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Research Protocol

Bone Replacement by 3-D Printing

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Received: August 28, 2019; **Published:** September 27, 2019

Abstract

Human bone is one of the most vulnerable tissues in human bodies. In the life-time of a lot of people, bone tissue is commonly experienced with bone fracture and other consistent bone pain. Bone diseases surgery, pharmacotherapy and cutting-edge technology utility are main choices of bone disease treatments in the clinic.

Keywords: *Human Bone; Bone Replacement; 3-D Printing*

Instruction

Human bone is one of the most vulnerable tissues in human bodies. In the life-time of a lot of people, bone tissue is commonly experienced with bone fracture and other pain symptoms especially after sports activity, constant hard labors and arthritis [1-8]. Bone-induced human morbidity and mortality are serious healthcare problems in orthopaedic scientific investigations. More recently, it has been greatly improved by new biomedical advances in bone disease treatments.

Methods

Bone disease commonly need a long term of physiological recovery. In search for new orthopaedic solutions for bone diseases, surgery, pharmacotherapy and cutting-edge technology utility is the main choices for bone disease treatments. Among these modern technology, 3-D prints for different tissues is very promising [9-14].

Suitable for different patients

Different origin and types for bone replacement [1-8]:

- Intense sports activity and bone injury
- Constant hard labors
- Bone cancer
- Frailty fracture
- Bacteria or other types of infection
- Osteoarthritis and other complications

Results

In many bone disease treatments, some bones are greatly damaged (break to a lot of small pieces or bone deaths), artificial bones will be replaced. There are many new attempts in clinical bone disease treatments. However, the artificial bones are difficult to make, very expensive to personalize and uncommon in clinical settings until now.

Major artificial bone matrix [11]:

- Inorganic compounds (calcium phosphate, calcium sulfate)
- Synthetic compounds (cellolose)
- Bioactive materials (bioactive glass)

Discussion

Presently, a systematic approach has been made for replacing broken bones with artificial bones. At present, many small pieces of bones or joint can be easily replaced by these artificial bones or joints. This process may treat a lot of patients in the future.

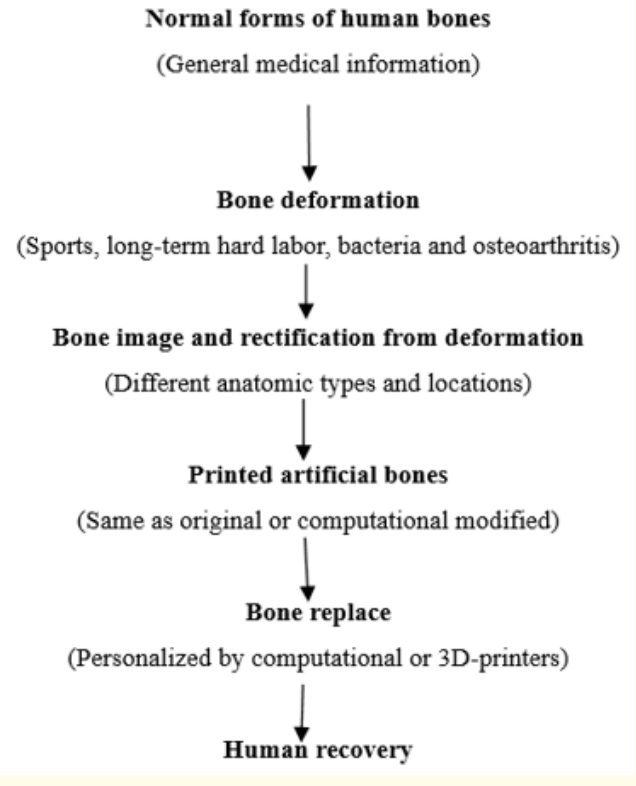

Figure 1: *Outlook of 3D-print bone treatments.*

Patients with bone diseases are greatly different in physiological characters (human size, height and bone locations). Each bone is different in anatomic patterns. The artificial bone producers may be difficult to provide all these different products. As a result, 3-D bone printers can improve this situation [12].

Conclusion

In the future, image-based 3-D printers will be replaced with artificial bones. From these orthopaedic efforts, a great anatomical study and artificial intelligence capability will be provided [15,16].

Conflict of Interests

None.

Bibliography

1. Melton J. "Hip fracture; a worldwide problem today and tomorrow". *Bone* 14.1 (1993): S1-S8.
2. Lu DY and Che JY. "Osteoporosis treatments". *Clinical Biotechnology and Macrobiology* 3.2 (2019): 612-614.
3. Lu DY., *et al*. "Osteoporosis in old women, therapeutic selection". *EC Orthopaedics* 9.7 (2018): 386.
4. Choudhary D and Alam A. "Anti-osteoporotic activity of bioactive compounds from Iris germanica targeting NK-Kappa B". *EC Pharmacology and Toxicology* 6.8 (2018): 665-678.
5. Pili FG., *et al*. "Osteosarcopenia; A geriatric syndrome". *EC Orthopaedics* 9.10 (2018): 741-754.
6. Marks R. "Vitamin E and osteoarthritic cartilage: Does vitamin E influence cartilage integrity?" *EC Orthopaedics* 10.5 (2019): 281-294.
7. Patel S. "Conservative pain management". *EC Orthopaedics* 9.8 (2018): 621-623.
8. Lu DY., *et al*. "Osteoporosis, importance for early diagnosis and treatment". *EC Orthopaedics* 9.9 (2018): 624-625.
9. Lu DY., *et al*. "Bone disease recovery strategies, An overview". *EC Orthopaedics* 10.1 (2019): 1-3.
10. Araujo JL. "The role of the orthopedic surgeon in preventing low back pain chronification". *EC Orthopaedics* 9.12 (2018): 809-812.
11. Harsini SM and Oryan A. "Bone grafting and the materials for using in orthopaedics". *EC Orthopaedics* 9.12 (2018): 822-833.
12. Lu DY., *et al*. "3 D print for bone replacement and design". *EC Orthopaedics* (2019): 1-2.
13. Moore N and Slater GL. "Surgical technique update: Slater modification of minimally invasive brostrom reconstruction". *EC Orthopaedics* 10.5 (2019): 308-314.
14. Xu B., *et al*. "Application of different patella height induces in patients undergoing total knee arthroplasty". *Journal of Orthopaedic Surgery and Research* 12 (2017): 191.
15. Lu DY., *et al*. "Osteoporosis treatments for old people". *EC Orthopeadicis* 10.5 (2019): 278-280.
16. Lu DY., *et al*. "Bone disease treatments, math-therapeutic modality". *EC Orthopaedics* 10.3 (2019): 140-143.

Volume 18 Issue 8 October 2019