The Impact of Adipose-derived Stem Cells (ASCs) on Micro-RNAs of Keratinocytes in Oral Lichen Planus (OLP) Patients using 3D culture System: a Pilot Study

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At a glance

Background: Oral Lichen Planus (OLP) is a potentially malignant disorder with a neoplastic transformation risk of 0.07%-5.8%, lacking a definitive therapy.
Adipose-derived stem cells (ASCs) exhibit immunomodulatory, pro-angiogenic, and oncosuppressive properties, potentially mediated by microRNAs (miRNAs), which may influence OLP progression.

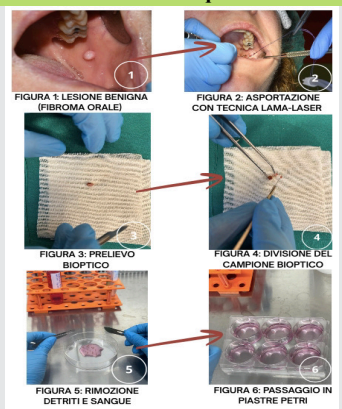
Aim: This pilot study investigates the oncosuppressive effects of allogeneic ASCs on OLP by analyzing miRNA expression and cellular behavior in keratinocytes using 2D/3D culture systems (organoids).

Methods

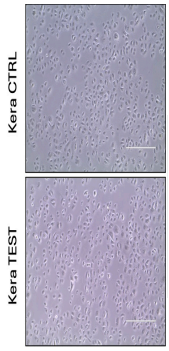
10 patients with OLP and 10 healthy controls.
A biopsy is performed on each patient and divided into two parts.
The isolated basal keratinocytes
will be co-cultured with allogeneic ASCs
from healthy donors or with their secretome.

The expression of miRNAs, fibrosis markers, extracellular matrix components, and neoplastic transformation is assessed using qRT-PCR and Western blot.
A 3D microfluidic model of the oral mucosa (organoid) reproduces the in vivo microenvironment to validate the results obtained from 2D cultures.

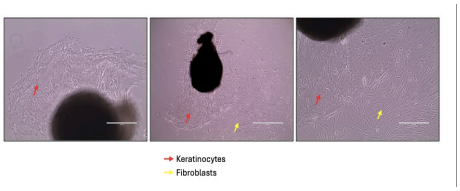
Clinical Sequence



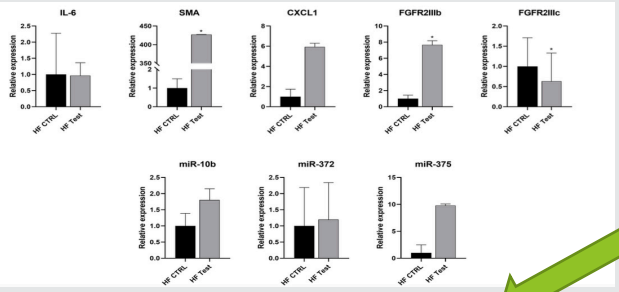
A starting point for the molecular baseline

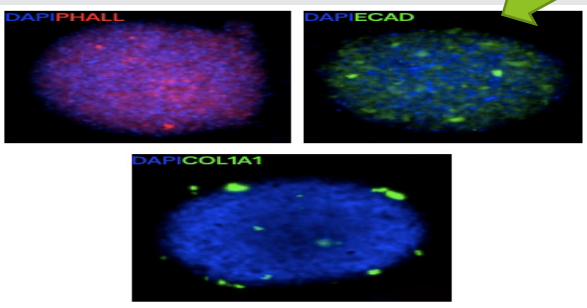


A closer and initial look of keratinocytes and fibroblasts derived from biopsies of test patients and control patients.

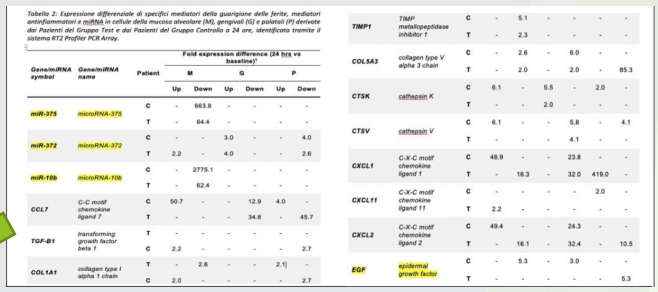


The chronic inflammation problem





First results based on just 20 patients



Treatment with the ASC secretome resulted in a significant reduction in the levels of oncogenic miRNAs, such as miR-10b, miR-372, and miR-375.
In addition to the effects on microRNAs, significant changes were observed in cellular parameters associated with malignant transformation.

This strengthens the hypothesis that ASCs exert a dual action: anti-inflammatory/repair and immunomodulatory/antitumor.

ASCs represent a new frontier for the treatment of OPMDs and tissue regeneration.

It will be essential to evaluate and analyze new anatomical sources for stem cell harvesting.

The future goal will be to deepen our understanding of these therapies through in vitro studies, organoids, and animal experimentation, in order to provide a valid and safe therapeutic alternative for patients.

This project has been approved by the Italian Lazio Area 1 Territorial Ethics Committee, with identification number 1120/2024; Established by Regional Resolution No. G01659.

Looking forward to research collaborations as well as academic and industrial partnerships
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