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Perspective

Fundamental Theorems in Medicine: A Perspective

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Abstract

In 2019, Ayim-Aboagye under the motivation of Torsten Gordh in Uppsala University contributed a remarkable article that outlined and characterized the notion of fundamental theorems in Medicine. The theorems, now classified as fundamental laws of medical science, have been widely accepted by many academics as the authentic theorems in medicine. They are soon to be recognized by other areas of behavioral sciences such as psychology and other public health disciplines. Indeed, fundamental theorems, with Herman Koch postulates and its extension by Fredericks and Relman, are becoming the most prominent unifying laws of medical sciences in general. In this perspective, we summarize the historical context and subsequent impact of the new fundamental theorems' contribution.

Introduction

In a brief 2019 communication to Torsten Gordh, Ayim-Aboagye formulated the concepts of fundamental theorems that have revolutionized medicine and its other parts of public health sciences [1]. The theorems were originally deduced from his recent article "Fundamental Theorems of the Theory of Superiority Complex, "which was published in the *International Journal of Emerging Trends in Science and Technology* (IJETST), Vol. 5, Issue 7, July, 6688-6703 [2]. Ayim-Aboagye, a Ph.D. from Uppsala University has collaborated in research works with Torsten Gordh, a renowned pain research specialist. They had written papers concerning African patients' experiences with chronic and acute pain and how modern medical doctors are finding it important to comprehend cultural factors that influence their illness conditions, descriptions, and dealing with their pain experiences. Ayim-Aboagye proposed fundamental theorems which were based on his observation of pain treatments that uncovered the probability of pain as a phenomenon in all hospital patients. For his part, diagnostic methods could then be the basic principles and grounds upon which all medical treatments, whether physical or psychological should be based. This sparked and generated his meticulous search of Gordh's (2017) famous work and discovery of pain symptom in a new perspective entitled, "A possible biomarker of low back pain: 18F-FDeoxyGlucose uptake in PETscan and CT of the spinal cord" which appeared in *Scandinavian Journal of Pain* in April 2017. Gordh's special diagnosis in this work enabled researchers and doctors to see the pain that a patient feels in his/her body [3].

Agreeing with Torsten Gordh and his team, and the PET center, Ayim-Aboagye concluded that as they have come up with compelling evidence of a major medical breakthrough, so could we commence to regard the diagnostic methods in pain and all other illnesses as a whole as an essential medical theory. Simply, Gordh's team has come up with a method of pinpointing and highlighting areas of chronic pain in the body, which has previously been notoriously difficult to spot and hence treat. Because of his remarkable invention, now doctors treating people with whiplash and other similar injuries, do not have to trust the patient to show them where they are in the most pain and how serious it is [4].

The Various Formulations of Fundamental Theorems in Medicine

Within the period of some months to a year, Ayim-Aboagye began with the first, second, and third formulations of the theorems which were stated as follows:

First Formulation • Theorem 1: No disorder is without a symptom; vice versa no symptom is without a disorder. • Theorem 2: A disorder can be transmitted from one individual to one another. • Theorem 3: An individual patient disorder cannot be treated in isolation by the patient; it must be attended to by experts through voluntary consultation that has been made by the patient.

Second Formulation • 1. If a patient is diagnosed as possessing a specific disorder, then there is a corresponding symptom(s) on which the practitioner has based his competent decisions/predictions. • 2. In cases where a disorder is judged to be an infectious disease or violent personality disorder, then there is a greater likelihood that a patient can transmit this disorder to other individuals irrespective of who comes into contact with him/her. • 3. A diagnostic procedure involving a disorder is not handled in isolation by a patient; it is attended to and steered by a competent practitioner who confronts a distressed patient that has voluntarily sought help

Third Formulation: Mathematical • 1. If an individual Q is diagnosed as having a disorder D, then there is a corresponding symptom C which is known as lurking behind D; then $Q_{ə} = C \cong D$, and vice versa is also true $Q_{ə} = D \cong C$. Where $_{ə}$ represents the condition of Q. • 2. Suppose that $Q_{ə}$ were to be the distressed patient in a zero-point condition (Zç) who is distressed, petrified, and disequilibrium, then the following (could result) patients can contract the illness from $\{Q_{ə} \rightarrow Q_{ə}1 \rightarrow Q_{ə}2 \rightarrow Q_{ə}3 \rightarrow \ldots Q_{ə}N\}$. The formula then becomes $Zç = Q_{ə} \rightarrow Q_{ə}1 \rightarrow Q_{ə}2 \rightarrow Q_{ə}3 \rightarrow \ldots Q_{ə}N$. • 3. Let Q be in the zero-point condition (Zç) of illness $Q_{ə}$ that is distressed, petrified, and disequilibrium. For every zero-point condition $Q_{ə} < S > Q$. Then, the following inequalities hold at any zero-point condition: $Zç = Q_ə < S > Q$. This means $Q_ə$ is subservient to S, the practitioner that is more knowledgeable than Q in the encompassing powerful context of medical diagnosis [1].

