

# Relevance of Ectopic Bone Formation to the Structure of TGF- $\beta$ Superfamily in Stress Condition; A Molecular Mechanic Vs. Clinical Study

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Formation of bone outside the skeletal system, which can occur in all kinds of soft tissues, is called Ectopic or Heterotopic Ossification (HO). It is the abnormal formation of true bone within extra skeletal soft tissues.

The TGF- $\beta$  superfamily Several physiological processes are mediate by these polypeptides such as regulates bone formation and resorption as well as osteoclasts differentiation and survival is stimulated by them. Total of 21 head injured patients admitted in the hospital between 8-33 yrs old. All individuals are treated with indomethacin to control HO formation. The red light treatment and heat lamp exposure were done for 20min in each day of physiotherapy. Both effective members of transforming growth factor-  $\beta$ , superfamily were analyzed by Molecular mechanic methods in amber force field. Montecarlo simulation was done for 200pSec and the  $\psi$ ,  $\varphi$  angles of each amino acids were calculated. Clinically, of 25 potentially relevant records identified, 21 were related to HO. Following the treatment 11 individuals showed the response to heat exposure and physical exercises. 9 out of 21 not only never do effective response to heat treatment, but also progress the HO formation. It is tough that, increasing temperature may cause denaturation in protein and it undergoes protein dysfunction. But the

results reveal that 2tgi tends to arrange the protein critical angels  $\varphi$  and  $\psi$ , into more favored and/ or allowed region and the formation and development of right handed, left handed  $\alpha$ - helices and  $\beta$ - Pleated sheath will be more facilitated because of rising in temperature. It is suggested that this phenomenon cause 2tgi to works better that expected and mediated the osteoblasts mechanism in changing the connective tissue to ectopic bone. Although the rising mechanism of TGF-  $\beta$  in post trauma patients is not clearly understood, but it is suggested that the nerve protecting rule of these super family is the main cause. May be its elevating cause the connective tissue around the contusion zone, make some hard tissues to prevent local damages, and prevents the response of macrophages. In other zones it is clear that some side effects would be observed, such as heterotypic ossification. 1tfg undergoes denaturation based on results explore in table 2. Therefore it is expectable that some patients with higher 1tfg rather than 2tgi, get the more healthy situation than whom with more 2tgi.