

Hydrogels with natural or chemical compounds: in vitro biocompatibility

Sara Bernardi¹, Keti Zeka², Maria Adelaide Continenza¹

¹Dipartimento di Medicina Clinica, Sanità Pubblica, Scienze della vita e dell'Ambiente, Università degli studi dell'Aquila, L'Aquila, Italy - ²Dipartimento di Ingegneria industriale e dell'informazione e di economia, Università degli studi dell'Aquila, L'Aquila, Italy

Biomaterials are very popular topics in advanced medical applications. Our group performed different types of hydrogels. Two of the most successful concern hydrogels with natural or chemical compounds inside. The first step of experiments has been the PVP-Hydrogel production. This new hydrogel consists of three polymers - Polyvinyl pyrrolidone (PVP), Agar and Polyethylene glycol (PEG) - mixed, reticulated and together sterilized by gamma irradiation at 25 kGy. Simultaneously, a different kind of hydrogel embedding *Crocus sativus* L. petals compounds was prepared. This hydrogel consists of PVP, Agar, PEG and Kaempferol and/or Crocin. Same sterilization process as the PVP-hydrogel. The target clinical applications of this new biomaterial are the "difficult wounds" and cosmetic sector. These hydrogels were compared with *Neoheal*. For the in vitro experimental protocol, it was used a primary culture of fibroblasts, from the subcutaneous tissue of a newborn mice, seeding the cells on 1cm² area of both kinds of hydrogel. As the ISO protocol prescribes, the experiments were repeated 3 times for each kind of hydrogel, stopping the culture at the 3rd, 7th and 14th day after the seeding. For all steps, three Petri dishes were used as controls without biomaterials. At each fixed deadline, all Petri dishes were colored using the Wright method for cell counting and other morphological evaluations. The microscopic analysis revealed the total biocompatibility of both hydrogels at each step of the experiment. The new PVP-Hydrogel was found to be more adsorbent, increasing its dimensions day by day and free floating in the medium. The hydrogel with the compounds extracted from *Crocus sativus* L. had the cells that growth faster. The *Neoheal*, indeed, revealed more sticky properties, adhering to the dish floor but neither swelling or increasing its volume. These results showed that both the new hydrogels are biocompatible and the different chemical properties caused a very different behavior in cells growth comparing with *Neoheal*. It is hoped that this study will stimulate further investigations in this field.

References

- [1] Zeka et al. (2014) Kaempferol, a powerful antioxidant from *Crocus Sativus* L. flowers: an in vitro study. *Ital J Anat Embr*, 119, 1s, 200
- [2] Zeka et al. (2013) In vitro biocompatibility of a new hydrogel with Crocin, powerful antioxidant found in *Crocus Sativus* L. flowers. *Ital J Anat Embr*, 118, 2s, 200

Keywords

Antioxidant; biomaterials; hydrogel.