

## Morning Note – January 24, 2012

- **Early Stem Cell Results in *The Lancet* Could De-Risk HuCNS-SC® in AMD**
- **First HuCNS-SC® Patient Cohort Completed in Chronic Spinal Cord Injury**
- **Screening for Second Cohort in Less Severe AIS-B Patients to Begin**
- **STEM Spinal Cord Program Undervalued Compared to Geron's at Exit**

Please See Last 2 Pages For Important Disclosures And Analyst Certification

Company	Ticker	Price	Mkt. Cap.	Daily Volume	Rating	Target	Analysts
StemCells Inc.	STEM	\$0.81 <i>Intraday</i>	\$18.1M	<i>3-month</i> 193,431 <i>10-day</i> 230,480	<b>Strong Speculative Buy</b>	\$8.00	Stephen M. Dunn Sr. Managing Director Research sdunn@LifeTechCapital.com (954) 240-9968

### Summary

Yesterday, Advanced Cell Technology (OTCBB:ACTC Not Rated) announced the publication in *The Lancet* of the early results of their embryonic stem cells in a Dry Age-Related Macular Degeneration (Dry AMD) patient and a Stargardt's Macular Dystrophy patient. We note that only 2 patients out of the planned enrollment of 24 patients were documented and that the data was only 4 months post-implant.

The paper titled "*Embryonic stem cell trials for macular degeneration: a preliminary report*" described the results from the Stargardt's patient as improving from zero letters to the 5 largest letters (line 1) on the Early Treatment Diabetic Retinopathy Study (ETDRS) visual acuity chart (consisting of 14 lines of 5 letters each or 70 letters). While the Dry AMD patient had improved vision from 21 ETDRS letters to 28 letters, there was no anatomical evidence of survival and engraftment (the patient did not comply with the immunosuppression regime). In addition, the patient reported mild visual function increases in the untreated eye, indicative of a potential placebo effect. The research paper may be downloaded and read at <http://download.thelancet.com/flatcontentassets/pdfs/S0140673612600282.pdf>

In our opinion, the key takeaway from the paper is that it showed no safety signals regarding hyperproliferation, tumorigenicity, ectopic tissue formation or apparent rejection after 4 months. **We believe this data provides some de-risking for StemCells Inc.'s planned IND filing for their HuCNS-SC program in Dry AMD. Investors should note that StemCells Inc. does not use embryonic stem cells, which are not patentable in Europe (see <http://bit.ly/yuDMik>) and do not have the ethical issues.**

Investors should also note that Geron's (Nasdaq:GERN Not Rated) decision to end their GRNOPC1 embryonic stem cell trial for spinal cord injury on November 14<sup>th</sup> has resulted in a loss of approximately \$60M in Geron's market capitalization. We believe this indicates that StemCells Inc.'s spinal cord injury program (*see Ongoing Clinical Trial for Chronic Spinal Cord Injury*) is significantly undervalued having a market capitalization of only \$23M which also includes their Pelizaeus-Merzbacher disease (PMD) remyelination program as well as the expected Dry Age-Related Macular Degeneration (Dry AMD) IND filing.

## HuCNS-SC<sup>®</sup> for Retinal Disorders

Photoreceptor deterioration occurs in diseases such as Age-Related Macular Degeneration (AMD) and Retinitis Pigmentosa (RP) and is the major cause of blindness in the developed countries. So far, there is no approved cure. Preclinical studies using HuCNS-SC implanted into the sub-retinal space of the eye showed that HuCNS-SC can rescue vision when injected into the sub-retinal space of rodent model for human retinal degeneration.

In November 2008, Dr. Raymond Lund, a researcher and professor at the Casey Eye Institute at Oregon Health & Science University (OHSU) and his research team presented successful 180 day preclinical results at the Foundation Fighting Blindness in San Francisco.