Triad of Diagnostic Relations

Already in his primary presentation of these remarkable theorems, Ayim-Aboagye had informed us that these theorems can help physicians to comprehend basic underlying principles guiding the medical field and its practices: • Firstly, he argues strongly, the theorems could educate practitioners about the disorder-symptom relation. • Secondly, he further states that the second theorem, in particular, could foster confidence and issue knowledgeable information to practitioners concerning disorder transmission relation. It is here that Koch postulates and its reformulation by Fredericks and Relman (1996) helped because it was used to prove the second theorem. • Thirdly, practitioner-patient relation could give both parties, that is, the practitioner and the patient the exceptional good information about the amicable relationship that must transpire in the context of medical care and treatment [1].

Because of its obviousness, Ayim-Aboagye, in giving proof to the first theorem never had to employ another theorem but he showed how essential the phenomenon of diagnosis is and how it is acknowledged that every disorder has a symptom on which it could lead every competent practitioner that has been trained in the context of medical apprenticeship to the causal root of the patient's dire problem or situation. Of course, vice versa is also true, for every symptom also points to a disorder at every zero-point condition (Zç), and that, in general, makes the theorem to be obvious in an empirical sense. Thus it says that $Q_ə = C \cong D$ and vice versa is also true $Q_ə = D \cong C$. In conclusion, the zero-point condition, according to Ayim-Aboagye, is the originating point of all true conditions of disease /illness when patients need cure/treatment and as a result, confronts the expert practitioner.

Fundamental Theorems and Koch Famous Postulates

Fundamental theorems are useful not just because they are themselves accurate predictors of how patients will behave when they are in dire situations, petrified, and non-equilibrium but also when they are not obtaining a cure the consequences these tensions could lead to. Here, the second theorem forcefully predicts what could happen because then the practitioner can identify certain complicated situations in which this tension between the individual selves and the illness could be transferred to others that may affect others' motivations as they seek to put their chaotic situations to equilibrium.

Koch postulates, which guarantee the existence of disorders' transmission satisfy the conditions in which these experiences by various patients are revealed in the second law of medical science, be it in the laboratory or research field. We meet Koch laws in different literature and numerous articles published all over the globe in international journals. The postulates are four criteria designed to establish a causative relationship between a microbe and a disease that can later be transmitted to humans. The postulates were originally formulated by Robert Koch and Friedrich Loeffler in 1884 (Koch 1893) [5], based on earlier notions labeled by Jacob Henle and finalized and issued by Koch in 1890 (Evans 1978) [6]. Koch utilized the postulates to picture the etiology of cholera and tuberculosis which he made widespread generalizations to other ailments.

It must be emphasized that Koch postulates were invented before the understanding of modern notions in microbial pathogenesis that cannot be detected using Koch's postulates, including viruses- which are obligate cellular parasites- or asymptomatic carriers. They have largely been ousted by other well-known principles, currently, such as the Bradford Hill Criteria for infectious disease causality in modern literature of public health. Yet its basic principles and scientific importance to medical law and disease transmissions in organisms as a whole are tremendous [6].

Ayim-Aboagye found wisdom in employing Koch's postulates to be mentioned below to prove the second law allowing the famous postulates to be found useful again even in these modern times in medical theory. The postulates, which have been disseminated widely in the literature both academic and popular science, enhance the fundamental theorems usefulness in medical health and sciences. They were: the microorganism must be found in abundance in all organisms suffering from the disease, but should not be found in healthy organisms; the microorganism must be isolated from a diseased organism and grown in pure culture; the cultured microorganism should cause disease when introduced into a healthy organism; the microorganism must be isolated again from the inoculated, diseased experimental host and identified as being identical to the original specific causative agent [6,7].

The inference was made that since the second law of the fundamental theorems of medical diagnosis states that a disorder can be transmitted from an individual to another individual and we find this well exemplified in hospital environments as well as the generally controlled environment through research, we infer from Koch postulates and Fredericks and Relman's [8] extended version of the postulates that a disorder is transmittable to individuals/organisms in conditions as explained. Ayim-Aboagye believed that there is a disease transmission principle that is enshrined in the fundamental notions of medicine and the diagnostic principles hovering around medical subjects/patients. Therefore, Koch laws allow us to push for the existence of a disorder transmission principle which the second theorem predicts.

Fundamental Theorems, Present-day Development in Medicine and Physician Training Institutions

