UNIVERSITY OF LIFE SCIENCES ”KING MIHAI I” FROM TIMISOARA
*”YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH IN APPLIED LIFE SCIENCES”*
*05-06 November 2026*



# SOLVENT POLARITY GOVERNS THE THERAPEUTIC WINDOW OF *SALVIA OFFICINALIS* L. LEAF EXTRACTS IN HUMAN KERATINOCYTES

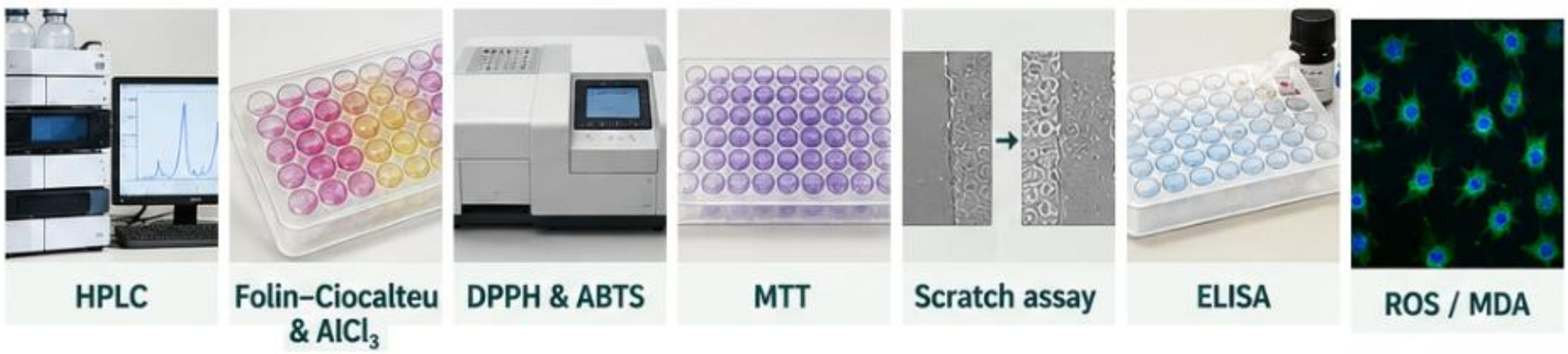
Melinda KALI[1,2], Teodor CERBULESCU[2], Ioana Liliana MUNTEAN[2], Roxana POPESCU[2]
*1 Doctoral School, Faculty of Medicine, “Victor Babeș” University of Medicine and Pharmacy,*
*2 Department of Cellular and Molecular Biology, Faculty of Medicine, “Victor Babes” University of Medicine and Pharmacy of Timisoara*

**Background:** Sage leaf (*Salvia officinalis L.*) is rich in caffeic-acid esters and abietane diterpenes with documented antioxidant and anti-inflammatory activity, yet head-to-head comparisons of extracts obtained with solvents of different polarity on the same human keratinocyte model remain sacre.




This study aimed to determine how different ethanol concentrations affect the phytochemical composition and biological properties of sage leaf extracts.

**Methods:** Three independent batches of 50% hydroethanolic (EHE50), 70% hydroethanolic (EHE70) and absolute-ethanolic (EET100) extracts were charactierized by HPLC (rosmmarinic acid, carnosic acid, carnosol), Folin–Ciocalteu and AlCl3 assays and by DPPH/ABTS radical scavenging. Cytocompatibility on HaCaT keratinocytes was mapped by MTT (0.1-200 µg/mL; 24-72 h). Wound closure (scratch assay), IL-6/TNF-α (ELISA) and intracellular ROS/MDA were quantified in unstressed cells and after LPS or H2O2 challenge.




The extracts were analyzed for phytochemical composition, antioxidant activity, cell viability, wound healing, inflammatory markers, and oxidative stress.

The biological activity of *Salvia officinalis* extracts depends not only on their antioxidant capacity but also on their phytochemical composition and cellular compatibility.

**Results:** Decreasing solvent polarity enriched rosmarinic acid (32.5 → 52.4 mg/g) and diterpenes but lowered extraction yield and total phenolics. EET100 was the most potent cell-free antioxidant (DPPH IC50 14.3 µg/mL) and the most cytotoxic (24 h CC50 148 µg/mL). EHE70 combined the highest total phenolics (178.3 ± 3.1 mg GAE/g) with a non-cytotoxic window of 0.1–50 µg/mL and, at 25–50 µg/mL , produced the largest acceleration of 24 h wound closure (80.6 ± 0.4% and 86.8 ± 0.5% versus 66.6 ± 0.8% in vehicle; both $p < 0.001$) and the strongest suppression of LPS-induced IL-6 (−49% to −59%) and TNF-α (−51% to −61%). EET100 at 25 µg/mL did not improve re-epithelialization.

**Conclusions:** Chemical antiradical potency is a poor surrogate of keratinocyte efficacy.
A 70% hydroethanolic extract occupies the most favorable efficacy-safety window and is the rational candidate for topical development.