



Contribution ID: 68

Type: Talk

GHK-Hyaluronic acid conjugates affect the wound closure in the presence of copper ions

Tuesday, 5 October 2021 12:15 (15 minutes)

Wound healing is a complex, efficient and highly regulated biological process that consists of four phases: hemostasis, inflammation, proliferation and migration of cells [1]. Copper-dependent stimulation of vessel formation during the wound healing has been mainly attributed to its regulation of vascular endothelial growth factor (VEGF) and angiogenin [2]. The human copper-binding peptide GHK (glycyl-L-histidyl-L-lysine) is a small, naturally occurring tri-peptide present in human plasma that can be released from tissues in the case of an injury and is able to control the fibrinogen biosynthesis in liver tissue [3,4]. Most authors attribute effects of GHK to its ability to bind copper (II) ions that can affect not only the copper metabolism but also regulate a number of human genes [5]. Hyaluronic acid (HA) is currently used in tissue regeneration either alone or conjugated with bioactive molecules [6,7]. 200 kDa HA affects tissue regeneration and pro-angiogenic and wound closure processes.

In the present work, we report on the protective and regenerative actions of the HA-GHK conjugate on mouse embryonic fibroblasts cell line (NIH/3T3) in the presence and in the absence of Cu(II) ion. Dose-response experiments show no significant effect on cell viability/proliferation with or without 1 μ M copper. The effect of HA-GHK conjugates on wound healing was investigated; as expected, HA200 treatment slightly increases the wound closure, while the addition of HA-GHK with different % of GHK loading results in higher % of wound closure than with HA200. Addition of 1 μ M copper or 50 μ M copper chelator BCS, modify this effect. Altogether, our findings pinpoint that GHK-HA is a good candidate as new molecular entity in wound healing and skin repairing.

- [1] Guo S and Dipietro LA, Factors affecting wound healing. *J Dent Res.* 2010; 89(3):219-29
- [2] Kornblatt AP et al *J of Inorg Biochem.* 2016; 161:1-8
- [3] Pickart L. *J of Biomat Sci. Polymer edition.* 2008; 19: 969-988
- [4] Pickart L et al. *Oxidative medicine and cellular longevity;* 2012: 324832
- [5] Pickart L et al. *BioMed Res. Int.,* 2014; 151479
- [6] Neuman MG et al. *Hyaluronic acid and wound healing. J Pharm Pharmac Sci.* 2015; 18:53.
- [7] Sciuto S et al. *Derivatives obtained from hyaluronic acid and carnosine.* 2015. PCT/IB/2015/055782.

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Session Classification: Session