

Biotechnological potential of by-products of the Brazilian animal protein industry in the generation of xenogeneic biomaterials for bone regeneration

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Biotechnological development, started in the 1950s and markedly accelerated since the 1990s, has brought significant advances in the use of biomaterials in treatments for bone loss. Study in Brazil have shown that the use of biomaterials for bone regeneration including grafts and membranes is a frequent practice among dentists of which 42% have already done grafts, especially with xenogeneic (33%) followed by autogenous (30%) and alloplastic (23%) materials. In their perception, there was high professional-patient satisfaction, absence of associated morbidity and moderate surgical procedure cost [1].

Adequately treated xenografts have physicochemical characteristics and favorable biological behavior to bone repair, functioning as cellular scaffolds with high biocompatibility, low antigenicity and moderate to high biodegradability; proving to be safe and applicable, with satisfactory clinical predictability [2,3]. Furthermore, animal products could contribute to the green industry, generating economic value, sustainability and a higher quality of life, due to lower waste disposal and environmental stressors [4].

In the following work, it's presented a brief integrative review on the outlook for obtaining animal raw materials for potential biotechnological application of xenografts in Brazil through technical reports thru 2017 consolidated technical reports from of the Brazilian Animal Protein Association [5], Brazilian Meat Exporting Industries Association [6] and Brazilian Fishery Association [7], besides original articles retrieved from the Pubmed database using the keywords “bone graft AND brazil AND poultry, bovine, porcine OR fish” from 2013 to 2018 [8]. The results showed that in 2017, Brazil was one of the major producers of animal protein worldwide. For example, the Brazilian poultry industry produced 12.9 Million tons (Mt) of animal protein, the second largest producer in the world [5]. On the other hand, 9.1 Mt of cattle were produced, being also the second in the world [6], while the production of pork was 3.7 Mt, fourth in the world [5], and the fish was 0.7 Mt, fourth largest in tilapia [7]. However, the Brazilian scientific research on bone xenografts is equivalent to only 2% of the whole world and emphasize cattle derivatives [8].

Due to the massive generation of by-products by the animal protein industries, there is high interest in the use of cattle [9-11], pig [12] or chicken bones [4] and fish teeth [13] to obtain hydroxyapatite as well as cattle tendon [10,11], chicken [4] or fish skin [2,13] and porcine intestinal submucosa or peritoneum [12] to obtain collagen

type I which could generate biomaterials with bone morphofunctional mimicry being applicable to bone regeneration [10].

Given this reality, it is necessary to increase the strategic partnerships between private companies and universities in translational studies to broaden the perspective of the current investigation and be able to develop innovative xenogeneic biomaterials for bone regeneration applicable in oral surgery.

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