

Biomedicine: an Introduction

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Abstract— *Biomedicine has played a major part in people's understandings of health and illness. As a social good, biomedicine may be regarded as a resource, the distribution of which is a matter of social justice. Three assumptions are central to the practice of biomedicine: universalism, reductionism, and modelization. It is ironic that these assumptions are increasingly being challenged by developments emerging from biomedical research. This paper presents a brief introduction to biomedicine.*

Key Words: *biomedicine, medical biology, modern medicine*

I. INTRODUCTION

Biomedicine (or medical biology) applies biological and other natural-science principles to human health. It may also be regarded as a cultural system because it is an integral part of western cultures and the way health and healthcare are perceived. Biomedicine often requires patients to change their customary behavior such as diet, working habits, or drinking habits. Biomedicine is also social practice.

After the Second World War, biomedicine became regarded as "modern medicine" as opposed to a more "traditional medicine" which is associated with the clinical acumen of individual physicians. The transformation of medicine into biomedicine was understood as being one of the modernizing projects of Western nations [1]. In other words, modern medicine is often regarded as "biomedical" because it explains health in terms of biology. Biomedicine embraces several areas in Western medicine such as immunology, toxicology, antibiotics, bioinformatics, proteomics, biochemistry, molecular biology, pharmacy, laboratory biomedicine, microbiology, toxicology, genetics, veterinary medicine, computational biology, biocomplexity, and physiological systems. Biomedical is the dominant model of disease today. The rise of biomedicine has impacted the search for universal mechanisms underlying disease.

II. TECHNOLOGIES FOR BIOMEDICINE

Recording medical information leads to massive amount of the data. Biomedicine database is a comprehensive database that contains Electronic Medical Record (EMR), medical images, mobile health, and pathologic parameters. It is composed by words, data, signals, images and some voice, and video signals. Different technologies and measures should be considered when dealing with these databases [2].

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- **Big Data:** Biomedicine is among the most exciting research areas in which big data finds application. It is in the midst of a data revolution. Through the increasing availability of more efficient data collection procedures, biomedical scientists are now struggling to process, interpret, analyze, and manage the data. Data mining and machine learning epitomize modern big data science [3]. The predictive power of big data has been explored in biomedicine.
- **Data Mining:** The data mining applied to biomedical database can help us with disease diagnosis, treatment, research, and decision making. Data mining covers machine learning, mathematical statistics, neural network, database, pattern recognition, and fuzzy logic.
- **Machine Learning:** It offers two advantages in building intelligent models of biomedical systems. First, prior knowledge of biological structure can address the problem of data heterogeneity. Second, models guided by biological structure can be interpreted mechanistically [4].
- **Cloud Computing:** As alluded earlier, biomedicine is characterized by the need for processing of large amounts of data in real time. Cloud computing should make any element of information and communication technologies (ICT) infrastructure accessible as an on-demand service. It provides many advantages, such as cost savings, elasticity, and scalability of using ICT [5].

III. BENEFITS AND CHALLENGES

Without doubt, biomedicine has made profound impact of biomedicine on different facets of human existence. This is partly due to the globalization of biomedical research. Biomedicine has become a standard for instrumental reasoning and measure. The potential of biomedicine to alleviate suffering makes the study of it in the cross cultural setting important.

While we acknowledge the extraordinary power of biomedicine to heal, biomedicine has been implicated in controversy and dispute among caregivers. Criticism of biomedicine as a social system need not gainsay the efficacy of biomedical practice [6]. The deluge of biomedical information requires new ways of handling the data to enable improvement in healthcare. The revolutionary changes in big

data generation and acquisition create profound challenges for the storage, transfer, and the security of information [7]. Many of the unfulfilled promises of biomedicine are due to a simplistic view of the application of basic biological knowledge to clinical practice.

CONCLUSION

Anthropologists, sociologists, and historians have shown how biomedicine has gradually changed its concepts of disease. Ongoing biomedical research will lead to cures in the future. There is need to prepare students in biomedicine core subjects that will give the foundations for a broad range of professional health pathways. For further information on biomedicine, one should consult the books in [8-10] and also the two journals devoted to it: *BioMedicine* and *Journal of Biomedicine*.

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