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Evaluation of Resveratrol Incorporation in Hydrogel Matrices

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Abstract – Resveratrol has been demonstrated to show benefits against skin disorders. This active compound immobilized in Poly-vinyl pyrrolidone (PVP) hydrogel could be very interesting for a topical administration. The PVP hydrogel matrices and devices were characterized by gel fraction, swelling and *in vitro* test of biocompatibility and the results showed that they have adequate physical and chemical properties (Table 1) and biocompatibility. The release degree of Resveratrol from devices was analyzed by High Performance Liquid Chromatography (HPLC) technique (Fig. 1) demonstrating capacity of release Resveratrol.

Resveratrol (RES) has been shown to possess exceptionally benefits for the skin, such as antiproliferative and chemopreventive properties against skin carcinogenesis, anti-inflammatory and antioxidant activity. Moreover, the oral bioavailability of Resveratrol is poor, leading to an irrelevant *in vivo* effect with oral administration compared to its powerful *in vitro* efficacy.[1] These properties make the Resveratrol immobilization in hydrogel membranes interesting to be used in topical treatments.

In this study two kinds of matrices composed of PVP K90, Polyethylene glycol (PEG) and Agar **(PVP/PEG**) or PVPK90 and Glycerin **(PVP/GLY)** irradiated in ^{60}Co gamma ray source at 20 kGy dose were analyzed. The Resveratrol devices (**PVP/PEG/RES** and **PVP/GLY/RES**) had the same composition as the polymeric matrix more 0.1% of Resveratrol, which was incorporated before crosslinking irradiation.

The properties of matrices and devices were analyzed by swelling, gel fraction and in vitro test of biocompatibility. A preliminary study to analyze the release degree of Resveratrol was performed immersing the devices in a Phosphate Buffered Saline solution (PBS) pH 5 for 6 hours. The samples were analyzed by HPLC.

The results of gel fraction and swelling after 24 hours are illustrated in Table 1, demonstrating that the matrices have appropriate properties to the immobilization of actives ingredients and these properties are maintained after Resveratrol incorporation.

In the cytotoxicity assay all matrices and devices showed a similar behavior of the negative control, an adequate *in vitro* biocompatibility. The positive control showed cytotoxic effect, presenting $IC_{50\%}$ about 72.

The HPLC chromatograms (Fig. 1) showed that the Resveratrol release from the PVP/GLY/RES device was approximately two times higher than PVP/PEG/RES, with a retention time of about 12.5 minutes.

The Resveratrol devices showed appropriate physical and chemical characteristics to be used in a topical application with adequate Resveratrol release on preliminary assay.

Table 1: Results of gel fraction and swelling

Samples	Gel Fraction (%)	Swelling (%)
PVP/PEG	88 ± 0,1	2090 ± 31
PVP/GLY	81 ± 1,2	2307 ± 133
PVP/PEG/RES	85 ± 0,7	2000 ± 94
PVP/GLY/RES	83 ± 0,5	2407 ± 79

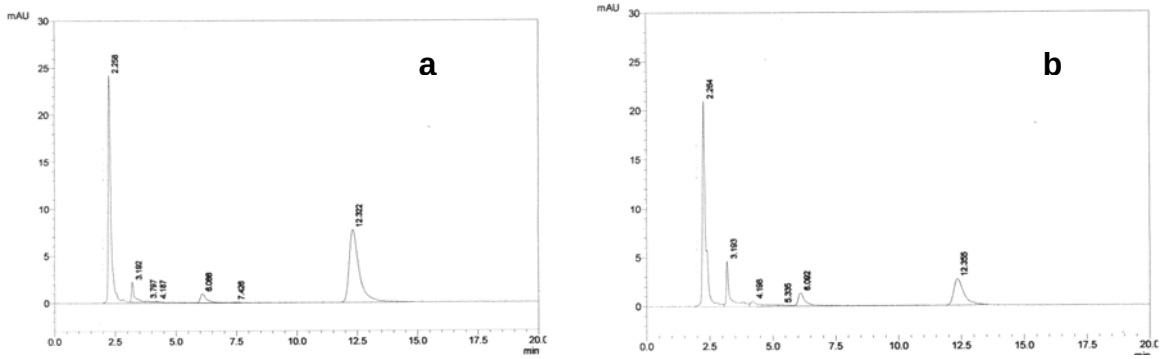

Figure 1: HPLC chromatograms of Resveratrol release from devices, **a.)** PVP/GLY/RES and **b.)** PVP/PEG/RES.

References

[1] C. F. Hung, Y. K. Lin, Z. R. Huang J. Y. Fang, Biol. Pharm. Bull. 31(2008), 955—962.