A Dental Surgeon’s Experience in A Biotechnology Lab: Trying to Resolve Surgical Controversies with Blood-Derived Growth Factors

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INTRODUCTION

Nowadays, there are a lot of articles about blood-derived growth factors (BDGF) using different protocols. These blood by-products have many applications in Medicine, especially in Dentistry. The most important thing is the use of an autologous biomaterial, from the patient's own blood to improve healing, soft tissue growth, hemostasis etc.[1-5] Many dental surgeons use BDGF in their surgical protocols, which is possible to observe in scientific articles,[1-4] dentistry congresses and especially on social media (although the last is unethical way to share and publish research results or cases reports).

One year ago, I started my post-doc in Biotechnology to understand more about these blood by-products. When I first arrived at the lab, everything was new to me. My knowledge in this field was minimal. At that moment, I felt lost. Out of my comfort zone.

But after acquainting myself with a lot of different biologics and biochemistry equipment, I had many new ideas! One of my objectives, was to improve fibrin mesh for dental surgical procedures, mainly for “guided bone regeneration.”

One day while I was taking a shower I had an “eureka” moment - to use Autologous Albumin!

Albumin is a macromolecule, which the human body produces naturally, and the principal idea was produce autologous denaturized proteins in a sponge form (Figure 1), which maybe we could use this to improve the fibrin mesh. After that, my group and I started research to produce a new autologous membrane using albumin. Using a centrifuge (Silfradent®, Italy) to provide the BDGF (serum + PPP + Platelet-rich plasma (PRP) zone + buffy coat), and another medical device (APAGÔ, Silfradent®, Italy) to denaturize the serum plus PPP and produce the albumin.

We tried to create new molded albumin membranes, in a glass cube. But we were only able to produce an albumin gel.

After several hours of brainstorming, I got it! I thought "Why we don't use the fibrin mesh plus albumin?". So, I added/ mixed the PRP and the buffy coat with the albumin in the glass cube. And “voilà,” I had a new consistent autologous membrane using albumin. I repeated this procedure step-by-step many times, to confirm the method. I told my research group about this new membrane, and we wrote the preliminary study.[6]

Figure 1- The first Alb-CGF membrane produced


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We now have a new moldable autologous membrane that releases growth factors. We think this could be a tremendous help in blood-derived growth factors studies. Futures studies are essential: *in vitro* (to explain the reaction of the albumin in the presence of other substances, such as metalloproteinases), *in vivo* (to know the response of the albumin in animals and its degradation), and after that, clinical trials. These studies will provide translational research for this new autologous membrane called Alb-CGF (Albumin plus Concentrate Growth Factors). [6] (Figure 1) Translational research is necessary to understand this new biomaterial, without which we have only a lab history. We are now just at the very beginning of a long journey, but if we persist I expect very positive results.

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**REFERENCES**