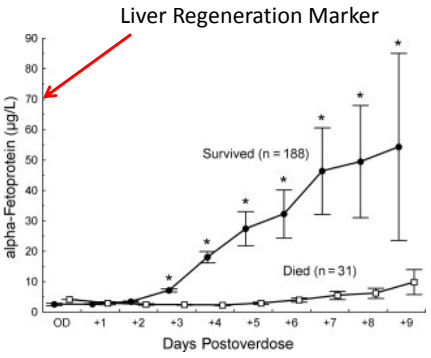
- Cancer and Immunotherapy
- Stroke and Neurodegenerative Disease
- Cardiac and Vascular Disease
- Musculoskeletal Disease and Trauma

Current Pre-Clinical Projects

- Graft vs. Host Disease (GvHD)
  - Collaboration with University of Kansas Cancer Center
  - FDA teleconference was held on 2/5 - approved for preclinical work
  - IND to be written and submitted for FDA approval to conduct a Phase I human clinical study

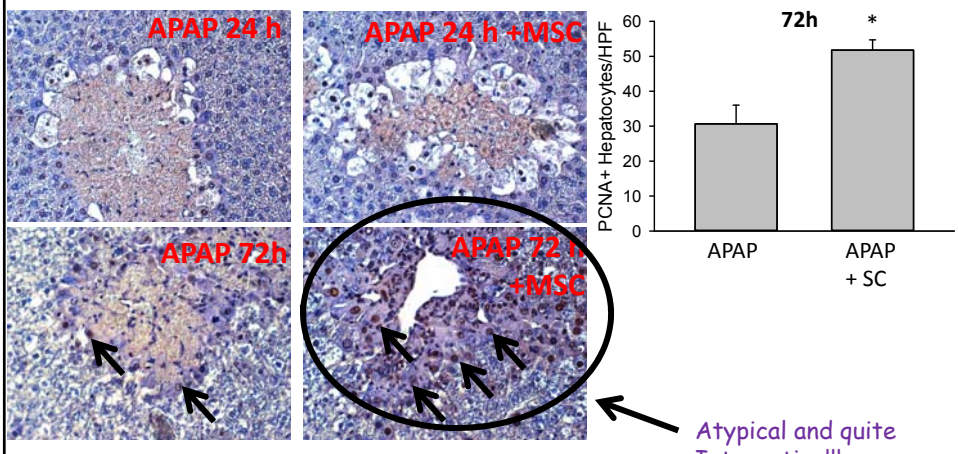
Liver Regeneration Predicts Survival in Patients with Acetaminophen Overdose

- Liver has native potential for regeneration
- However, after an acute liver injury, some patients will progress to an advanced state called Acute Liver Failure
- Mesenchymal stem cells may be able to stimulate regeneration in these patients, providing an entirely novel therapeutic option



Schmidt and Dalhoff, 2005

Enhanced Liver Regeneration in MSC Post-treated Mice 72h after Acetaminophen Dose



Atypical and quite Interesting!!!