In May 2009, Dr. Trevor McGill presented confirmatory follow-up data at 250 days at the annual Association for Research in Vision and Ophthalmology (ARVO) conference (*see table below*):

Investigator Conclusions from Preclinical Study using HuCNS-SC for Vision Rescue	
<p>✓ Early sub-retinal transplantation of HuCNS-SC's limits the loss of behaviorally measured vision, limits the deterioration of luminance thresholds measured from the superior colliculus, and delays the death of photoreceptors in the RCS rat.</p>	
<p>✓ HuCNS-SC transplanted into the sub-retinal space engraft and survive for at least 220 days post transplantation.</p>	
<p>✓ HuCNS-SC migrate through the subretinal space and form a continuous layer of cells by day 60. In about one-third of the animals sacrificed at day 90, donor cells are also seen in the inner retina. By day 120, donor cell migration is seen in all cell layers</p>	
<p>✓ Migration of donor cells along the subretinal space or into various layers of retina appears to have no negative effect on vision.</p>	
<p>✓ Declining concentrations of immune suppression appeared to have no immediate negative effect on graft survival or efficacy.</p>	

Source: T.J. McGill, et. al. "Long-term efficacy of HuCNS-SC transplantation into the subretinal space of RCS Rats" ARVO 5/3/09

Source: R. D. Lund, et. al. "Vision rescue by HuCNS-SC in a rodent model" Foundation Fighting Blindness 11/1/08 UCSF

In October 2009, Dr. Trevor McGill presented additional preclinical data at the Society for Neuroscience 2009 Annual Meeting titled "Histological analysis of HuCNS-SC differentiation and cone photoreceptor preservation in RCS rats following sub-retinal transplantation" demonstrating that HuCNS-SC protect cone photoreceptors (light sensing) in the eye from progressive degeneration and preserve visual function long term. The researchers concluded that "subretinal transplantation of HuCNS-SC may provide significant therapeutic value for clinical cases of retinal degenerative disease. In particular, the long-term survival of HuCNS-SC and corresponding long-term functional benefit suggest durable outcomes may be achieved after a single transplantation."

## Ongoing Clinical Trial for HuCNS-SC<sup>®</sup> in Chronic Spinal Cord Injury

StemCells Inc. announced that the first patient cohort of AIS-A chronic spinal cord injury (the most severe level) in their Phase I/II clinical trial has been successfully transplanted with their HuCNS-SC<sup>®</sup> adult neural stem cells at Balgrist University Hospital, University of Zurich. Screening for AIS-B patients, who have a less severe, incomplete type of spinal cord injury, will now begin. In addition, after review by the clinical team at Balgrist Hospital and StemCells Inc. they have decided to open enrollment for the remainder of the trial to include U.S. and Canadian patients.

**Spinal Cord Injury Trial Design:** The trial will enroll 12 patients with thoracic (chest-level) spinal cord injury (neurological injury level of T2-T11), and will include both complete and incomplete injuries as classified by the American Spinal Injury Association Impairment Scale (AIS). All patients will receive HuCNS-SC cells through direct transplantation into the spinal cord, and will be temporarily immunosuppressed. Following transplantation, the patients will be evaluated regularly over a 12-month period in order to monitor and evaluate the safety and tolerability of the HuCNS-SC cells, the surgery and the immunosuppression, and to measure any recovery of neurological function below the injury site. StemCell Inc. will follow the long-term effects in a separate four-year observational study at the conclusion of this trial.

- The first cohort will include patients classified as AIS-A. These patients have what is considered to be a "complete" injury, or no movement or feeling below the level of the injury.
- The second cohort will progress to patients classified as AIS-B, or patients with some degree of feeling below the injury.
- The third cohort will consist of patients classified as AIS-C, or patients with some degree of movement below the injury.

**Endpoints:** In addition to assessing safety, the trial will evaluate preliminary efficacy using defined clinical endpoints, such as changes in sensation, motor, and bowel/bladder function.

