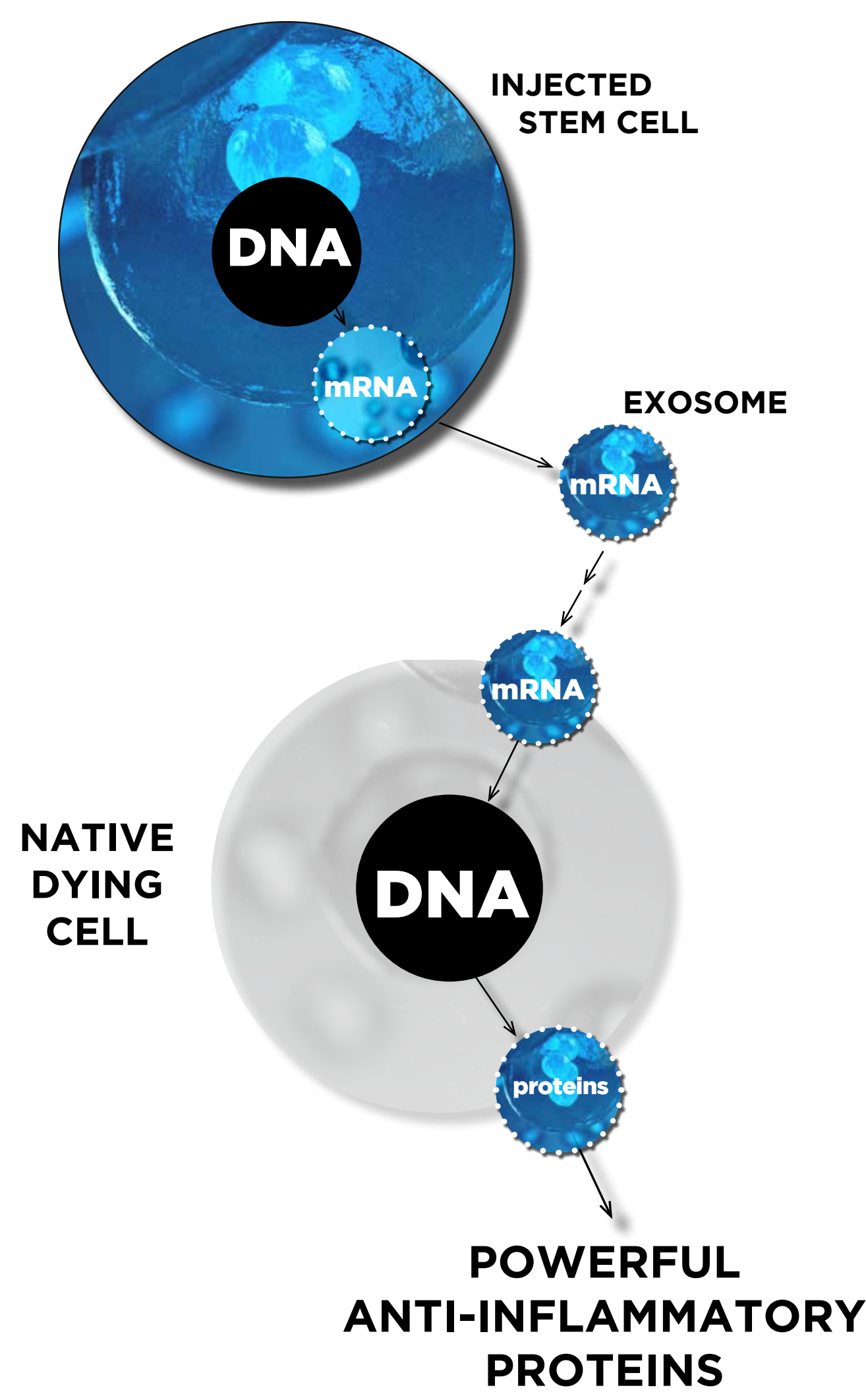


# STEM CELLS: How They Work

## A. ANTI-INFLAMMATION

- DNA in injected stem cells create instructions encoded in mRNA
- mRNA is packaged into exosomes, released into extracellular matrix and sent to native dying cells
- mRNA instructs the struggling cells to produce **powerful anti-inflammatory proteins**



## B. IMMUNOMODULATION

Stem cells produce growth factors that:

