



# Cell Therapy - TRACKing, Circulation, & Safety (CT-TRACS): The Health and Environmental Sciences Institute (HESI)'s New Collaborative Effort to Address the Challenges of Cell Therapies Translation.

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HESI.

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## Cell Therapies Translation Challenges

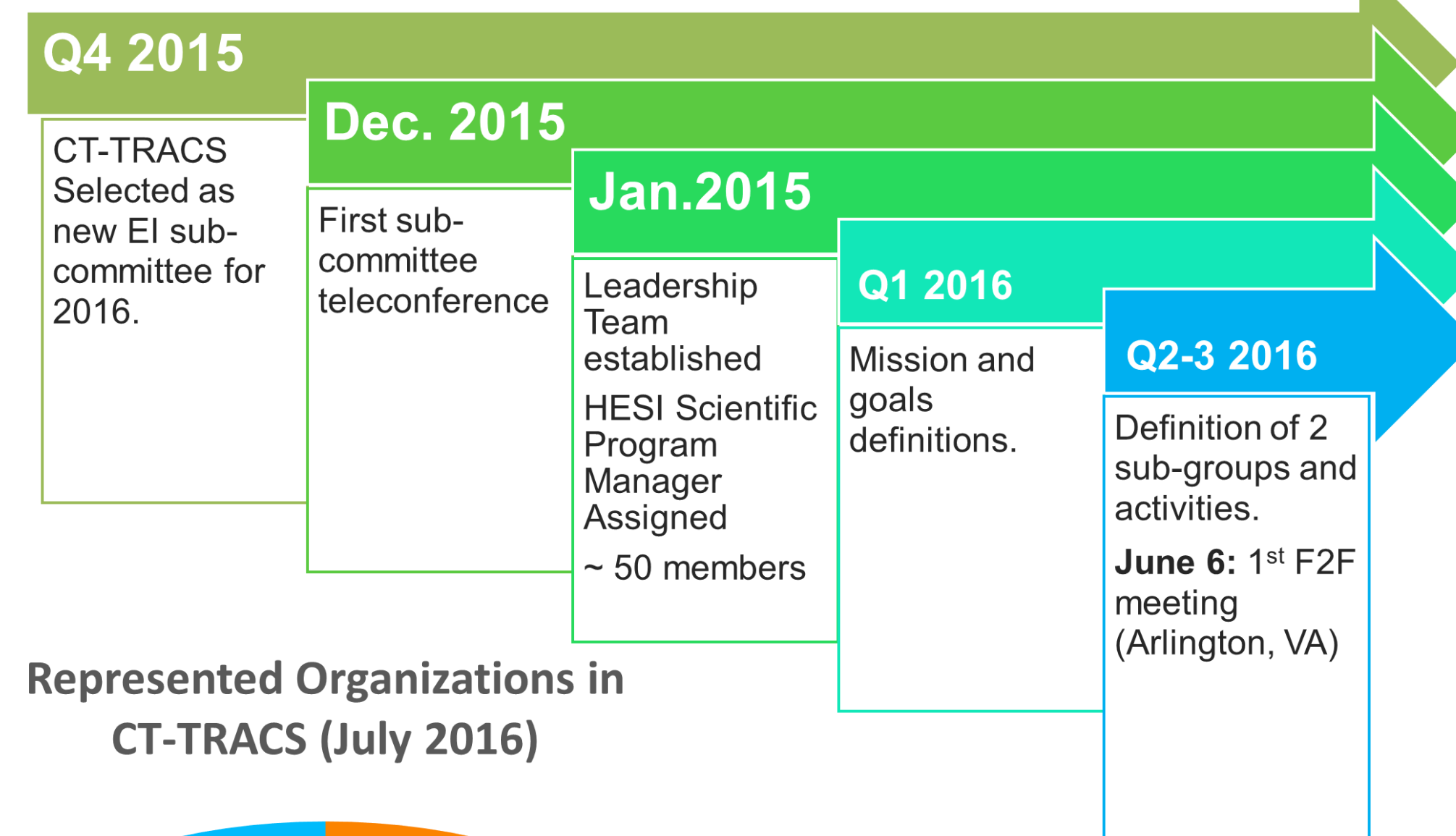
Cell therapies show great therapeutic promise in the fields of regenerative medicine and immunotherapy. To realize their full clinical potential there is a need for greater understanding of their mode of action, how they migrate after administration to deliver their therapeutic benefits, their persistence at sites of action, and whether their localization or distribution may cause safety issues. Currently, there are several existing and many emerging tools available to develop pharmacokinetic data on these cell-derived therapies to improve our understanding of the mechanism of action and demonstrate on target delivery, but adoption by clinical investigators has been limited. Furthermore, the regulatory landscape is not yet clearly defined for these emerging new therapies.