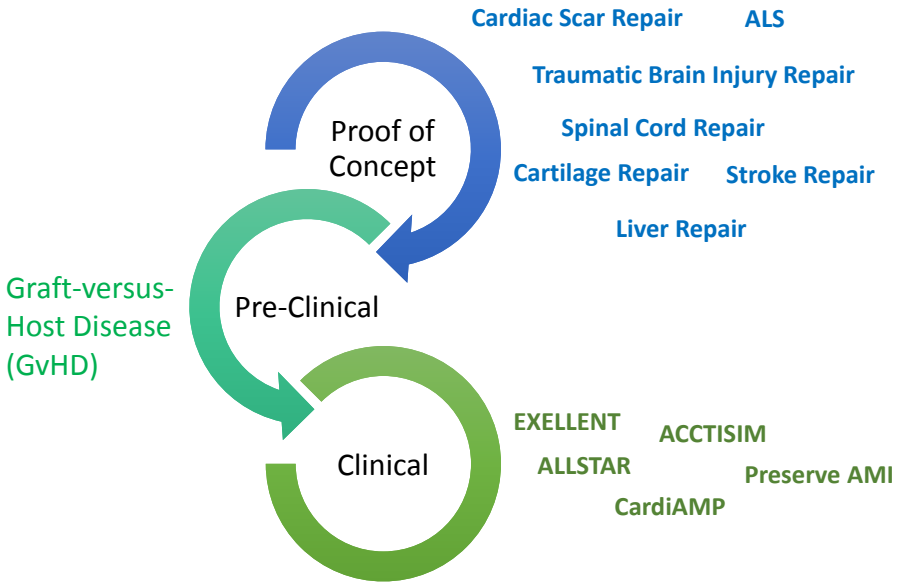
Additional KUMC Collaborations

- Amyotrophic Lateral Sclerosis (Lou Gehrig's disease)
  - KUMC, Dept. of Neurology, Dept. of Anatomy and Cell Biology
  - WJMSCs shown to produce cytokines believed to be important in nerve repair
- MI Scar Repair
  - KUMC, Cardiovascular Research Institute
  - Animal studies to begin 1st Qtr 2016
- Cartilage Repair
  - KUMC, Dept. of Orthopedic Surgery
  - WJMSCs being evaluated to determine their ability to differentiate into chondrocytes, the cells that generate and maintain cartilage matrices

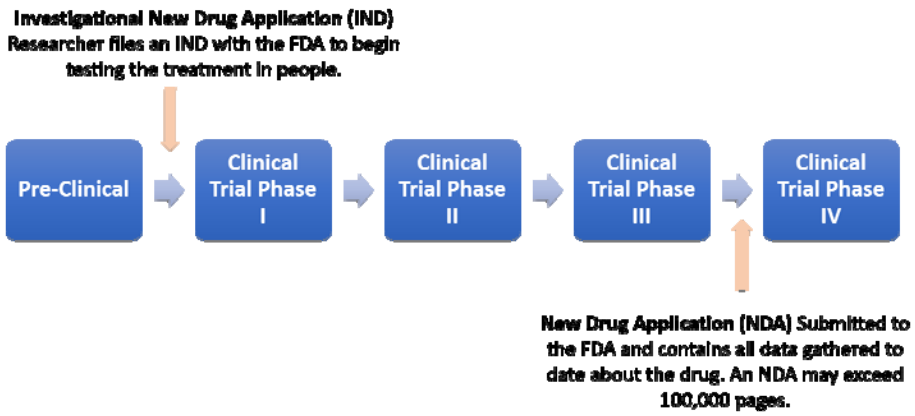
Additional Internal Collaborations

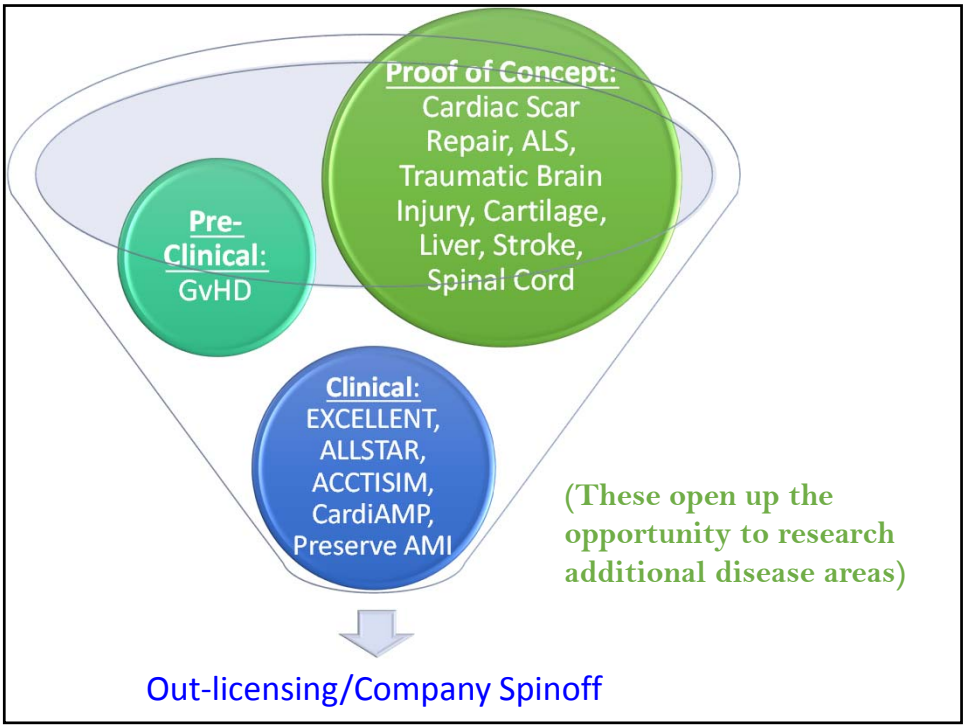
- Spinal Cord Repair
  - KUMC, Dept. of Molecular and Integrative Physiology/Dept. of Pathology and Laboratory Medicine
  - WJMSCs being evaluated for the capacity to differentiate into neurons
- Stroke and Traumatic Brain Injury Repair
  - KUMC, Dept. of Rehabilitation Medicine
  - WJMSCs being evaluated for the capacity to differentiate into neurons

