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Short Communication

Clinical potential in modern medicine of fibrin glues as drug delivery system

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In an attempt to achieve greater therapeutic efficiency of products, especially in the pharmacological area such as drugs in general, the drug delivery system that controls the distribution of substances through macromolecular carriers has been developed with the primary objective of optimizing their delivery to target locations [1].

Records in the scientific literature of pioneering controlled drug delivery studies date back to the 1960s at Harvard with the in vivo implantation of a silicone tube that became a drug delivery device, in this case anesthetic gases, at a constant rate of release. [2]. Clinical use was approved in the 1980s and 1990s with the use of microscopic degradable polymer depot Drug Delivery Systems (DDS) but it can be cited that clinical success occurred in the 2000s with nanoscopic products [3]. From this period a rapid evolution occurred and the range of use at both molecular and supramolecular levels was expanded [4]. The clinical use of nanotechnology in health has been a major revolution, with controlled drug release being one of its examples in treating various types of cancer, manufacturing vaccines and treating fungal infections using liposomes as a component [5].

Among the various products used as DDS, we can highlight nanogels and fibrin sealants. Nanogels are made up of hydrogel and nanoparticles and stand out for their biological consistency, stability and carrying capacity [6]. Fibrin sealants, which were originally used as hemostatics, have over time diversified their use, mainly due to their biocompatibility property, three-dimensional structure and degradation time, leading to the possibility of use as DDS [7]. In Europe, commercial sales of fibrin sealants began in the late 1970s, while in the United States in 1998, one of the world's most marketed products, Tisseel®, was distributed by Baxter Healthcare Corporation (Glendale, CA) [8]. Fibrin sealants are the only agents currently approved with sealant, hemostatic and adhesive properties by the Food and Drug Administration (FDA) [9].

Initial studies with the use of fibrin sealant, at the time called fibrin glue, such as DDS date from the 80's with the mixture with antibiotics to treat mycotic aneurysms in bacterial endocarditis [10] and in the 1990s as an assistant in heart valve surgeries at the suture site, also to prevent bacterial endocarditis [11]. The composition of fibrin sealants generally contains fibrinogen and thrombin, autologous or homologous human blood plasma derivatives [9]. However, in the case of the homologous sealant, scientific research reports the risks of spreading infectious diseases such as acquired human

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immunodeficiency syndrome (SIDA), human parvovirus and hepatitis [12].

A new fibrin sealant, currently called fibrin biopolymer due to its diversity of applications and properties, was developed in Brazil by a group of researchers from CEVAP (Center of the Studies of Venoms and Venomous Animals – UNESP Botucatu, SP) without the presence of human blood. This bioproduct has been shown to be effective in a variety of preclinical and clinical situations with therapeutic potential such as repair of nerve damage [13–18], correction of bone defects [8,19–21], treatment of venous ulcers [22] and stem cell scaffolds [23].

In conclusion, several future researches to expand the use of fibrin glues as scaffolds and drug delivery systems will certainly be carried out, in several areas of medicine and other health areas, beyond their initial objective, of simple use as therapeutic glues [24].

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