Additional background can be found at <http://clinicaltrials.gov/ct2/show/NCT01321333>

PHASE I/II HUMAN CLINICAL TRIAL PROTOCOL	
<b>Title</b>	A Phase I/II Study of the Safety and Preliminary Efficacy of Intramedullary Spinal Cord Transplantation of Human Central Nervous System (CNS) Stem Cells (HuCNS-SC®) in Subjects With Thoracic (T2-T11) Spinal Cord Trauma
<b># of Patients</b>	12 (Male and Female)
<b>Trial Design</b>	Open Label, Non-Randomized, Safety/Efficacy Study, Single Group Assignment
<b>Ages</b>	18 to 60 Years
<b>Treatment</b>	Single dose intramedullary transplantation of HuCNS-SC cells in the thoracic spinal cord Study subjects will receive immunosuppression for nine months following transplantation
<b>Endpoints</b>	Primary: Types and frequencies of adverse and serious adverse events one year after transplant Secondary: Patients will be enrolled in a separate 4 year long-term follow-up study
<b>Inclusion</b>	<ul style="list-style-type: none"> <li>• T2-T11 thoracic spinal cord injury based on American Spinal Injury Association (ASIA) level determination by the principal investigator (PI)</li> <li>• T2-T11 thoracic spinal cord injury as assessed by magnetic resonance imaging (MRI) and/or computerized tomography (CT)</li> <li>• ASIA Impairment Scale (AIS) Grade A, B, or C</li> <li>• Minimum of six weeks post injury for the initiation of screening</li> <li>• Must have evidence of preserved conus function</li> <li>• Must be at stable stage of medical recovery after injury</li> </ul>
<b>Exclusion</b>	<ul style="list-style-type: none"> <li>• History of traumatic brain injury without recovery</li> <li>• Penetrating spinal cord injury</li> <li>• Evidence of spinal instability or persistent spinal stenosis and/or compression related to initial trauma</li> <li>• Previous organ, tissue or bone marrow transplantation</li> <li>• Previous participation in any gene transfer or cell transplant trial</li> <li>• Current or prior malignancy</li> </ul>
<b>Center</b>	University Hospital Balgrist- Uniklinik Balgrist, Forschstrasse 340 Zurich, Switzerland, 8008

Investigator: Armin Curt, MD University Hospital Balgrist						
<i>Source: ClinicalTrials.gov NCT01321333</i>						
<b>Estimated Development Timeline (Subject to Significant Changes)</b>						
Cell Type:	Human Central Nervous System Stem Cells (HuCNS-SC)			Human Liver Engrafting Cells (hLEC)		Stem Cell Sciences
	Disease:	Spinal Cord	Retinal (Dry AMD)	Liver	Hepatitis C	Various
Q2 2009						✓ Acquisition Closed
Q3 2009				✓ IRB Approval		
Q4 2009	✓ Initiate Phase I					
Q1 2010						✓ US Launch ✓ New Cell Culture Product ✓ New Cell Culture Product
Q2 2010						
Q3 2010						
Q4 2010		✓ File IND (Swiss)				✓ New Cell Culture Products
Q1 2011	✓ Complete Enrollment	✓ Initiate Phase I/II				✓ New Cell Culture Products
Q2 2011						✓ New Cell Culture Products
Q3 2011	✓ Phase I 6 Month Results					
Q4 2011		✓ Complete Enrollment for AIS-A ✓ Initiate Enrollment for AIS-B				
Q1 2012	Phase I 12 Month Results		File IND			
Q2 2012			Initiate Phase I			
Q3 2012						
Q4 2012		Interim AIS-A Results				

