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Short Communication

Bioenergy in Clinical Technologies

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1. Introduction

Bioenergy is not an unfamiliar concept for clean energy. Rural areas in the globe have used simple methods to utilize the biochemical materials from the byproducts of food production. The U.S. has the largest bioenergy pipeline network, and biofuels have been an important renewable energy source in industries [1]. Less that have come to the attentions are the bioenergy in human physiology.

Clinical and medical examination apparatus have been heavy in energy consumption and the machinery production & maintenance costs create a barrier to healthcare, apart from the radiological exposures the patients have to go through. The environmental correlates of health are not new to the consciousness of biochemists, and biomaterials have been a focus in clinical technologies, with a market value forecasted in 488.7 billion USD by 2030 [2]. Even though the medical community have been warning on the urban technological sources of biochemical harms, a reversed thinking has not been considered in minimizing exterior energy needs with medical technologies.

Physiology as an Energy System

Human physiology is a regulated bioenergy system. The medical sciences have come to the understandings of the nuclear paths of biochemistry with applications of nuclear medicine [3, 4]. Apart from the polarized electric currents, mechanical forces are also present in basic physiology such as heart beats and pulses. Currently, we've been using large machines to detect these biosignatures in hospitals and specialized facilities to diagnose the energy flows through exterior energy sources.

Portable and wearable technologies for medical examinations are the recent innovations for optimizing medical care and clinical efficiency. Portable and wearable devices are used in close physical touch with the human bioenergy system. If it has been the energy traces we're trying to detect, why can't the devices be powered by the energy traces?

Examining the Possibilities

The key technical detail for the vision is the channel diversion between biosignal and bioenergy. Take an electrocardiogram for example, the peak pulsation can be more powerful than a potato clock, but the biosignal capturing and direct transcription cannot be fully integrated to a power indicator in the exterior battery. The minimal data strength in biosignature and maximum utilizable bioenergy ratio will determine the integrity of amplifiable raw data and the portable wear's need for exterior power source, such as mini-batteries or thermal charge. It can be similar to mobile electroencephalography, and with intricate enough biomaterials, brainwaves can also be utilized [5].

Towards An Informatics Medical System

The emergence of wearable portable medical devices potentially solves the resource problems of hospital services and medical runs. Experienced by the SARS-CoV-2 pandemic, getting intensive care unit to the lives and homes of the people can be critical in preventing sudden deaths and optimize the emergency rooms. With regular data transmission and machine learning for health alerts, predictability both on the supply and demand side of the medical system can be facilitated, and reduce the wastes in the precious time during medical emergency. Raised awareness in medical knowledge by using wearable devices will also increase the communication efficiency in patient selfceare and during diagnoses. Cyber security and data integrity in hospital transmissions and privacy management, however, will have to be a different topical corridor.

The Physic-Chemical Basis

Biomaterials and their applications are currently conceptually separated in product designs. I would like to establish a novel conceptual framework from the perspective of nuclear science to merge the two distinctly dissected perspectives together that can be energy-optimal in consumption designs, hence the term bioenergy.

Signals and energy are equivalent, so is as to biosignatures and signals. The objective for material designs would thence be: 1) initial signal (biosignature) source collection and conduction carrier; 2) quantifying material on top of the initial carrier, with data storage unit optimally run on the energy from the latter; 3) energy collection and storage material if there can be net energy gain from biosignature; 4) data storage unit and transmission unit which may run on the biokinetic energy according to application scenarios.

2. Conclusions

My methodological consideration is on phonons, and the engineering system can be said quantum mechanical. All materials' crystal lattice vibrations need to be measured according to the biosignatures that can be measured according to phonon quantities. The initial carrier's quantification will need to depend on the quantifying material's relative differences in crystal lattice vibration threshold compared to that of the initial carrier, and the harmonic oscillation of the two generates the energy to be stored. Thence the two primary devices can be treated as a harmonic oscillator, and its operating parameters need to be stored in exterior devices and energy created need to be stored on an energy collection and storage unit.

The harmonic oscillator is the core of the technology design proposed. Combined with more precise designs in application scenarios with the data units, it can revolutionize the biomedical technologies. The proof-of-concept prototypes may be able to be conducted with low-cost 3D-printing, before finer material details are finalized.

Acknowledgment

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