Fundamental theorems provide us common lenses to study medicine and health sciences without allowing the differences in conditions with patients in diverse cultures to present a hindrance. The scientific nature of laws makes disciplines develop faster and medicine and health acquiring its laws will make it more attractive to the younger generations' doctors who are in apprenticeships. Caregiving irrespective of its different cultures and climates will help to make medical apprentices understand psychiatry and other important care areas of patients as important. The disease causes physical pain and leaves the patient that is suffering from it to have a disequilibrium mind because of the thoughts associated with it that one may eventually die if help is not sought and given in time. In some patients, the harboring of such thoughts increases the symptoms of confusion, depersonalization, dumbness, depression, anxiety, etc. Fundamental theorems educate us to consider the symptom-disorder relation apex important. As mentioned already, the first law is the origination of competent diagnosis by an expert which gives confidence to the practitioner to tackle the illness and the conditions hovering around the patient. It is the knowledge of this law that offered practitioners the vital aspects of hospital care which any neglect could lead to susceptible complicated symptoms preceding the enormous pain that often is involved with the individual. It could signal that the disease has reached the final stages. Studies conducted among patients from diverse groups have shown that certain patients have other associated symptoms that if not meticulously attended to and investigated in the beginning could bring additional constant muscle and joint pain to the whole body. It is from this successful knowledge of symptom-relation criterion that the practitioner will master the necessity to investigate the patients' dire experiences further to treat methodically the illness or pain and its undying associated numerous symptoms [9].

Experimental Medicine and Fundamental Theorems

It has been argued in different fields of medicine that medical research would be very different without models of health and disease. The use of cells, tissues of animals to establish what healthy biological processes look like, how they change with disease, and to test new interventions will have been impossible without the use of models of health and disease.

The medical field has traditionally made significant discoveries with the use of models and then, once it was appropriate it would be tested with patients while other potential interventions are being made with several other people. In the scientific field, all kinds of models are employed, from cells in dishes to macaque monkeys. It is estimated that cell and animal models will continue to be a cornerstone of medical research, but it is time, as some scientists argue, to commence experimenting in another important model organism known as human beings. Other cells in animals could indeed be of significant help, but what could teach scientists more about human health than the human body itself? To do that significant laws must be established to help scientists from these important fields progress in their endeavors.

Fundamental theorems have played an important role in the experimentation that has initially gone on in the medical fields. British and German Universities have pioneered in these experimental research areas with tremendous success accruing to them Nobel Prizes in various medical fields. Koch's discovery of Anthrax [6], Alexander Fleming's discovery of penicillin [10-12], and James Watson and others' discovery of DNA double helix [13,14] all had gained from the use of experiment to gain knowledge. Currently, some tools permit scientists to pose questions about the human body that humans could not use to asking of cells, flies, and mice. Inquiries such as which brain pathways and neurotransmitters may be concerned in the onset of schizophrenia, or what is the function of placental infection in unfavorable pregnancy aftereffect?

A classic instance can be given that experimentation of these technologies that have marshaled in by the human genome project, used in the 'omics' fields of genomics, proteomics, and metabolomics, mean that scientists can follow the complexities of disease contrivances from blood or urine trials. Fresh imaging technologies such as hyperpolarized magnetic resonance imaging provide scientists non-invasive access to the human body at detailed resolutions, permitting not only the picturing of structure but also how it operates.

The Medical Research Council (MRC) in Britain [15], where experimentation and human science are taking place, significant discoveries have been made in science. Here the laws of science are contributing to experimental medicine and it is attracting young researchers from all over the world. Youth with ambitious thinking for experiments in human beings are possessing fascinating new insights into disease mechanisms. It sounds obvious, but experimental medicine is all about the experiment, perturbing a system and recording the effect, not simply characterizing a group of patients using these powerful new technologies. Instead, we want ideas that address specific gaps in our knowledge of the disease.

In other areas, for example, in a project supported by grants, Prof Vincenzo Cerundolo, director of the MRC Human Immunology Unit, is infecting volunteers with the S. Typhi or S. Paratyphi variants of *Salmonella* to fill in the gaps in our knowledge of how the immune system responds to the bacteria and how the infection spreads throughout the body." Again at the Imperial College London, Prof Steve Bloom is looking for the solution of whether the effects of gastric bypass surgery are largely down to the boost in gut hormones that they cause.

His research is relating a group of unwell individuals receiving a bypass with a similar group of patients who will receive gut hormones via a pump. By comparing the metabolism, it is surmised the weight of the body and appetite of the two groups, this researcher will unravel whether hormone therapy could be a new treatment for obesity and diabetes [15].

Fundamental Theorems in Perspectives: Concluding Remarks

In its few years of inception of the development of fundamental laws, the concepts of the theorems have become an important topic estimated to be popular alongside experimentation of medicine as a whole. Both social and behavioral scientists will need to exploit its explicit citation to make it well known. It may not be like the discovery of penicillin, DNA, or Koch famous postulates themselves, but still, they will present competitive mention in journals and literature around the world. Sure there will be future modifications, generalizations, and refinements, but the basic laws as exemplified and enshrined in Koch laws will make it more strategic as important notions in experimental medicine. They will function great in the future development of medicine and allied public health disciplines.

In the scientific publication of Torsten Gordh, "Top diagnosis," diagnostic science has moved into center stage in experimental medicine in Scandinavia as a medical theory. Experimental science has also become part of a lively scientific conversation with other empirical science and, increasingly, the source of practical advice on the design of research projects. Looking ahead, if experimental medicine and fundamental laws of medicine are to be as productive, the challenges are that both medical theorists and experimentalists must incorporate more varied and realistic models of human beings in concert to deal with the complexities of disease mechanisms.

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