

# Preliminary *in vitro* evaluation of a e-beam cross-linked doxorubicin loaded hybrid hydrogel as a potential therapeutic strategy for melanoma

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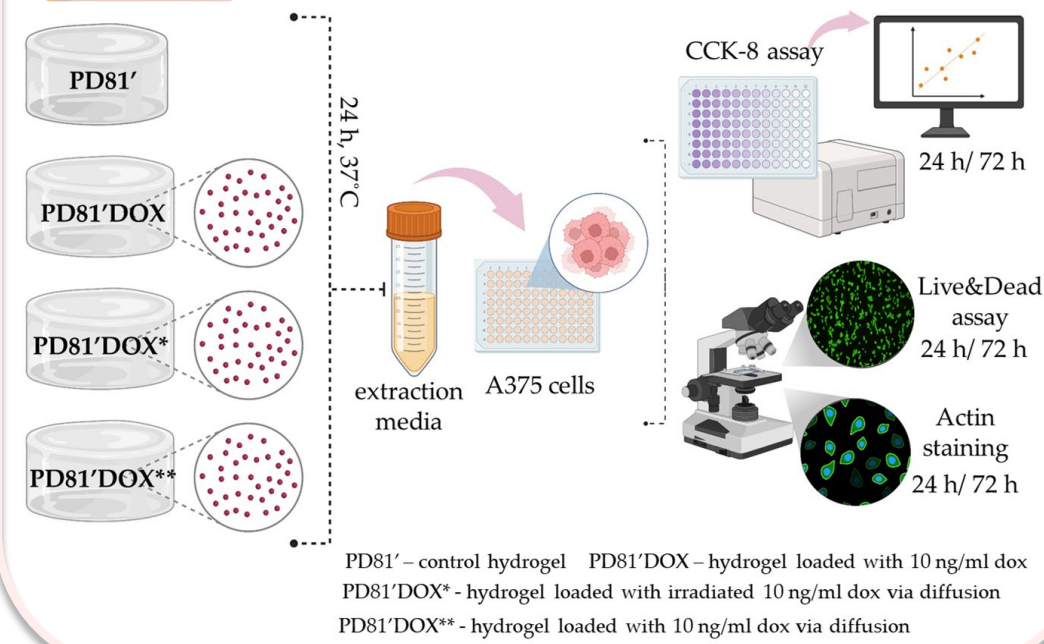


## INTRODUCTION

Polymeric drug delivery systems have gained attention, with hydrogels emerging as promising candidates due to their tunable properties, controllable degradation, and ability to stabilize labile drugs [1]. Literature suggests that hybrid hydrogels, combining synthetic and natural polymers, offer optimal chemical and mechanical properties for medical use [2]. Among crosslinking strategies, electron beam (e-beam) radiation stands out, providing precise network control and inherent sterilization without toxic reagents [3].

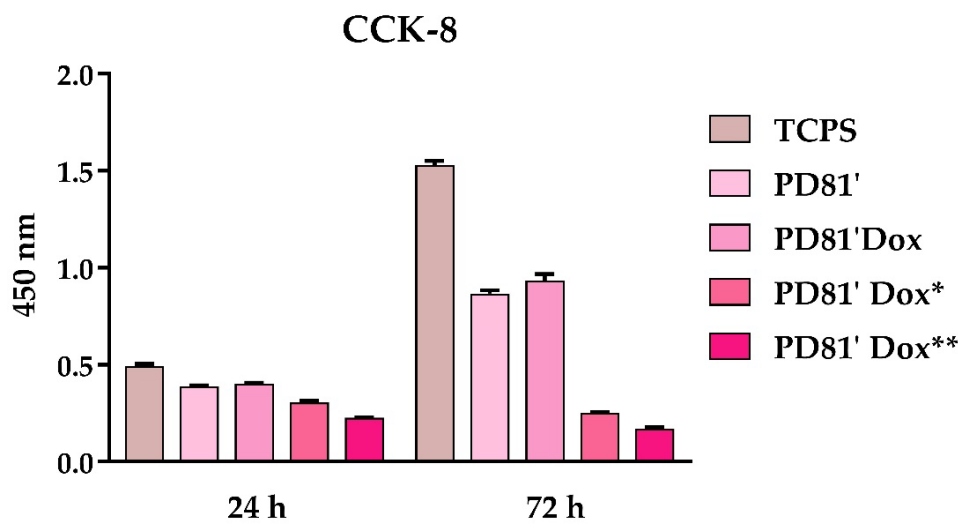
**AIM:** *in vitro* evaluation of novel e-beam cross-linked doxorubicin (DOX) hybrid hydrogels comprised of bovine collagen and sodium carboxymethylcellulose with poly(vinylpyrrolidone)- PVP and poly(ethylene oxide)- PEO