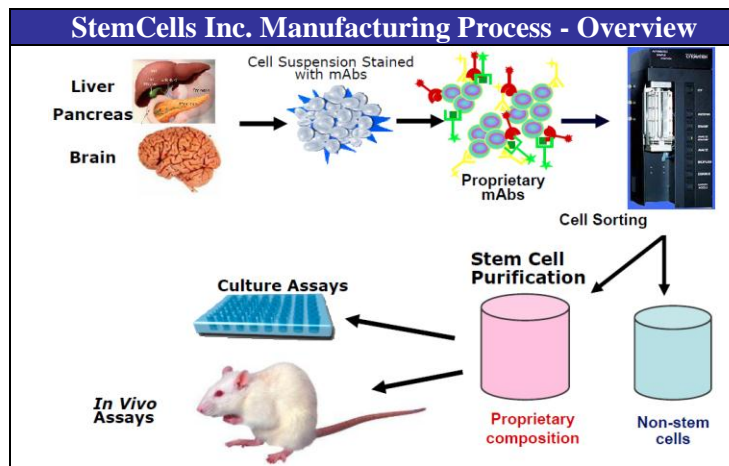
*Source: LifeTech Capital estimates*

## Stem Cells

### What are Stem Cells?

Stem cells are unique in that they can divide and replicate for long periods and can be induced to differentiate into specific cell types such as neuronal, liver, retinal, bone, pancreatic and others. This allows living organism to maintain and repair damaged tissue.

There are two types of stems cells, embryonic and non-embryonic or adult stem cells. Embryonic stem cells are derived from embryos that develop from eggs fertilized in vitro. While these stem cells are the most versatile and can theoretically differentiate into any type of cell the body requires (pluripotent), the process has resulted in moral and political objections. There are also some concerns about safety issues, such as potential tumor genesis.



Source: StemCells Inc.

Non-embryonic and adult stem cells have limited differentiation abilities compared to embryonic stem cells. They can differentiate into cell subtypes belonging to the same organ or tissue from which they were derived and their replication abilities make them extremely useful for regenerating and repairing damage in their specific organ or tissue of origin.

### What Type of Stem Cells Does StemCells Inc. Use?

StemCells Inc. uses non-embryonic stem cells which are derived from specific tissue such as the brain and liver. The brain or liver cells are marked with specific monoclonal antibodies (MAb) and the stem cells are extracted and purified (for instance, only 2.3% of the cells in the brain are neuronal stem cells). The cells are then cultured and expanded to increase their number until the desired volume is reached. Specifically, StemCells Inc. is focused on Human Central Nervous System Stem Cells (HuCNS-SC) and Human Liver Engrafting Cells (hLEC).

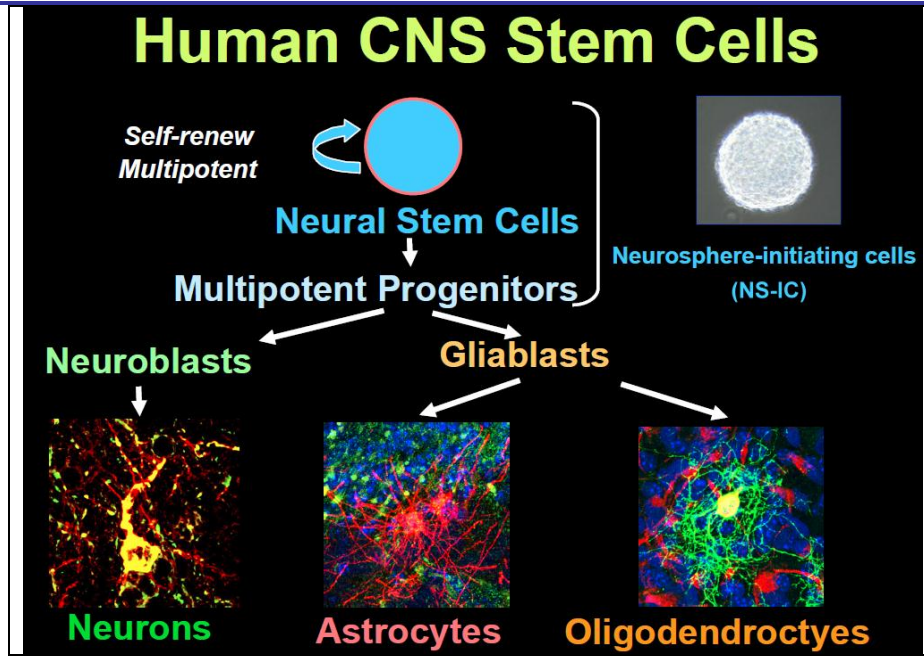
## HuCNS-SC<sup>®</sup> (Human Central Nervous System Stem Cells)

