



<b>Title</b>	<b>Phyto-Oestrogens for Growth Modification – A Novel Therapeutic Possibility</b>
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<b>Citation</b>	<b>Journal of Bioanalysis and Biomedicine, 2013, v. 5 n. 3, p. 65</b>
<b>Issued Date</b>	<b>2013</b>
<b>URL</b>	<b><a href="http://hdl.handle.net/10722/193584">http://hdl.handle.net/10722/193584</a></b>
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# Phyto-Oestrogens for Growth Modification – A Novel Therapeutic Possibility

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Height is not only important to physical health but also to social and psychological well-being. It is widely accepted that growth is assign of health. At all stature is an unattainable dream for many. At present, treatment with growth hormone alone or with growth hormone-releasing factor is the only treatment available. However, long-term treatment with growth hormone has numerous side effects, including rapid progression through puberty and a reduction in bone mineral density [1]. In addition, the need for daily injections makes growth hormone treatment unpopular; therefore, this treatment is reserved for patients with the most severe growth deficiencies.

The current methods for growth enhancement include growth hormone (GH) treatment alone or combined with a gonadotropin-releasing hormone (GnRH) analogue [2]. However, these treatments have several side effects: an increase in the rate of passing the growth spurt period and rapid progression through puberty; a reduction in bone mineral density [1]; increases in lean bodyweight, muscle mass and lipid weight; and uncertain short- and long-term benefits [3]. The levels of insulin-like growth factor-1 (IGF-1) and insulin-like growth factor-binding protein-3 (IGFBP-3) can be used as indices to monitor growth [4].

Oestrogens also play a pivotal role in the regulation of normal skeletal growth and maturation in both boys and girls [5]. In both sexes, oestrogen deficiency leads to the absence of a pubertal growth spurt [6].

Phyto-oestrogens are plant-derived nonsteroidal compounds that bind to oestrogen receptors (ERs) and have activities similar to that of oestrogen [7]. Phyto-oestrogens can increase alkaline Phosphatase activity and promote the mineralization of bone in mouse calvaria osteoblast-like cells [8].

Over the years, our team has investigated Traditional Chinese Medicines and the active components of these medicines that enhance bone healing. We have identified several chemicals from plants that have strong bone healing effects. To examine the effects of various agents (e.g., naringin, statin and quercetin) on bone formation, we have used New Zealand White rabbits with surgically created bone defects in the parietal bone [9-12].

In addition, to investigate the possibility of modifying jaw growth either by physical or chemical means, we have researched the sphenoid occipital synchondrosis, which is the growth centre at the base of the skull. We developed an organ-culture technique for the synchondrosis in neonatal mice, and we have demonstrated that mechanical tension can enhance growth across the synchondrosis [13,12]. Using the same model, we have demonstrated that quercetin, a phyto-oestrogen commonly found in onions, apples and grapes, enhances bone healing and formation and promotes growth across the synchondrosis [14]. This result suggests a novel therapeutic possibility: growth can be enhanced by a single phytochemical.

## References

1. Yanovski JA, Rose SR, Municchi G, Pescovitz OH, Hill SC, et al. (2003) Treatment with a luteinizing hormone-releasing hormone agonist in adolescents with short stature. *N Engl J Med* 348: 908–917.
2. Leschek EW, Rose SR, Yanovski JA, Troendle JF, Quigley CA, et al. (2004) Effect of growth hormone treatment on adult height in peripubertal children with idiopathic short stature: a randomized, double-blind, placebo-controlled trial. *J Clin Endocrinol Metab* 89: 3140–3148.
3. Bryant J, Baxter L, Cave CB, Milne R (2007) Recombinant growth hormone for idiopathic short stature in children and adolescents. *Cochrane Database Syst Rev* 18: CD004440.
4. Binoux M, Hossenlopp P (1988) Insulin-like growth factor (IGF) and IGF-binding proteins: comparison of human serum and lymph. *J Clin Endocrinol Metab* 67: 509–514.
5. Cutler GB Jr (1997) The role of estrogen in bone growth and maturation during childhood and adolescence. *J Steroid Biochem Mol Biol* 61: 141–144.
6. Kato H, Ota T, Furuhashi T, Ohta Y, Iguchi T (2003) Changes in reproductive organs of female rats treated with bisphenol A during the neonatal period. *Reprod Toxicol* 17: 283–288.
7. Branca F (2003) Dietary phyto-oestrogens and bone health. *Proc Nutr Soc* 62, 877–887.
8. Kanno, S, Hirano S, Kayama F (2004) Effects of phytoestrogens and environmental estrogens on osteoblastic differentiation in MC3T3-E1 cells. *Toxicology* 196: 137–145.
9. Wong RWK, Rabie ABM (2003) Statin collagen grafts used to repair defects in the parietal bone of rabbits. *Br J Oral Maxillofac Surg* 41: 244–248.
10. Wong RWK, Rabie ABM (2006) Effect of Naringin Collagen Graft on Bone Formation. *Biomaterials* 27: 1824–1831.
11. Wong RWK, Rabie ABM (2007) Effect of Puerarin on Bone Formation. *Osteoarthritis and Cartilage* 15: 894–899.
12. Wong RWK, Rabie ABM (2008) Effect of Quercetin on Bone Formation. *J Orthop Res* 26: 1061–1066.
13. Rukkulchonk BK, Wong RWK (2008) Effect of tensile force on expression of PTHrP and thickness of hypertrophic zone in organ-cultured mouse sphenoid occipital synchondroses. *Arch Oral Biol* 53: 690–699.
14. Apichart V, Wong R, Rabie B, Lei S (2012) The effect of quercetin on expression of SOX9 and subsequent release of Type II collagen in organ-cultured mice sphenoid occipital synchondroses. *Angle Orthodontists* 82: 247–253.

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Received June 26, 2013; Accepted July 08, 2013; Published July 10, 2013

Citation: Wong RWK (2013) Phyto-Oestrogens for Growth Modification – A Novel Therapeutic Possibility. *J Bioanal Biomed* 5: 065. doi:10.4172/1948-593X.1000081

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