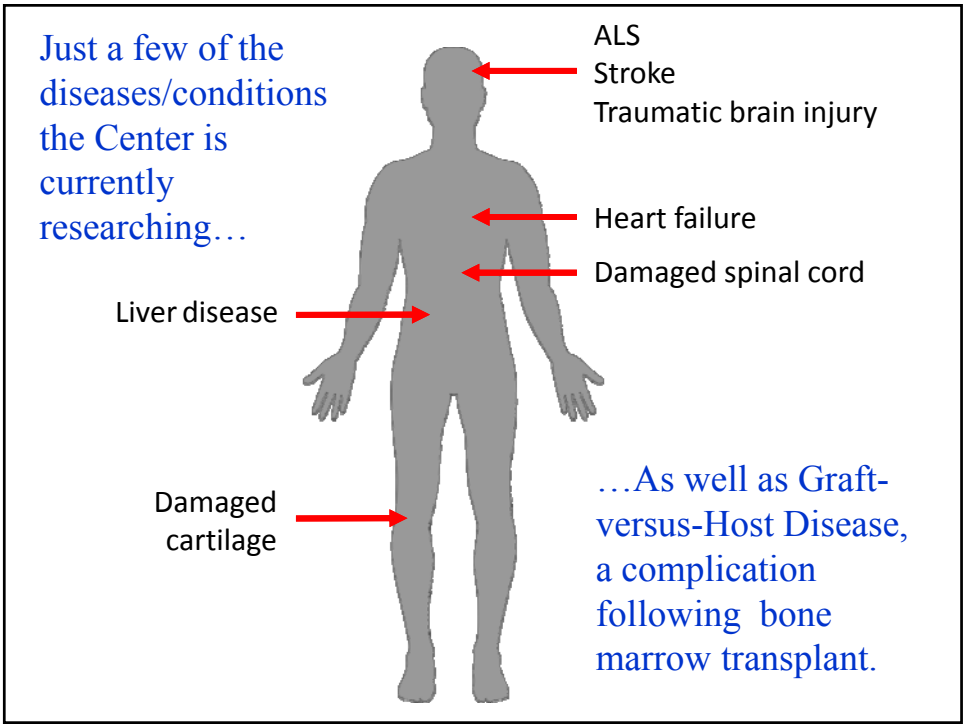
Project Pipeline



FDA Clinical Trial Process




Proof of Concept:
Cardiac Scar Repair, ALS, Traumatic Brain Injury, Cartilage, Liver, Stroke, Spinal Cord
Pre-Clinical:
GvHD
Clinical:
EXCELLENT, ALLSTAR, ACCTISIM, CardiAMP, Preserve AMI
(These open up the opportunity to research additional disease areas)
Out-licensing/Company Spinoff


Just a few of the diseases/conditions the Center is currently researching…
ALS
Stroke
Traumatic brain injury
Heart failure
Damaged spinal cord
Liver disease
Damaged cartilage
…As well as Graft-versus-Host Disease, a complication following bone marrow transplant.