## HESI's Response

In late 2015 HESI launched a new multi-sector collaborative sub-committee to identify key needs for assessing the safety of cell therapies and identify opportunities to meet these needs, the **Cell Therapy - TRACKing, Circulation, & Safety (CT-TRACS)** Emerging Issues sub-committee.

- **Neutral platform.**
- Brings together an **international and multi-disciplinary team of experts:** cell therapy developers, researchers, regulators, imaging specialists and other stakeholders, with interest in sharing their knowledge of common challenges and seek consensus on finding harmonized solutions.
- Brings **awareness** on how the application of existing cell tracking technologies, methods, and best practices can benefit the clinical translation of new cell therapies.

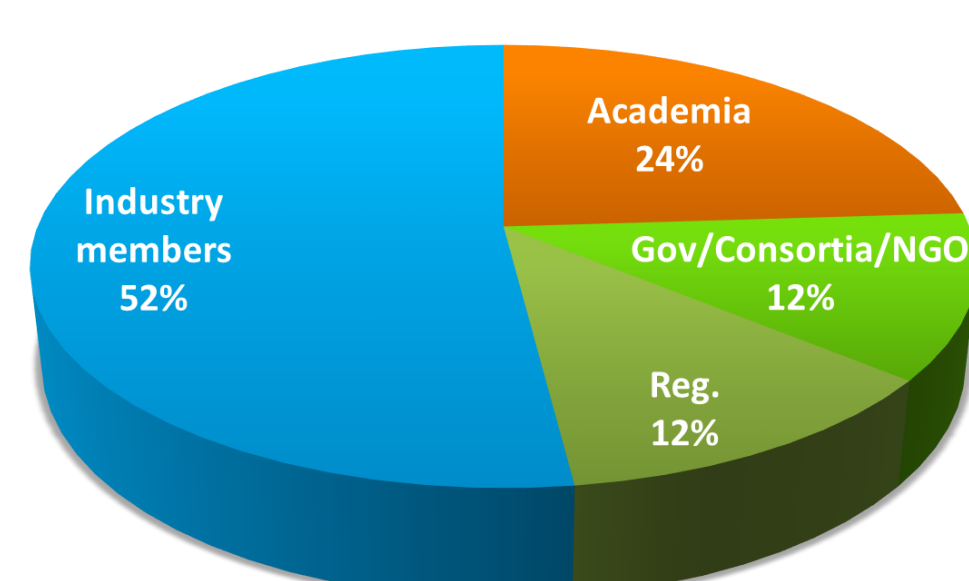
## CT-TRACS: Year-1 in Review



Represented Organizations in CT-TRACS (July 2016)

