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Ecologic, Economic, and Time Factor in Biomaterials Engineering: Does it Matter?

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Introduction

In the field of tissue engineering, the biomaterial science is the most evolving area with various applications. Every year hundreds of new biomaterials and techniques are introduced and studied worldwide at different research centers and universities. Huge amount of private and governmental grants are assigned for development of new biomaterials but the real clinical output are usually low. A quick look at biomaterials literature reveals this fact that although different types of techniques and biomaterials have been introduced, just few have entered production line for commercialization. Many of the research efforts just stopped at the initial phases which were limited to basic phases (e.g., *in vitro* studies) without consideration of further translational studies [1]. Of course, many researchers may not aim from the beginning to commercialize their product, but this should be their final goal. It should be noted that the field of biomaterial science is patient oriented where their clinical needs is the core of research activities. Therefore, a holistic approach is required considering different aspects of a general goal.

Impact of ecologic, economic, and time factors

The researchers in biomaterial science should pay attention to different factors in the beginning of any research effort. The final goal and objectives should be addresses keeping an eye on the real clinical needs and final benefits of the patient. This is to save the budget and time and utilize them in the best way for the final patient benefits. Commercialization of a product indicates the need for mass production which often necessitates consideration of other factors beyond the scope of the study level. One of the most important factors is the total cost of the techniques or materials, as such a costly procedure has a little chance to reach the production line. Product cost should be affordable for majority of the patients in need from the ethical point of view. The second most important factor is the total time of materials processing. A lengthy complex procedure involving many phases may not be cost effective and convenient as well. Furthermore, the reproducibility of the methods and techniques may be questionable. This is the responsibility of a researcher to make proper effort to secure the reproducibility and reliability of their methods beforehand. The third factor is related to ecologic or environmental consideration. The principle of green chemistry encourages processing methods with low or no by products to reduce the environmental chemical hazard [2]. Medical or chemical wastes should be reduced and if unavoidable they should be environmentally friendly and readily removable from the final product. Synthesis or production techniques with high byproducts, high chemical wastage, and low end product have very low chance of commercialization. It should be noted that there are other factors that should also be considered such as stability under sterilization procedures and storage condition, etc [3].

Conclusion

Researchers in the field of biomaterial or biomedical science should make their best effort to consider environmental and financial issue as well as the time factor. There is a clear need for new versatile methods to reduce the cost of the available products and increase the patient accessibility while maintaining their best quality and clinical performance. The final goal should not be limited to development of new methods or materials and scientific publication; rather the ultimate benefit of the research should be transferable to the patient. As a result the research activities in the field of biomaterial science require higher quality strategic planning considering the final clinical benefits that facilitate translation of newly developed technique or product. This may necessitate more accurate revision of budget allocations at institutional and private sectors.

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