

## TAM2-2

### Activation of TGF beta-1 following low power laser irradiation – a potential mechanism for photobiomodulation.

Praveen Arany<sup>1</sup>, David Mooney<sup>1</sup>, Michael Hamblin<sup>2</sup>

<sup>1</sup>Harvard School of Engineering and Applied Sciences, Cambridge, MA, United States,

<sup>2</sup>Wellman Center of Photomedicine, Boston, MA, United States

The ability of laser light to modulate specific biological processes has been well documented and is now widely used in routine clinical scenarios. But the precise mechanism mediating these photobiological interactions remains an area of intense investigation. We have recently demonstrated the ability of low power near infrared laser irradiation to activate the latent TGF-beta complexes *in vitro*. We used a 904nm GaAs laser (ORALASER 1010, Oralia, Konstanz, Germany) at 10mW, continuous beam in contact, delivering varying fluences from 10sec (0.1J/cm<sup>2</sup>) to 600secs (6J/cm<sup>2</sup>) through a fiberoptic handpiece. We observed two isoforms, namely TGFβ1 and TGFβ 3, were capable of being activated by laser irradiation using ELISAs and a reporter based assay system. We then followed up on our *in vitro* study by looking at this process *in vivo* by performing a clinical trial with 30 patients in an oral tooth-extraction wound healing model. The healing tissues were assessed using routine histopathology and immunostaining where we observed a better organized healing response in laser irradiated oral tissues that correlated with an increased expression of TGFβ1 immediately post laser irradiation. As our data suggested the source of latent TGFβ1 is probably from the degranulating platelets in the serum in the freshly wounded tissues, we are presently pursuing the precise photomolecular mechanisms focusing on potential chromophores, wavelength and fluence parameters affecting the activation process. In summary, we present evidence of a potential molecular mechanism for laser photobiomodulation in its ability to activate latent TGFβ complexes.