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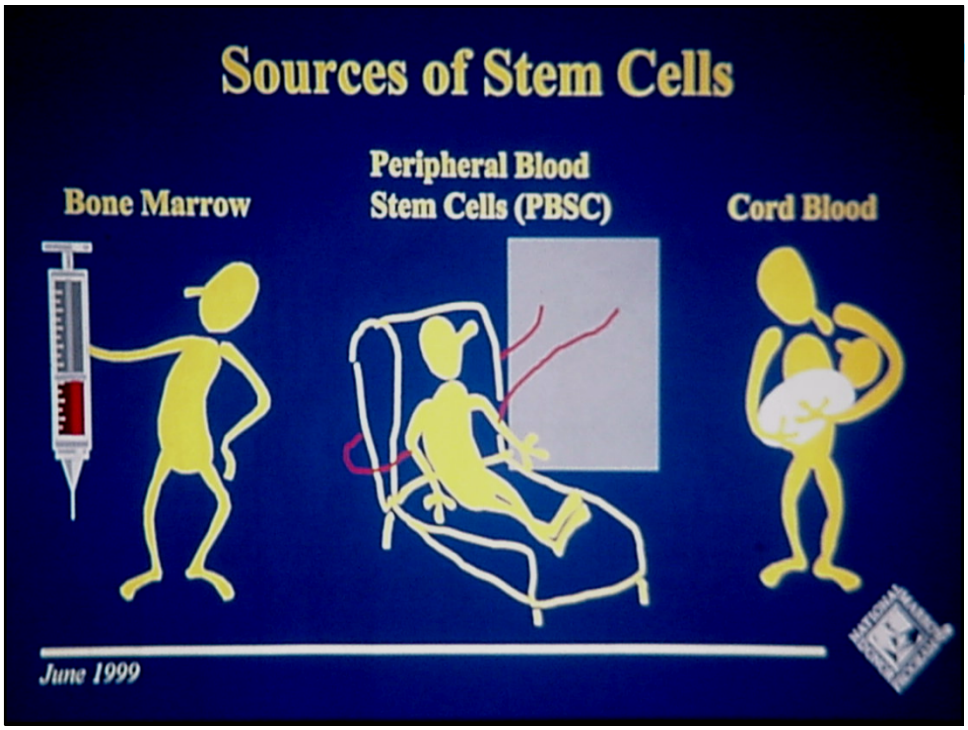
THE UNIVERSITY OF KANSAS CANCER CENTER

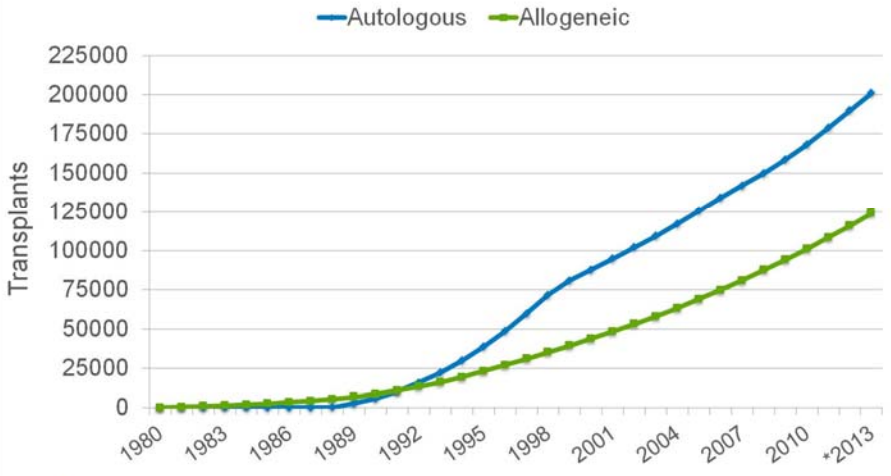
BEST HOSPITALS U.S.News

Advances in Stem Cell Transplantation and Cellular Therapeutics

Dr. Joseph McGuirk
Medical Director, Blood and Marrow Transplantation
Division Director, Hematologic Malignancies & Cellular Therapeutics



Cumulative Plot of Transplant Recipients in the US by Transplant Type



CIBMTR

* 2013 Data incomplete

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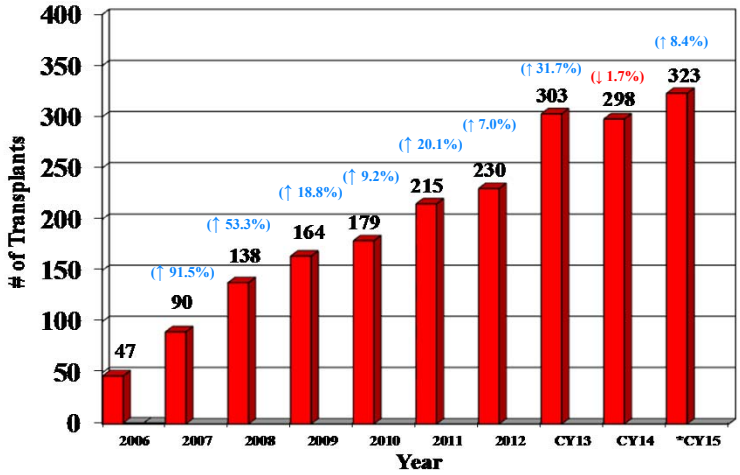
Blood & Marrow Transplant – Annual Volume (CY)



