Opinion

Bioresorbable 3-D collagenic matrix obtained in artificially created coal acid environment. Development prospects

Volume 5 Issue 6 - 2019

Gurin Maxim Vyacheslavovich
LLC Cardioplant, Russia

Correspondence: Gurin Maxim Vyacheslavovich, Research team, LLC Cardioplant, Russia, Tel +79273965088, Email gmv798@mail.ru

Received: November 19, 2019 | **Published:** December 12, 2019

Opinion

Bioresorbable polymers are widely used in reconstructive surgery as implantable medical products for tissue regeneration. They are widely used in surgical dentistry, maxillofacial surgery, periodontics, for targeted regeneration of soft tissues in the defect area. Matrices for the manufacture of such products should have a number of parameters, the most important of which are biocompatibility, relative strength and the presence of spatial 3-D structure.[1] Most manufacturers of collagen matrices obtain the final product by dissolving collagen from connective tissue raw materials of animal origin using acids, followed by precipitation and lyophilization. Such approaches make it possible to obtain biomaterial with a given thickness and are quite effective for use in production. However, they also have drawbacks - for example, insufficient strength characteristics of the final product and the residual content of acid compounds, which ultimately affects the reaction of surrounding tissues after implantation. These circumstances force us to look for new methods of processing collagen-containing raw materials. A promising direction is to study the effect on the connective tissue collagen-containing raw materials of carbonic acid while preserving the native architectonic properties of the material. Collagen is able to swell and dissolve in an acidic environment, depending on the degree of acidification of the solution and the form in which it is processed. The degree of collagen denaturation also depends on the aggressiveness of the medium. As you know, carbonic acid is a weak unstable acid. A low pH value is formed only at high pressure, which saturates water with CO_2.[2]

Pressure relief leads to decomposition of the compound into carbon dioxide and water, which may be useful in the production of collagen matrices, since in this case the acid does not require neutralization or removal. In the developed protocol, connective tissue membranes of xenogenic origin were used, they were purified, and for slow swelling they were placed for a long time in a carbonic acid medium artificially created by pressure. The feed was loaded into a container with distilled water, which was placed in a sealed reactor, where carbon dioxide was supplied and high pressure was created. After depressurization, the resulting matrices were lyophilized and sterilized. In vitro tests were performed on cell cultures with test matrix samples to evaluate the cytotoxicity and proliferative activity of cells. An in vivo study was also conducted on a model of heterotopic implantation in laboratory animals with reference samples of known medical devices. The research results showed a high degree of matrix biocompatibility and controlled biological behavior of the obtained samples.

Funding details

None.

Acknowledgments

None.

Conflicts of interest

Author declare that there is no conflict of interest.

References

1. Materials for medicine, cell and tissue engineering. Krasnoyarsk. Siberian Federal University; 2009.
2. Pigaleva MA. Features of the organization of copolymers in a solution of acetic acid and the creation of composites with metal nanoparticles on their basis. Moscow. Federal State Educational Institution "Moscow State University named after MV Lomonosov"; 2015.