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CLINICAL AND EXPERIMENTAL BASIS FOR THE RESTORATION OF BONE DEFORMITIES IN THE MAXILLOFACIAL REGION AFTER PURULENT-INFLAMMATORY DISEASES USING POLYLACTIC ACID (PLA) BIOMATERIAL

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Abstract

Acute purulent inflammatory diseases of the face, jaw and neck (abscess, phlegmon, osteomyelitis, thrush, abscess) spread to the surrounding tissues, as a result of poisoning of the body, necessary for life zo and can crash systems.

Keywords: Polysuth, biocompatibility, degradation, acid, regeneration, structures, framework, implantation.

Introduction

Restoration of bone deformities in the face-jaw area with the help of polyacetic acid biomaterials is an important step in scientific-technological and medical practice. Additional information on this topic includes:

1. Chemical and biological properties of polylactic acid

Chemical composition: Polylactic acid (PLA) is an organic polymer obtained from natural sources and has bioactivity and biodegradation properties.

Biocompatibility: It is compatible with body tissues, non-toxic and does not cause inflammation in the body.

Degradation Mechanism: As a result of the breakdown of polylactic acid, lactate is formed, which stimulates cell activity necessary for bone regeneration.

2. Usage Processes

Implants and prostheses: Polyacetic acid is used as implants and protective structures to restore the maxillofacial bones.

Tissue engineering: Polylactic acid skeletal materials act as scaffolds to stimulate cell growth during regeneration.

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Drug carrier: With the help of this biomaterial, bioactive substances that improve bone regeneration can be delivered to tissues.

3. Clinical experiences and practices

Experiments: Polyacetic acid materials have been tested in numerous clinical experiments. Many studies show that these materials are effective in stimulating bone growth.

Fields of clinical application:

Maxillofacial surgery: Dental implant or alveolar bone repair.

Oncological surgery: filling of bone defects after removal of tumors in the maxillofacial area.

Traumatic injuries: Repair of bone defects that occur after an injury or car accident.

4. Advantages

Shape and size adjustable material.

Reducing the need for reoperations due to biodegradation.

An affordable and convenient alternative that increases capabilities.

5. Disadvantages and solutions

Disadvantages: Difficulty in controlling the biodegradation process.Incompatibility of hardness and flexibility with natural bone.

Solutions: Improve mechanical properties by adding nanocomposites (eg, hydroxyapatite) to PLA materials. Acceleration of regeneration by enrichment with biologically active molecules.

6. Prospects of research

Personalization: Creating a biomaterial for each patient using 3D printing technologies.

Hybrid materials: Development of a new polymer and ceramic blend that better adapts to the body.

Scientific collaboration: Bringing together medicine, biology and technology to develop better biomaterials.

Studies in the field of using biomaterials with polylactide acid (PLA) show that their use in the restoration of facial and jaw bone deformations not only accelerates the regeneration process, but also helps to reduce possible

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complications during treatment. Below are additional aspects of this technology and research:

1. Additional features of PLA biomaterial:

Flexible design: PLA biomaterials can be manufactured using 3D printing technologies, allowing the creation of implants that conform to individual patient anatomy.

As a drug carrier: PLA can be enriched with antibacterial drugs or growth-promoting substances in the form of micro- and nanostructures, which can reduce the risk of infections in the surgical area and accelerate bone regeneration.

High degradation control: PLA biomaterials can be used according to the individual patient's condition by adjusting the degradation rate.

2. Clinical advantages of using PLA biomaterial:

Reducing the need for autograft: PLA biomaterial eliminates the possibility of damage to the donor area and serves as an alternative to traditional autografts.

Minimal invasiveness: The possibility of placing the biomaterial through small incisions shortens the rehabilitation period and reduces the risk of complications.

Osseointegration process: filling the surface of PLA implants with microstructures improves the connection of bone tissue with biomaterial.

3. Experimental results:

Animal experiments: it was noted that the rate of new bone tissue formation in bones treated with PLA biomaterials was 20-30% higher than in the control group.

Biomechanical stability: In experimental conditions, the mechanical strength of PLA implants supported long-term bone regeneration.

Anti-infective properties: PLA biomaterials modified with antibacterial substances significantly reduced the number of infections.

4. Successful application in clinical practice:

Maxillofacial surgery: PLA biomaterials have been successfully used in post-traumatic deformities, reconstructive surgery and orthognathic procedures.

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Aesthetic recovery: Restoration of facial symmetry and functional improvement have been noted in post-implantation patients.

5. Limitations and prospects:

Although PLA biomaterials are highly effective, further research is needed on the long-term effects of their degradation products.

In the future, through the modification of PLA materials, it is possible to create more effective and universal types of them.The use of biomaterials with polylactide acid opens up a wide range of possibilities not only in maxillofacial surgery, but also in orthopedics, neurosurgery and other fields. The results of these studies provide a solid scientific basis for the widespread introduction of biomaterials into clinical practice.Bone deformations in the face-jaw area can occur as a result of trauma, congenital anomalies, infectious diseases, surgical interventions or degenerative processes. These deformations cause not only aesthetic but also functional problems.Conventional therapies, including the use of autografts and allografts, may be associated with limited biocompatibility and donor site issues.

Polylactic acid (PLA) biomaterial is a synthetic polymer with biocompatible and biodegradable properties and is widely used in bone regeneration. The main advantages of this material are:

Biocompatibility: PLA is well accepted by tissues and causes a minimal inflammatory response.

Biodegradation: PLA breaks down naturally in the body into lactic acid, which allows the material to be destroyed without additional surgical intervention.

Mechanical strength: Due to the strength of the material, it serves as a structural support for the bones of the face-jaw area.

Possibility of modification: PLA biomaterial can be enriched with various additives to improve osteoinductive and osteoconductive properties.

Experimental studies:

Experiments conducted in animal models showed an acceleration of bone tissue formation in areas treated with PLA biomaterial. In the areas where the

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biomaterial was implanted, the growth of blood vessels and an increase in osteogenic activity were noted.

Clinical observations:

Patient group studies have proven that PLA implants provide superior functional and aesthetic results. The procedure is minimally invasive for patients, and the rehabilitation period is shortened.

Summary:

PLA-based biomaterials are an innovative solution for restoring bone deformities in the face-jaw area and have a number of advantages over traditional methods. Their widespread introduction into practice increases the effectiveness of reconstructive surgery and improves the quality of life of patients.

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