**An injectable collagen and gelatin-based hydrogel with tunable properties for wound healing applications**

A person smiling at the camera

Description automatically generated**Corresponding Author name: Francesca Basso**

**Affiliation: Italian Institute of Technology (IIT)**

**Email ID’s: francesca.basso@iit.it**

**WhatsApp No: 3345487023**

**Other Authors if any: Marco Contardi, Giovanni Perotto**

**Presentation type:** Oral presentation

**Abstract (250-300 words):**

Hydrogels are three-dimensional, hydrophilic polymer networks that can absorb and retain a large amount of water or biological fluids within their structure without dissolving. Collagen and gelatin are two excellent candidates for creating hydrogels for biomedical applications, thanks to their biomimetic properties. However, a drawback is their solubility in water at 37°C. This poses a limitation in their application in the biomedical field. Therefore, to use these two proteins at body temperature, it is necessary to covalent crosslink them. Microbial transglutaminase (mTG) was selected for a harmless enzymatic crosslinking, minimizing undesirable effects associated with potential chemical crosslinker residues and ensuring enhanced biocompatibility. The collagen type used in this study is noteworthy. Fish swim bladders, often discarded as waste, are a promising source of collagen. We demonstrated that a combination of gelatin and swim bladder collagen crosslinked with mTG can be utilized to create hydrogels suitable for wound healing applications. It has been proved that hydrogel properties can be substantially tuned by varying the degree of crosslinking and the matrix composition. This is important because different biomedical applications may require hydrogels with specific properties such as mechanical strength or swelling behaviour. It has been demonstrated that swelling and gel fraction properties can be tune by varying the enzyme concentration while the mechanical properties can be modified by changing the gelation time. It has been demonstrated that our hydrogels cover a wide range of swelling values. Moreover, hydrogels are soft hydrogels with Young's modulus values ranging from 0.5KPa to 10KPa. Hydrogels were loaded with a natural antioxidant polyphenol to understand the release performance and the fitting of the drug release profile in vitro showed a diffusion-controlled drug release mechanism. Finally, the biocompatibility of the hydrogels was verified using keratinocytes and fibroblasts. Overall, our findings suggest that the hydrogels developed in this study holds great potential for use in wound healing applications.

**Biography (150-200 words):**

I am a PhD candidate at the Italian Institute of Technology (IIT) in collaboration with the University of Genova (curriculum: bionanotechnology). I hold my bachelor’s degree in Biomedical Engineering from University of Genova and my master’s in Bioengineering, curriculum biomaterials. My research focuses on the development of new materials for biomedical applications, such as wound healing applications, with a particular interest in natural biomaterials. My current work involves developing novel hydrogels to improve biocompatibility. In addition to my research, I am passionate about the world of patents and am currently doing an internship at IIT on this topic.