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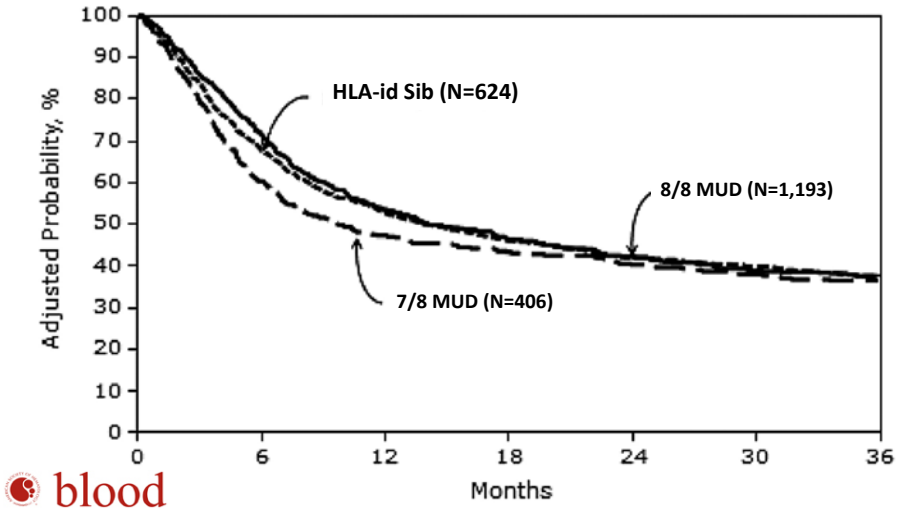
Adjusted probability of overall survival in 2223 adult AML patients by donor type



blood

Wael Saber et al. *Blood.* 2012;119:3908-3916

©2012 by American Society of Hematology

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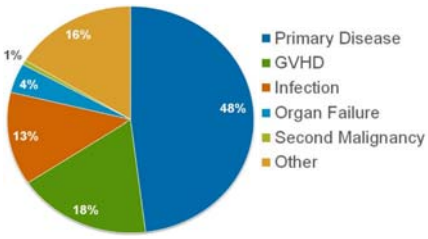
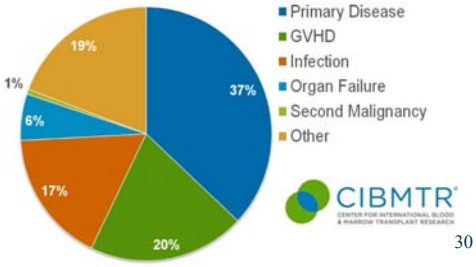
Causes of Mortality related to Allogeneic BMT

(2011-2012)

HLA-identical Sibling



Unrelated Donor



CIBMTR

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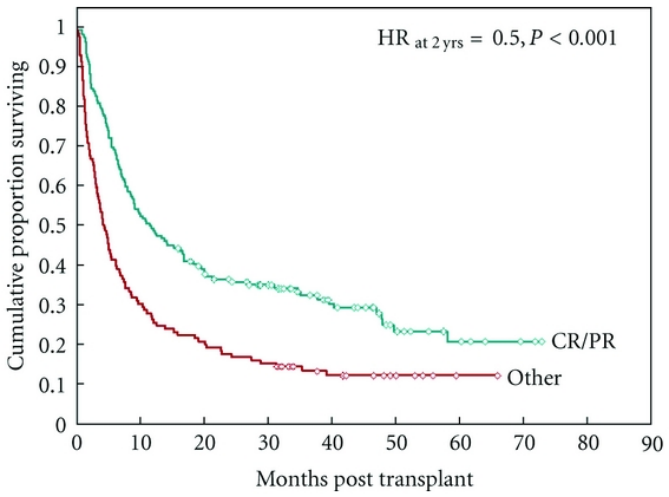
Overall Survival in Steroid-responsive and refractory aGVHD



J Westin et al. *Adv Hematol*. 2011; 2011: 601953.