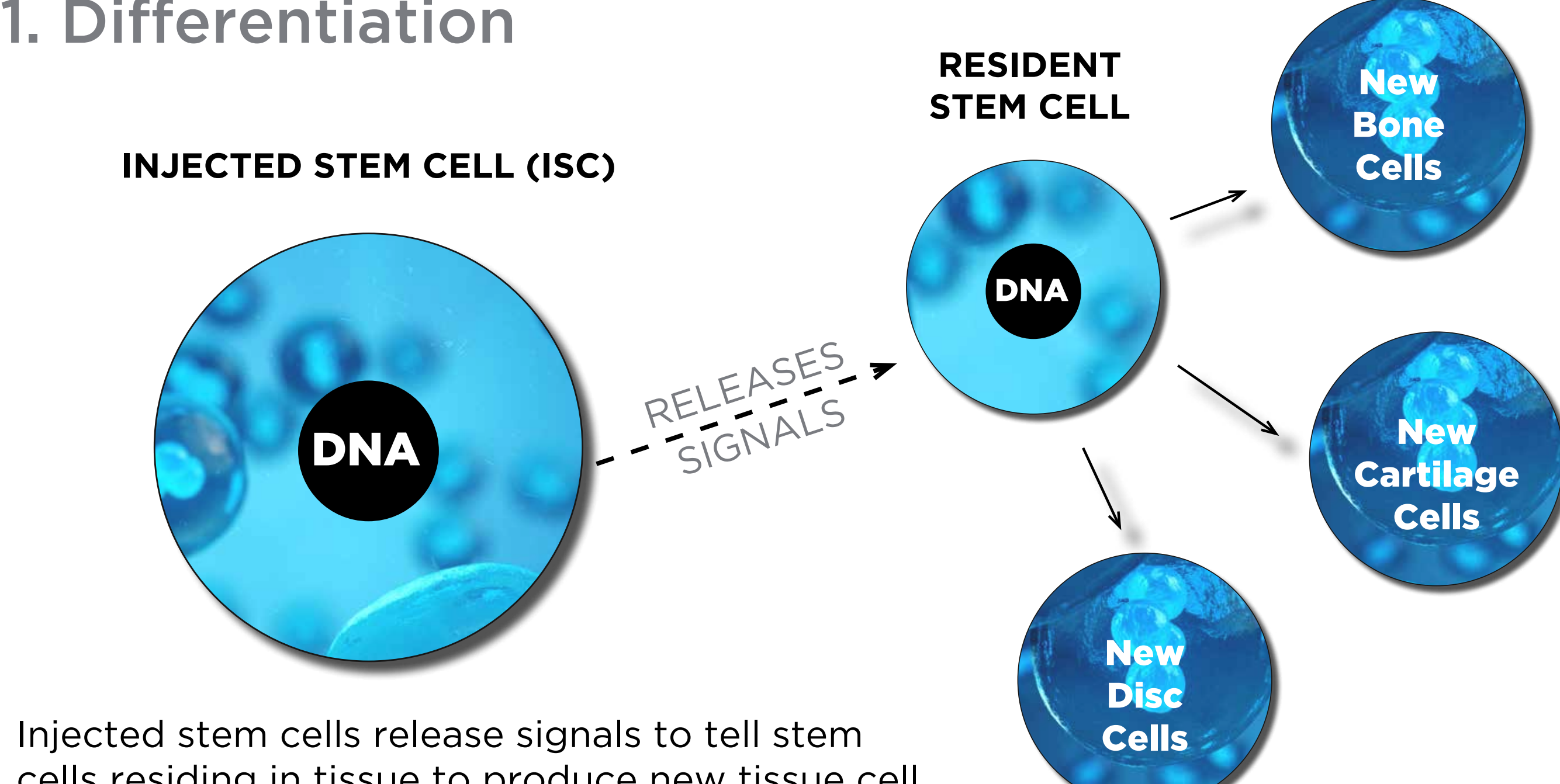
1. Coat the stem cells to protect against inflammation (like using mosquito spray when camping).
2. Create a protective microenvironment around the stem cells to give them a safe space to work (like mosquito defogger in your yard).