49 Participants

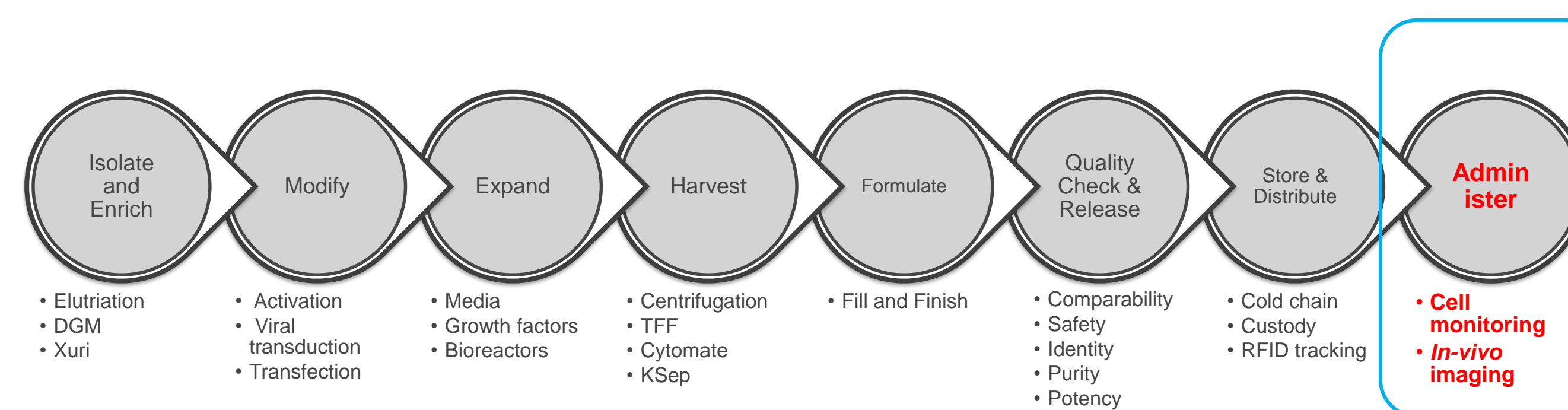
25 Organizations



## CT-TRACS's Mission

To improve the safety of cell-based therapies for patients by enhancing our ability to reliably apply analytical methods, devices, and scientific knowledge to evaluate the distribution and fate of these cells in a patient.

**CT-TRACS will facilitate the translation of cell based therapies to the clinic by driving the development of tools, methods and knowledge required to evaluate the in-vivo safety and fate of therapeutic cells.**



## Rationale

Scientists have been tracking cells *in vivo* for last 30 years!

- Materials & methods to prepare imaging agents and contrast media are available in most hospitals with capability to run cell therapy trials.
- Imaging agents/contrast media that could be applied to cell therapy exist (or are being developed).

Regulatory 'pull' for cell tracking & tumorigenicity evaluation

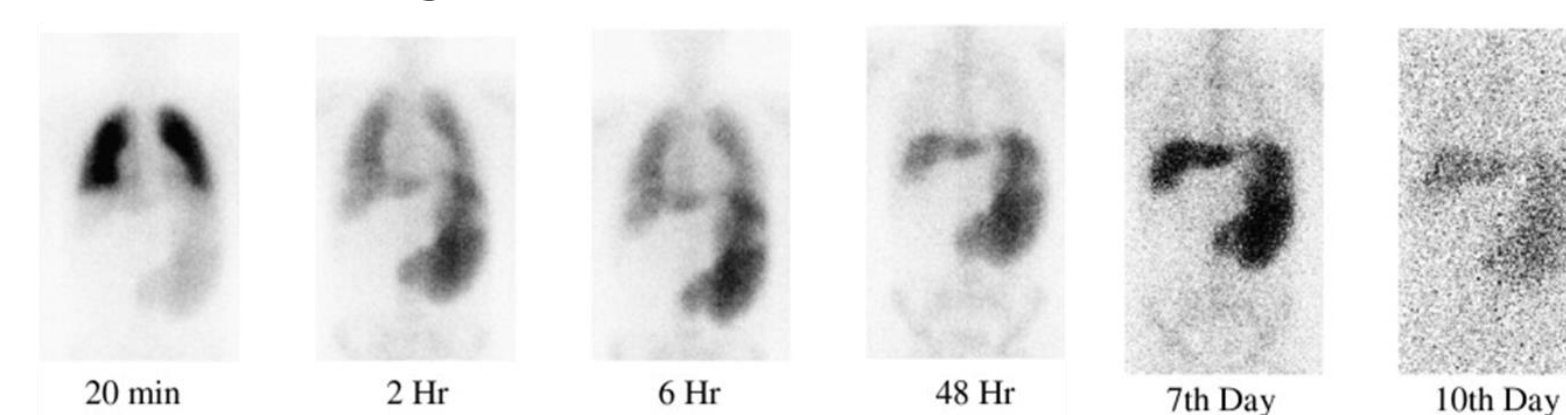
- Regulatory Agencies (US FDA, EU EMA, Health Canada, JP PMDA) recognize the importance of distribution, migration of cells, but the inadequacy of the conventional PD/PK methodologies; recommend using imaging technologies to track cells as appropriate.

Safety questions cell tracking can address:

- Do the cells localize to the expected sites?
- How many cells survive administration?
- How long do the cells remain at the engraftment site?
- Do you see any "off-target" localisation?
- Are the cells proliferating?