HuCNS-SC are created by finding and separating the NeuroSphere-Initiating Cells (NS-IC) (using CD133<sup>+</sup>/CD24<sup>-/lo</sup> expression) which can then differentiate into Neuroblast (neurons) and Glioblast (astrocytes & oligodendrocytes) cells. HuCNS-SC grown as NS-ICs have shown a normal karyotype (chromosomal characteristics), do not form tumors *in-vivo* and retain multipotent progenitor capabilities.

### How Do HuCNS-SC Differentiate Into the Proper Cell Type?

When HuCNS-SC are implanted, they take biochemical cues from the mature cells surrounding it. For example, HuCNS-SC implanted into the olfactory bulb will differentiate into neurons while HuCNS-SC implanted into a blood vessel will differentiate into astrocytes. StemCells Inc. has done extensive work on the proliferation, migration & differentiation characteristics of HuCNS-SC in preclinical testing.

StemCells Inc. HuCNS-CS<sup>®</sup>



**DISCLOSURES**



Ratings and Price Target Changes over Past 3 Years

- Initiated February 2, 2010 – Strong Speculative Buy - Price Target \$2.20 (\$22.00)
- Update April 8, 2011 – Strong Speculative Buy - Price Target \$1.60 (\$16.00)
- Update July 6, 2011 – Strong Speculative Buy - Price Target \$8.00 (1:10 Split 7/6/11)

**Analyst Certification:** I, Stephen M. Dunn, the author of this research report certifies that a.) All of the views expressed in this report accurately reflect my personal views about any and all of the subject securities or issuers discussed b.) No part of my compensation is directly or indirectly related to the specific recommendations or views expressed in this research report and c.) We may be eligible to receive other compensation based upon various factors, including total revenues of the Firm and its affiliates as well as a portion of the proceeds from a broad pool of investment vehicles consisting of components of the compensation generated by investment banking activities, including but not limited to shares of stock and/or warrants, which may or may not include the securities referenced in this report.

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Does the Firm or affiliates beneficially own ≥1% of the Company's common stock?	NO
Has the Firm or affiliates received investment banking services compensation in previous 12 months?	YES
Has the Firm or affiliates received non-investment banking securities-related services compensation in previous 12 months?	NO
Does the Firm or affiliates expect to receive or intend to seek investment banking compensation in next 3 months?	YES
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LifeTech Capital Research	Research Coverage	Investment Banking	FINRA RULE 2711	Research Coverage	Investment Banking
<b>Ratings Distribution</b>	% of Total	% of Total	<b>Ratings Distribution</b>	% of Total	% of Total
Strong Buy	17%	0%	Buy	75%	33%
Strong Speculative Buy	58%	43%	Hold/Neutral	8%	100%
Buy	0%	0%	Sell	17%	0%
Speculative Buy	0%	0%	Total	100%	33%
Neutral	8%	100%			
Avoid/Sell	17%	0%			
Under Review	0%	0%			
Not Rated	0%	0%			
Restricted	0%	0%			
Total	100%	33%			

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Boca Raton Office  
4431 Woodfield Blvd.  
Boca Raton, FL 33432  
Tel: 561-988-9129  
Fax: 561-988-9129

San Francisco Office  
One Market Street  
Spear Tower, 35th Floor  
San Francisco, CA 94105  
Tel: 415-293-8142

New York Office  
17 Park Avenue #201  
New York, NY 10016  
Tel: 917-834-7206  
Fax: 415-887-7814