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The University of Kansas Cancer Center | NCI·CC

MSCs for GVHD – Summary

- 20 studies used MSCs for GVHD grade 2-4
- MSCs have a positive effect (varies between studies)
- Conditioning varied from myeloablative, nonmyeloablative, RIC, DLI, etc.
  - No apparent difference in response
- MSCs from HLA identical, haploidentical and unrelated, unmatched have been used
  - No apparent differences in response
- MSCs from fresh or frozen/thawed

Source: Mark Weiss

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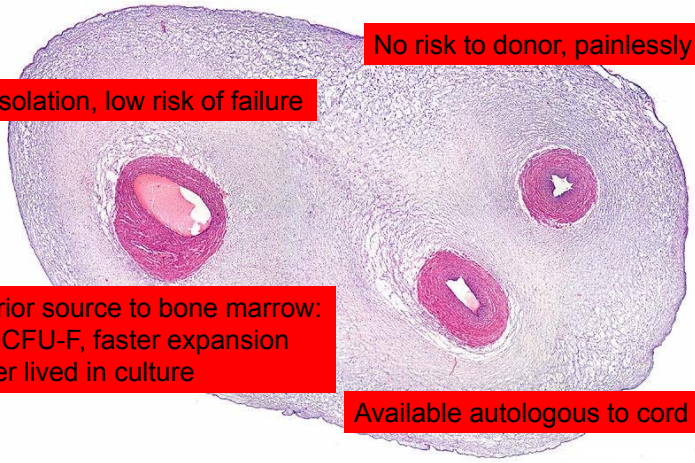
Wharton's Jelly Cells – the MSCs of the Umbilical Cord



No risk to donor, painlessly collected

Easy isolation, low risk of failure

Superior source to bone marrow:
More CFU-F, faster expansion
Longer lived in culture

Available autologous to cord blood

Umbilical cord is not biohazardous waste.
It is a gold mine!

Source: Mark Weiss

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Objectives of the Center - II

- Informing the public on available adult, cord blood, and related stem cell therapeutic options
- Creating and maintaining a database of available stem cell clinical trials and therapies
- Foster a regional network of physicians trained in adult stem cell therapy

Dissemination of Information

- Website (www.kumc.edu/msctc)
- Compilation of an extensive resource for adult stem cell information
- Providing answers via emails/meetings
- Conferences

Midwest Conference on Cell Therapy and Regenerative Medicine

September 16-17, 2016
Sheraton Overland Park, KS

Objectives

- Continue to be a reliable and trustworthy source for practitioners who want up-to-date information on adult stem cell therapy
- Continue to build awareness of Center

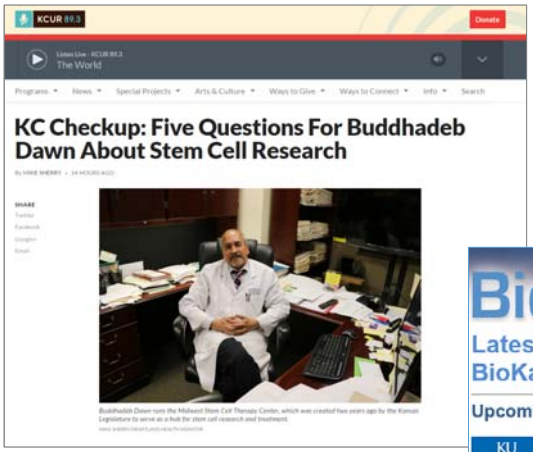
Establishing Relationships

Archdiocese of Kansas City

Vatican

Monsgr. Tomasz Trafny
Head of Science and Faith Department
at the Pontifical Council for Culture

Establishing Relationships

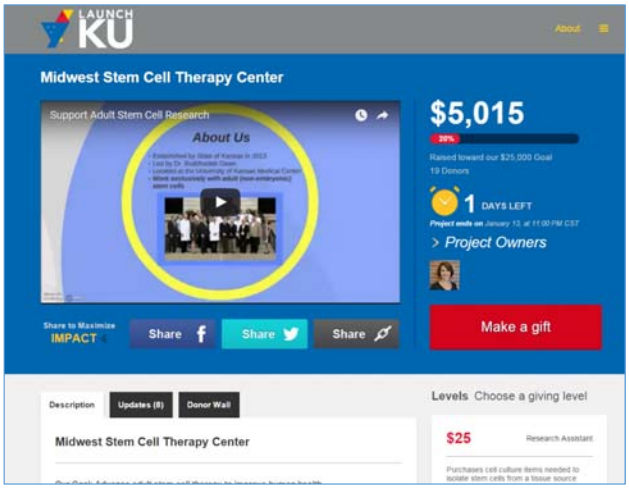


KC check-up

BioKansas

Establishing Relationships

- KU Communications departments
- KU Endowment
  - Pilot for new crowdfunding initiative