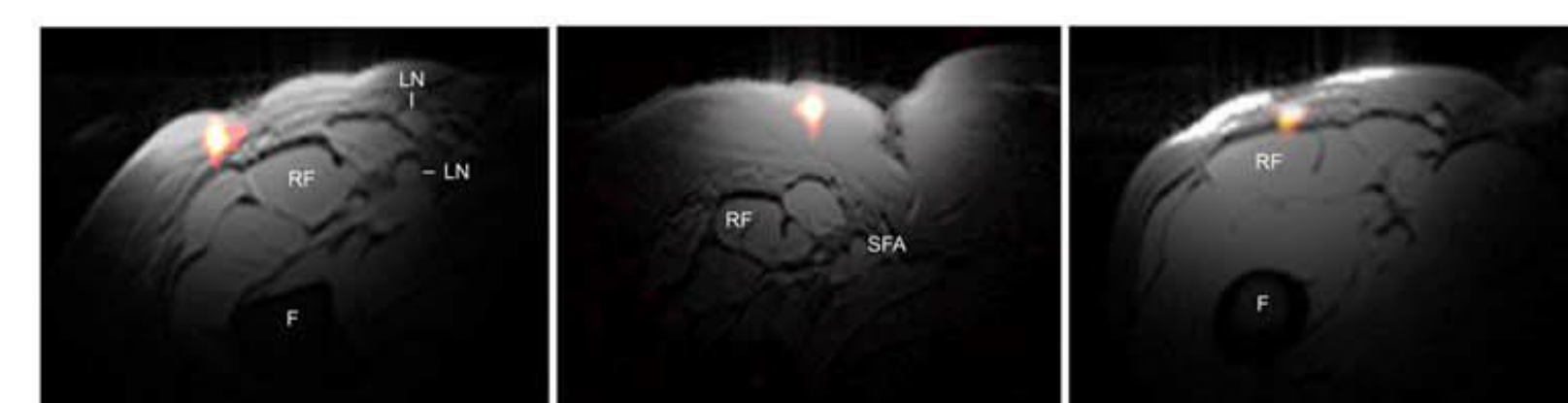
## Examples of Non-Invasive Imaging Modalities

Tracking In-111 labelled MSCs in Liver Cirrhosis



Following intravenous infusion, the labeled MSCs first accumulated in the lungs, and gradually shifted to the liver and spleen during the following hours to days. *Gholamrezaezhad et al., Nucl. Med. Biol., 2011.*

*In vivo* MRI in patients following intradermal dendritic cells administration into quadriceps



Axial composite <sup>19</sup>F/<sup>1</sup>H images of the right thigh at 4h postinoculation in three patients. The dendritic cells are rendered in "hot-iron" pseudocolor and the <sup>1</sup>H anatomy is displayed in grayscale (F= femur, RF= rectus femoris, SFA= superficial femoral artery, LN= inguinal lymph node). *Ahrens et al., Magn. Reson. Med., 2014.*

## Scientific Program

CT-TRACS

Point of Administration & Biodistribution

Identify current approaches (and gaps) in monitoring/evaluating the fate and activity of cells after their administration *in vivo*, to assess the safety of cell-based therapies.

