STEM CELL INNOVATION CONTEST 2026

11TH EDITION | THEME: STEM CELLS & AI

ID: 317

Bio-DHM

ORGANIZER

SPONSORING ORGANIZATION

HAIR RESTORATION

cell -based and cell-free therapies

from stem cells to healthier hair



1. Background

Hair loss (e.g., AGA), seborrheic dermatitis, stress-related hair loss and other conditions are common and seriously affect quality of life. Stem cell technology offers a promising direction to reduce hair loss and restore hair growth, contributing to society's well-being.

2. Objectives

Cell-based therapy

- Create an unlimited source of hair follicle cells for **AGA** patients through **iPSC-derived hair follicle cells** (instead of autologous sources)
- Support hair restoration in cancer patients after radiotherapy, chemotherapy, or severe burns (grade 2-3) affecting hair follicles.

Cell-free therapy

- Develop topical and injectable products using **ADSC-CM** to stimulate hair growth, thicken and strengthen hair follicles, combined with placebo and personalized treatment protocols.

3. Scientific basis

Cell-based therapy

- High differentiation potential of **iPSCs** (from blood and skin cells) and unlimited proliferation in culture.
- Methods to reprogram somatic cells into **iPSCs.**
- **iPSCs** also support angiogenesis, creating a nutrient-rich environment for hair growth.

Cell-free therapy

- Biological products (injection, topical) containing **ADSC-CM** promote hair regrowth when injected into AGA areas (Lee et al., 2020; Legiawati et al., 2023; Fukuoka et al., 2017; Narita et al., 2020).

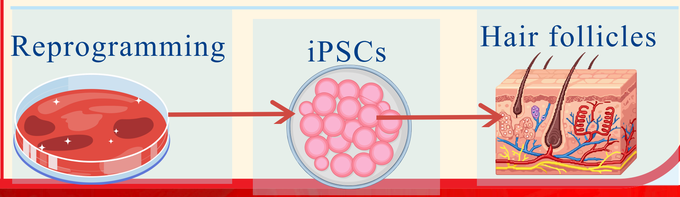
4. Research direction

Cell-based therapy

1. Reprogram somatic cells (blood and skin) into *iPSCs* using retrovirus vectors
2. Culture *iPSCs* in nutrient-rich media for unlimited proliferation.
3. Redifferentiate cells into *DP* , *DS* and vascular endothelial cells.
4. Use *ADSC-CM* to induce epithelial cells and assemble *DP* + *DS* into complete hair follicles, assess cell viability.
5. Ensure proper differentiation, safety and conduct clinical trials (differentiation rate, survival rate, etc.) before transplantation into patients.

Cell-free therapy

1. Culture autologous ***ADSC-CM*** as a source for bioproducts (injection, topical, etc.).
2. Isolate and process into ***biological formulations.***
3. Test efficacy through multiple experiments.
4. Combine with ***PRP*** and ***angiogenic stem cells***.



5. Experimental design

1. Viability and biological characteristics of DP and DS cells

Time

3-4 weeks

Goal

Assess viability, proliferation, biological properties of ***DP*** & ***DS*** ***after IPSC differentiation***; compare co-culture vs. single culture.

Evaluation

- Differentiation efficiency
- Cell identity confirmation
- Viability & proliferation
- Morphology changes Molecular markers & function
- DP-DS interaction
- Hair induction capacity
- Keratin (mainly in eptithelial cells)
- Collagen (ECM indicator)

2.Preclinical evaluation of safety and therapeutic potential

Model

Animal (e.g., mouse) or human scalp organoid (from iPSC)

Goal

Assess ***safety*** and ***efficacy*** of cell-based and cell-free therapies.

Expected results

- ***≥60%*** follicle survival rate
- Reduced immune response
- ***Thicker***, ***stronger*** hair follicles in 2-3 weeks

6. Expected outcomes

Cell-based therapy

- **Viable, proliferative DP-DS cells**
- **Stable hair-inducing properties**
- **Formation of complete hair follicles**
- **Safe for transplantation**

Cell-free therapy

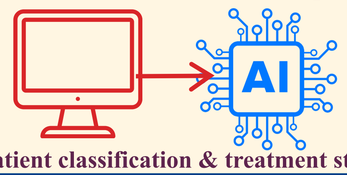
- **Effective hair growth stimulation**
- **Increased hair density and thickness**
- **Minimal immune response**
- **Safe and well-tolerated**

7. Applications



8. AI-Assisted analysis

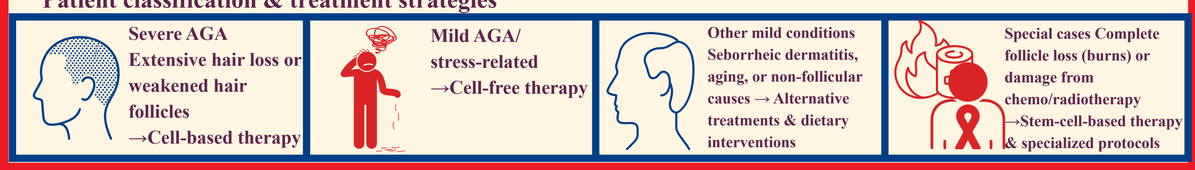
Use AI to analyze hair-imaging and scalp-ultrasound results, classify patients, and monitor treatment outcomes based on 3 parameters:



Three key parameters

1. Minimum & maximum hair-shaft diameter
2. Proportion of vellus hairs (after treatment)
3. Proportion of multi-hair follicular units

Patient classification & treatment strategies



Phone: 028 3636 1206 (nhánh 3)

Website: 2026.stemcellinnovation.com.vn

Email: sci@sci.edu.vn