Donor Communications

MSCTC Fiscal Overview

The MSCTC is currently funded by:

- State of Kansas annual appropriation
- Donor giving routed through KU Endowment
- EVC discretionary KUEA fund for Advisory Board and other official hospitality expenses
  - "Official hospitality" needs to be added to the State budget bill
- Income received from GMP manufacturing and externally funded projects
- Clinical Trials

Prepared by R. Potter

Major Support from KU Medical Center and the Kansas Legislature

- Funds toward initial GMP construction, personnel salary and benefits
- Space and other key infrastructure support
- Administrative support, RI
- Brand recognition
- Abundance of collaborators
- Continued funding from the State of Kansas

Business Initiatives

Sponsored R&D

- Nueterra
  - Adipose MSC treatment for Osteoarthritis/Cartilage Repair
  - Project proposal being drafted by Nueterra for review
- Stemodontics
  - Isolation, recovery of dental pulp MSCs and long-term banking
  - Contract for business over the next 10 years in final stages
- Applied Stemcell
  - Gene Therapy for Aplastic Anemia
  - Contract in development
- Cell Prothera
  - Expanding bone marrow CD34+ cells using proprietary StemXpand Automated system
- KUCC and Stowers
  - Cord Blood Stem Cell Expansion for transplant
  - Cord Blood IRB approved, work to start in 2016

Business Initiatives

Clinical Trials

- Capricor
  - ALLSTAR – MI Scar repair
- Sanbio
  - ACTIsSIMA – Stroke repair

Sale of Stem Cells

- Developed process
- Documents being developed

Grant Initiatives

- Gene Therapy for Aplastic Anemia patients
  - Applied StemCell submitted an SBIR grant
    - Included KUCC, Stowers and MSCTC
    - Opportunity to resubmit following company funded proof of concept
- Gene Therapy for Severe Cellular Immunodeficiency patients
  - Includes KUCC and Stowers
  - Applying for an NIH U01 grant due February 8, 2016

Philanthropic Initiatives

- Crowdfunding
- Working with KU Communications departments to increase awareness
- Midwest Stem Cell Therapy Center Website