Tumorigenicity

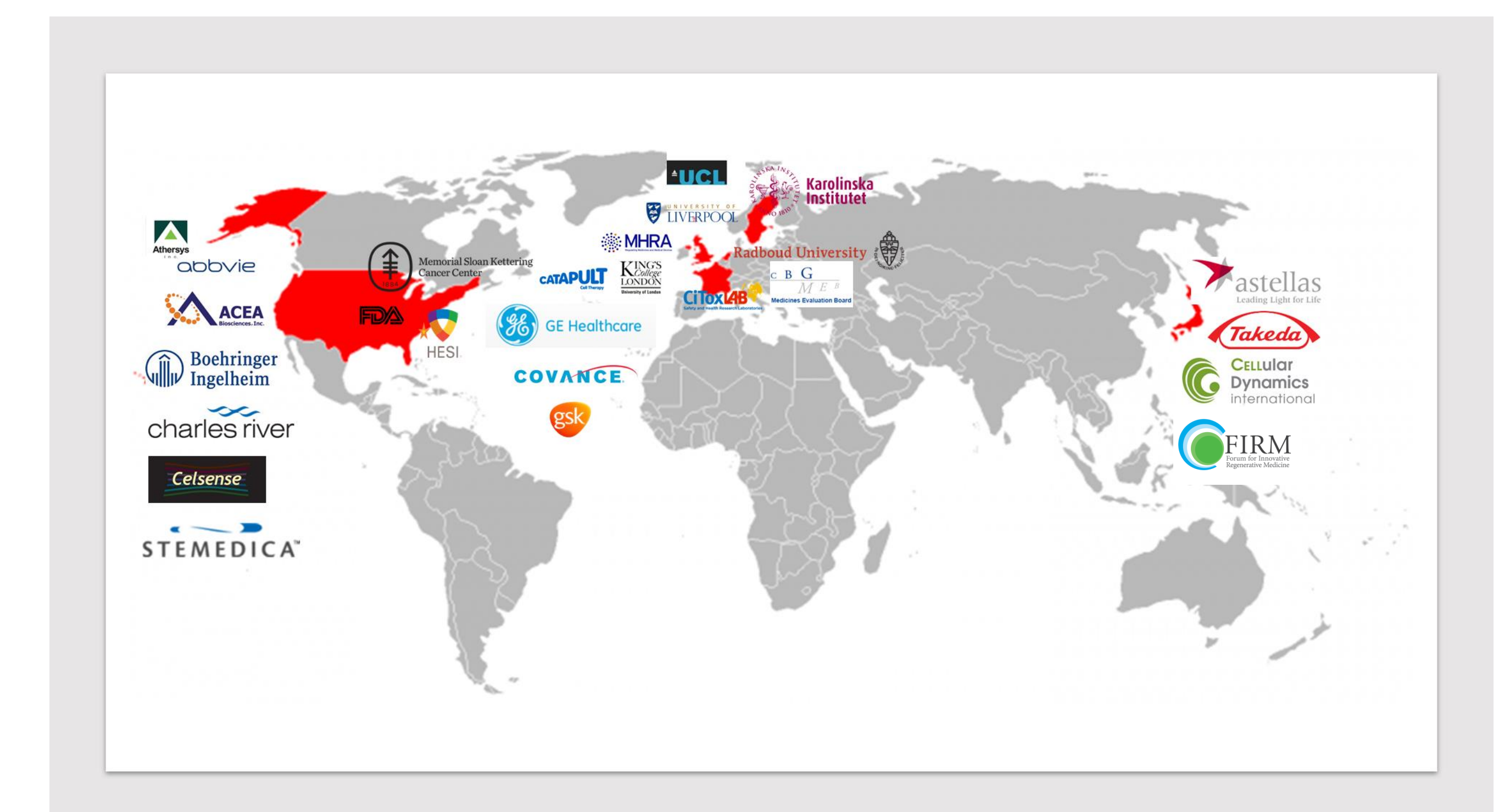
Address concerns regarding the potential for tumorigenicity of pluripotent stem cell-derived products by assessing and/or developing methodologies and guidelines that could support tumorigenicity evaluation.

## Work plan and anticipated work products:

This collaborative multi-sector program will bring together experts from various fields to help identify current needs and gaps hampering the translation of cellular therapies. Results from CT-TRACS' activities and possible solutions proposed will be presented through:

- a Publication or White Paper;
- a Workshop where CT-TRACS participants will promote the dialogue with the international community to discuss opportunities to address the challenges facing the application of cell therapies in the clinical setting. *Tentative: ISCT, May 3-6, London.*

## Participating organizations:



## How can I get involved?

- **The CT-TRACS project** is open to all current HESI members as well as new participants with relevant technical expertise. The program also seeks creative funding partners and encourages inquiries by those with interest in providing financial support for these innovative efforts. Please contact Lucilia Mouriès, Sc. Program Manager, at: [lmouries@hesiglobal.org](mailto:lmouries@hesiglobal.org).
- **About HESI:** The Health and Environmental Sciences Institute (HESI) is a non-profit institution whose mission is to collaboratively identify and help to resolve global health and environment challenges through the engagement of scientists from academia, government, industry, NGOs, and other strategic partners. Learn more at: [www.hesiglobal.org](http://www.hesiglobal.org).