STEM CELLS: HOW THEY WORK

# STEM CELLS: How They Work

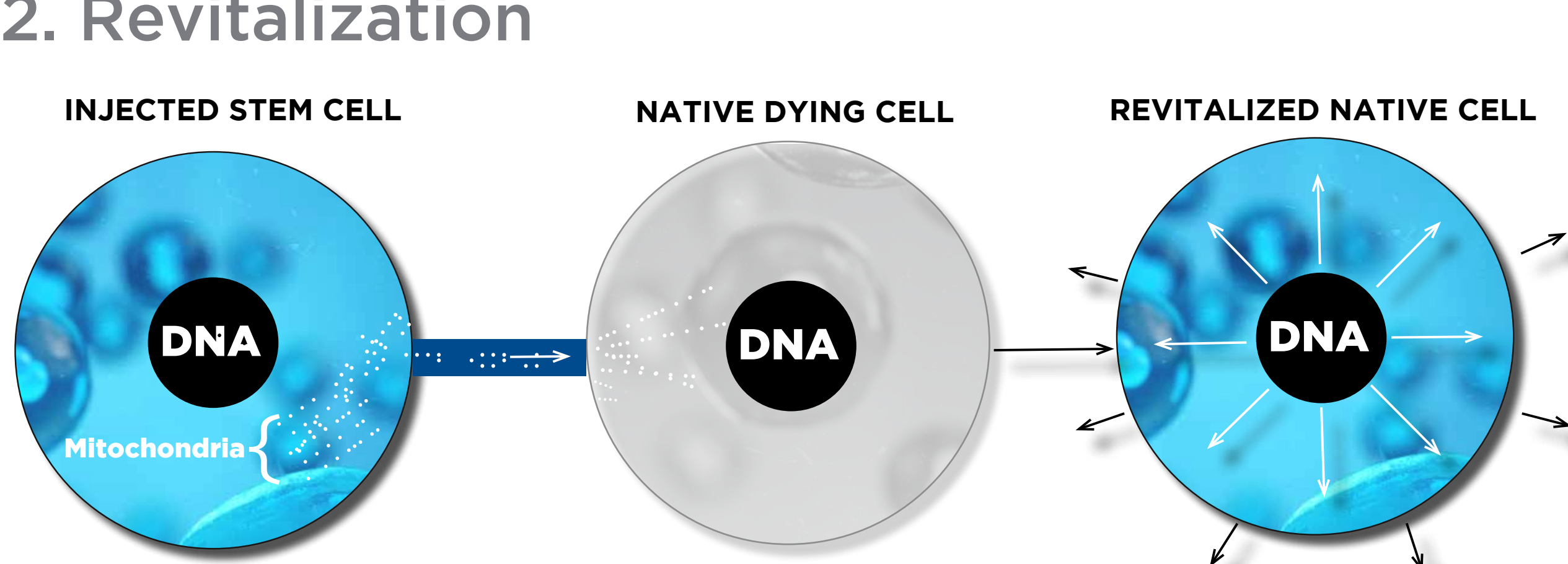
## C. CELL REGENERATION

### 1. Differentiation



Injected stem cells release signals to tell stem cells residing in tissue to produce new tissue cell