FY15 Expense Report

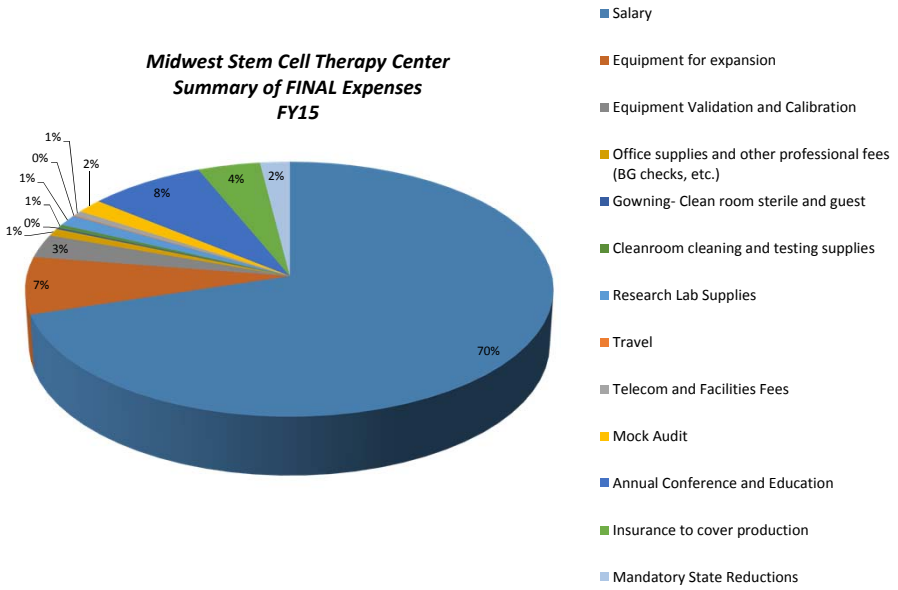
State appropriations

- Received $754,500 in July 2014

Total State FY15 Midwest Stem Cell Therapy Center Allocation	$ 754,500.00	
Expenses		
Salary	$ 529,648.95	70.2%
Equipment for expansion	$ 54,702.12	7.3%
Equipment Costs	$ 22,282.75	3.0%
Office Supplies and other professional fees (BG checks, etc.)	$ 7,037.20	0.9%
Gowning- Clean room sterile and guest	$ 1,413.90	0.2%
Cleaning and testing supplies	$ 3,290.21	0.4%
Research Lab Supplies	$ 10,483.07	1.4%
Travel	$ 708.01	0.1%
Telecom and facilities fees	$ 4,900.03	0.6%
Mock Audit	$ 13,500.00	1.8%
Annual Conference	$ 59,493.92	7.9%
Advisory Board meeting expenses (quarterly meetings)	$ 44.28	0.0%
Insurance to cover production	$ 31,800.00	4.2%
Mandatory State reductions	$ 15,168.00	2.0%
	$ 754,472.44	

Did not receive $26 invoice from HP before FY A/P cutoff, total sent back to state: $27.56

FY15 Expense report



FY15 Sources and Spends

FY15 Other Revenue

- GMP Manufacturing Income and Philanthropic contributions

FY15 Other Revenue		
GMP Manufacturing (Lifecells)		6,319.54
KU Cancer Center transfer for project collaboration		77,323.00
Philanthropic transfer for cell expansion equipment		147,795.00
	Subtotal of revenue	231,437.54

FY15 Other Expenses		
Capital Equipment	$	80,672.84
Equipment (validation, service agreements, room validation)	$	1,294.30
Schendel	$	568.55
Propharma QA/QC (split cost with STC)	$	1,400.00
Gowing- clean room sterile and guest	$	252.74
Office supplies for GMP suites and other professional fees	$	156.50
Cleaning and Testing supplies	$	2,422.47
Research Lab supplies	$	18,026.95
GMP Facility modification	$	1,778.00
Cell Expansion equipment	$	103,588.83
*Subtotal of expenses**	$	210,161.18

FY15 Percent of Expenses to Income	91%

FY15 Sources and Spends

EVC Advisory Board and Official Hospitality via KUEA

- Received one time allocation of discretionary funds of $15,000 in August 2014 to cover all Advisory Board and Official Hospitality related expenses (e.g. conference) as that language is currently not in the legislative bill for the State appropriation funds

FY15 KUEA-EVC MSCTC Advisory Board and Official Hospitality		
One time allocation from EVC	$	15,000.00

FY15 KUEA-EVC MSCTC Board and Hospitality Expenses		
Annual Conference hospitality	$	890.00
Visitor hospitality expenses	$	165.85
Advisory Board expenses	$	2,526.23
Legisltative update meeting	$	3,209.92
Professional and office fees not allowed on state funds	$	162.36
*Subtotal of expenses**	$	6,954.36

FY15 Percent of Expenses to Income	46%

FY15 Sources and Spends

FY15 Other Revenue – KUEA Donations

- ALS "Ice Bucket Challenge" donations

FY15 KUEA ALS Ice Bucket Challenge donations	$ 48,647.90
FY15 KUEA ALS related Expenses	
Credit card fees	$ 1,151.74
Nishimune support	$ 2,531.17
Transfer to Neurology for ALS stem cell research	$ 46,112.08
Subtotal of expenses	$ 49,794.99
FY15 Percent of Expenses to Income	102%

- General gift donations made to the MSCTC

FY15 KUEA MSCTC General Donations	$ 2,480.00
$90 of total contributions were named in honor or Marjorie Prentice	

No funds were spent in FY15, most general donations occurred late FY

FY15 Sources and Spends

FY15 Summary – Percent Expenses to Income from all sources

FY15 All Income	
State Appropriation	$ 754,500.00
GMP Manufacturing	$ 6,319.54
KU Cancer Center transfer for equipment for project collaboration	$ 77,323.00
Philanthropic transfer for cell expansion equipment	$ 147,795.00
EVC Advisory board and official hospitality one time allocation	$ 15,000.00
ALS Ice Bucket Donations	$ 48,647.90
MSCTC General Donations	$ 2,480.00
Total of all FY15 Income	$ 1,052,065.44
FY15 All Expenses	
State Approriation	$ 754,472.44
GMP Manufacturing related income and cell expansion and equip.	$ 210,161.18
Advisory Board and official hospitality	$ 6,954.36
ALS Ice Bucket - Neuro support	$ 48,643.25
KUEA online credit card processing fees	$ 1,151.74
Total of all FY15 expenses	$ 1,021,382.97
FY15 Percent of Expenses to income	97%

Thank you.

KU MIDWEST STEM CELL THERAPY CENTER