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Prospecting, development, optimization and clinical trial of new heterologous fibrin sealant derived from snake venom: From bench to the bedside

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To bridge the GAP between basic and applied sciences is needed to push forward disease research and therapeutics. What types of drug leads are truly "druggable", sit in "patented bioproducts space" and can be pushed towards clinical trials? We present one successful translational case of bioproduct from laboratory bench to the bedside. Although animal toxins present excellent candidate molecules because they have high specificity for a cellular receptor without side effects, few drugs are approved for human use. Considering that infectious diseases could be transmitted via human blood a new heterologous fibrin sealant (HFS) is proposed, whose components are a serine protease (a thrombin-like enzyme) extracted from the venom of *Crotalus durissus terrificus* snakes and a fibrinogen-rich cryoprecipitate extracted from the blood of *Bubalus bubalis* buffaloes. This new bioproduct has been used as a coagulant, sealant, adhesive and recently as a scaffold candidate to bone and cartilage repair using mesenchymal stem cells. Thus, we show its pre-clinical applications aiming at repairing nervous system traumas and bone regeneration. Also, we have finished an innovative safety trial phase I/II to treat chronic venous ulcers concluding that the product is safe and clinically promising candidate for this purpose due its preliminary effectiveness.

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