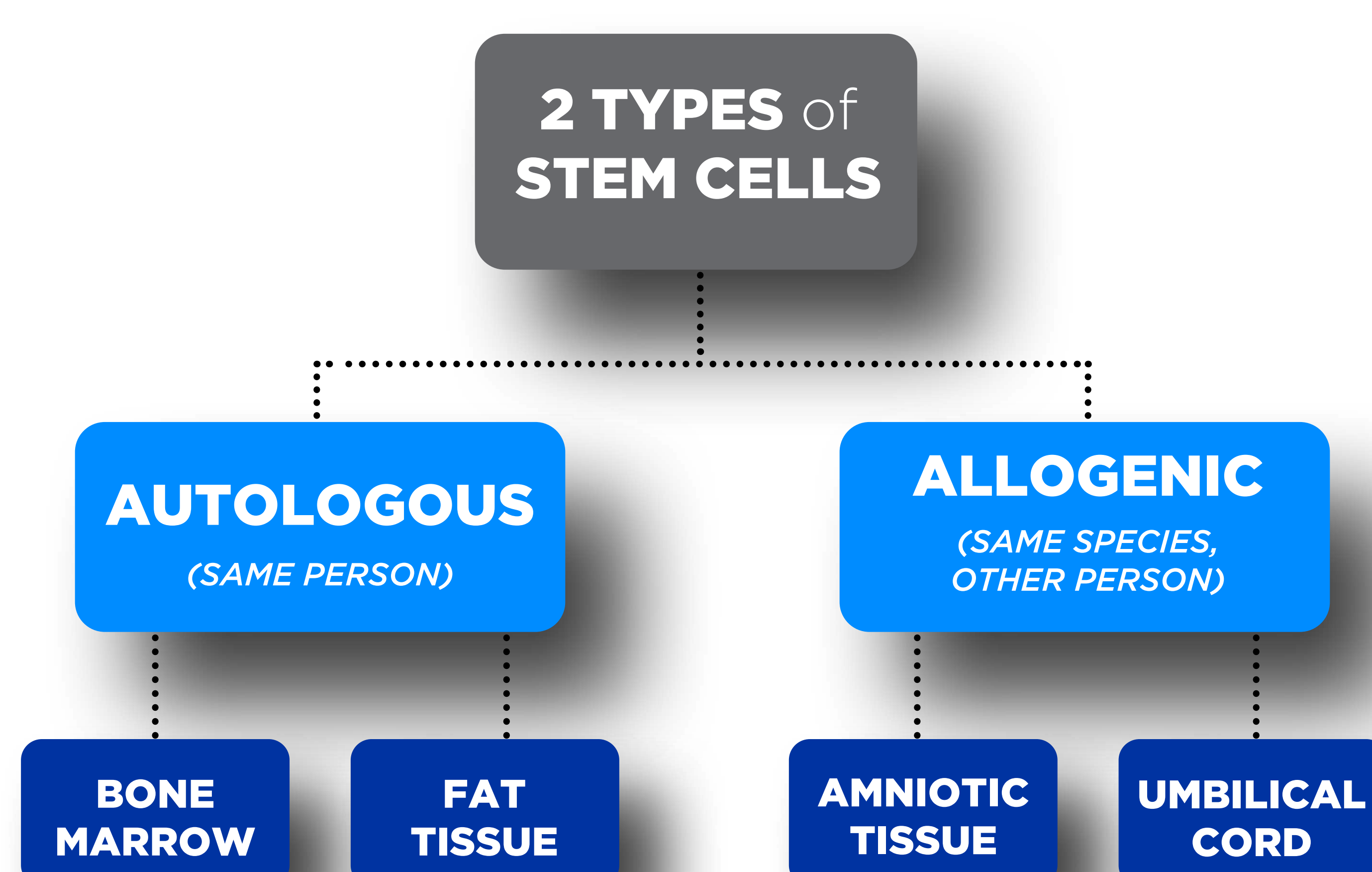
### 2. Revitalization



- Injected stem cell forms connecting tube with native dying cell
- Cellular batteries called mitochondria are injected into the native dying cell
- The native dying cell is revitalized

STEM CELLS: HOW THEY WORK

# STEM CELL Classification



## STEM CELLS FOR THE SPINE

- The inner 2/3 of the adult spine disc is the largest structure in the body without a blood supply
- This avascular area inside the disc is a hostile environment of low oxygen and high acidity
- Bone marrow stem cells have been found to be the most effective treatment for the adult spine disc

STEM CELL CLASSIFICATION

# CLINICAL Studies

<p><b>Treatment of Discogenic Back Pain with Autologous Bone Marrow Concentrate</b>  <i>Pettine, et. al.</i>  <i>American Journal of Stem Cell Research, 2018</i></p>	<ul style="list-style-type: none"> <li>• 70% significant relief</li> <li>• 40% regeneration in disc</li> <li>• 5-year results</li> </ul>
<p><b>Intervetebral Disc Repair by Autologous Mesenchymal Bone Marrow Cells</b>  <i>Orozco, et. al.</i>  <i>Transplantation, 2011</i></p>	<ul style="list-style-type: none"> <li>• 70% significant relief</li> <li>• water content elevated in discs</li> <li>• 2-year results</li> </ul>
<p><b>Intra-discal Injection of Autologous, Hypoxic Cultured Bone Marrow-Derived Mesenchymal Stem Cells</b>  <i>Elabd, et. al.</i>  <i>Journal of Transplant Medicine, 2016</i></p>	<ul style="list-style-type: none"> <li>• all patients reported improved pain and strength</li> <li>• positive correlation between improvement &amp; number of cells injected</li> </ul>

- This latest data suggests a role for treating severe degenerative disc disease with bone marrow stem cells.
- Decision-making should be based on the latest research available in order for patients and physicians to have the best chance for success.

CLINICAL STUDIES