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Naturally Based Biomaterials and Therapeutics

The Case of India

Springer

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Preface

Today, more than ever before, there is a pressing need for biomedical innovations to address the plethora of health problems afflicting the world. Particularly in developing countries like India—where communicable diseases, non-communicable diseases, and injuries all contribute substantially to overall morbidity and mortality—there is no panacea that will easily pave the way to improved health outcomes. Different cultural, economic, infrastructural, and other factors also prevent many interventions currently popular in the developed world from being sufficiently effective in the developing world. For example, despite having far more people, nominal GDP in India and China in 2009 was less than one-fifth that of the United States and Western Europe,[1] a statistic that makes it clear that many high-tech, expensive procedures conducted in the US might not be as fitting for use in India.

The lack of suitable options currently available to improve health outcomes in developing countries like India presents a tremendous opportunity for less-traditional approaches, including those that utilize naturally based biomaterials and therapeutics, an area that has traditionally been overlooked but has also demonstrated impressive potential for health applications in recent years. This book seeks to explore precisely these kinds of applications, which can enable countries like India to access more effective, inexpensive treatments while also taking more ownership of their healthcare technologies and innovations.

The book is divided into four distinct chapters. Chapter 1 provides some background and context for the rest of the book, giving a brief introduction to global health, biomaterials, and therapeutics. It starts by surveying the current state of health worldwide before focusing specifically on India and the challenges this populous, diverse country faces. Then it covers the significance of biomaterials and therapeutics and their promise in the quest to improve world health.

Chapter 2 introduces nine natural resources with potential medical applications. These resources—bamboo, banana, coconut, jackfruit, jute, rice, silk, soy, and

[1] Hamilton, D. and J. Quinlan. "The Transatlantic Economy 2011: Annual Survey of Jobs, Trade and Investment between the United States and Europe." *Center for Transatlantic Relations*, 2011.

tamarind—are commonly found in India as well as in certain other regions of the world. This chapter explores their various properties and current applications.

Chapter 3 delves into some of the most important potential biomaterial and therapeutic applications for each of these nine crops. Such applications vary from drug-eluting stents to treatments that eliminate intestinal parasites. Some of these applications are already in use today or have been used in times previously, such as coconut water as an alternative to popular contemporary intravenous fluid treatments. Other applications—such as the use of cross-linked carboxymethyl jackfruit starch as a tablet disintegrant—require additional exploration and research before they can be proven effective and safely used for humans. Each of these biomedical applications has demonstrated abilities to combat health concerns that are highly relevant to India, as well as other regions of the world.

Chapter 4, the final chapter of this book, summarizes the primary themes of the previous chapters and discusses the implications of these key points. It then raises and addresses several of the most compelling challenges and objections to using naturally sourced biomaterials and therapeutics for health applications, particularly in developing countries. Finally, it presents several recommendations and lays out a basic plan to move forward and harness the potential of naturally derived biomaterials and therapeutics to maximize their benefit in health applications.

Altogether, this book aims to help readers better understand some of the key health concerns facing countries like India and how naturally derived biomaterials and therapeutics could help substantially alleviate many of these problems. This is an exciting time for such biomaterial and therapeutic research, and hopefully further exploration of bio-derived materials will yield even greater benefits for world health outcomes in years to come.

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