## METHODOLOGY



## RESULTS

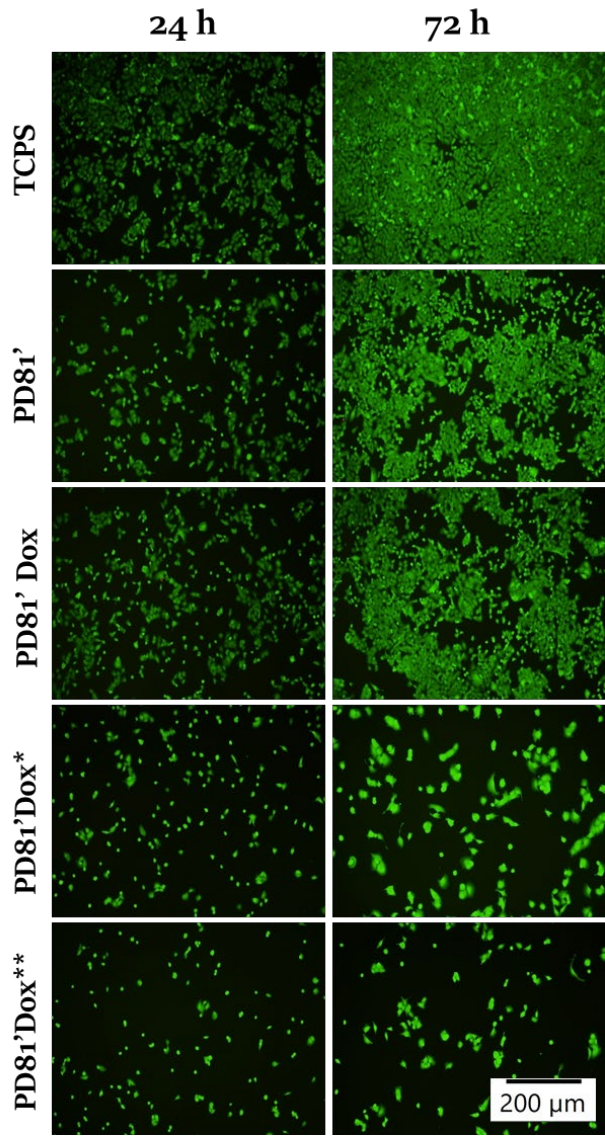
### ➤ CCK-8 assay results



**Fig. 1.** The potential effects of the tested extracts on the proliferation rate of A375 cells (CCK-8 assay)

- as observed from the graphic, the strongest reduction in cell proliferation occurred in PD81'DOX\*/PD81'DOX\*\* (~70%) extracts, followed closely by PD81' and PD81'DOX (~30%)

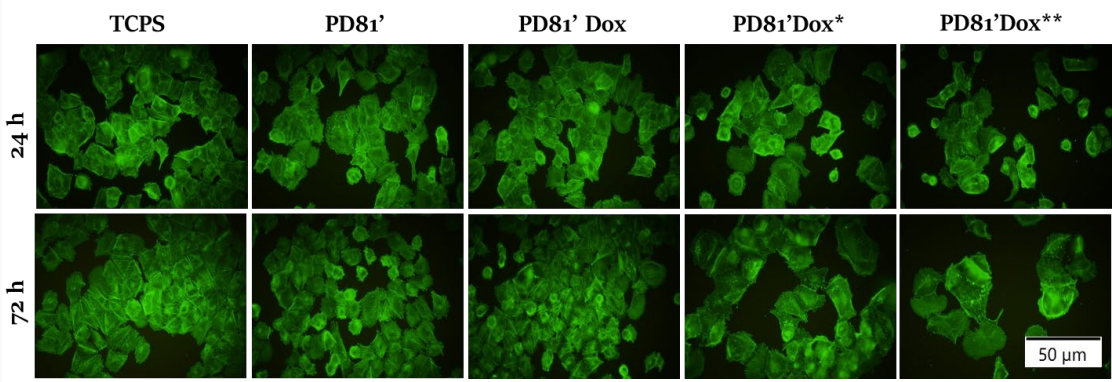
### ➤ Live/Dead assay results



**Fig. 2.** The potential effects of the tested extracts on the survival rate of A375 cells via the Live/Dead assay (live cells – green ; dead cells – red)

- in terms of cell survival, the fluorescence images revealed a high percentage of green-stained (live) cells and the absence of red fluorescent cells
- this observation, together with the CCK-8 assay results, indicate either a suppression of cell metabolic activity or a restriction in cell proliferation rate

### ➤ Morphological characterization



**Fig. 3.** The potential effects of the tested extracts on the morphology of A375 cells as assessed via actin (green fluorescence) and nuclei (blue fluorescence) staining

- the actin cytoskeleton examination showed a decrease in cell density and a more spread-out morphology of the cells grown in the PD81'DOX\* and PD81'DOX\*\* extraction media, further highlighting the anti-proliferative effect of these hydrogel formulations

## CONCLUSIONS

In conclusion, the doxorubicin-loaded hybrid hydrogels exhibit promising anti- tumour potential and could serve as effective drug delivery platforms in melanoma therapy.

### REFERNECES

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- [2]. Demeter, M.; Negrescu, A.M.; Calina, I.; Scarisoreanu, A.; Albu Kaya, M.; Micutz, M.; Dumitru, M.; Cimpean, A. Synthesis, Physicochemical Characterization, and Biocompatibility of Multi-Component Collagen-Based Hydrogels Developed by E-Beam Irradiation. *J. Funct. Biomater.* 2023, 14, 454.
- [3]. Negrescu, A.M.; Cimpean, A. A Recent Insight into research Pertaining to Collagen –Based Hydrogels as Dressings for Chronic Skin Wounds. *Gels* 2025, 17, 527.

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