To a holistic classification in medical theory and education

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ABSTRACT

Introduction: Nowadays teaching medicine is based only on structural functionalism. Thus the conventional organization of the content of functional medical sciences like physiology, pathophysiology and internal medicine is sometimes ridiculous and difficult for learning and practicing.

Objective: To present the advantages of the functional approach in classification and teaching the content of Pathophysiology and Internal Medicine compared to the structural approach.
Method: In an attempt to improve teaching I reorganized the content of pathophysiology in a functional classification and then I applied it in the training of a group of medical students for three months.
Result: The comparison of the results of the annual examinations of experimental and control groups shows that the functional approach significantly decreased the time required for the successful taking examinations.
Conclusion: The results suggest that the functional classification of the content of some medical science must be available, if not as a basis, at least as an additional alternative in medical education.

Keywords: holistic, structural, functional, pathophysiology, education

Introduction

Over the last decade some authors in the medical literature began to discuss the issue of consistency of reductionism in medical theory and the need of a new approach to solving the challenges facing medical science. Demand is directed to systems biology [1,2], physiology [3], and translational medicine [4]. It seems that holistic approach is looking towards its proper form. The need for holistic thinking can be found long ago in the past. Since Aristotle the science believes that knowledge is complete when its content is organized into consistent system of notions, constructed by genus (general) and species (unique variations of the genus). Otherwise its fundament concepts are incomplete and inconsistent. Modern medicine is dominated by the descriptive (structural) classification of content, which means that structures are genus and functions are species. This approach is justified in anatomy, pathoanatomy and surgery, but it seems ridiculous in the sciences, whose main subject are functions, like physiology [5,6], pathophysiology [7,8,9] and internal medicine [10,11]. All these sciences use classification which is

inappropriate for their subject. Functional sciences are more meaningful to use functional classification with functions as genus and structures - as species.

Every classification is questionable if is internally inconsistent. The inconsistency becomes obvious by finding logical contradictions. When use this rule we could easily find inconsistency in the structural classification of functional mater. Let us compare six diseases classified both in structural and functional manner. Thrombocytopenia, leucosis and anemia belong to the same structural genus "blood disease" just bacause platelets, leucocytes and erythrocytes could be described as blood cells. However the basic role of platelets is to support the impermeability of the blood vessels, leucocytes functionally belong to immunity, and erythrocytes - to oxidation. Exactly the opposite, from functional point of view anemia, chronic obstructive pulmonary disease and cardiac insufficiency belong to the same functional genus (oxidative disorders) and have as common syndrome insufficiency of oxygenation but according to the descriptive classification they belong respectively to blood, lung and heart disease.

Similar contradictions could be found in endocrine disorders. Some of the hormones belong functionally to homeostasis (aldosterone, insulin, glucagon, etc.), other could be determined as stress hormones (epinephrine, corticosterone, etc), third play important role in the physiological effect of the social interactions (sex hormones, oxytocine, etc) and could be classified as social hormones. In descriptive classification all they belong to one functionally (and logically) inconsistent group of endocrine diseases.

As consistency is natural for thinking, more consistent science means more effective teaching and practicing medicine. In an attempt to improve teaching I developed a method of teaching pathophysiology, based on functional classification [12] and I started to use it in teaching my students. When I became convinced that this helped the students, I conducted a pilot study to check its effectiveness.

Material and Method

I carried out a pilot investigation on successfully taking examinations by medical students trained in conventional and functional thinking in pathophysiology. The experimental group (n=13) was trained both conventionally and functionally in understanding mechanisms of diseases (second part of the curriculum). The control group (n=35) was trained only conventionally. Both groups conducted annual examinations in three consequent sessions (divided by one month each) by independent (blind) examiner. Statistics were comparison of percent distribution of successfully tested students in three consequent sessions and Fisher exact test for significance of the differences.

Results

Additional functional teaching on the mechanisms of diseases (experimental group: n=5, 38.46%) performed twice better during first session than control group (n=6, 17.14%; $P<0.05$). Even after

the second examination, the successfully passed the examination students from the control group (n=20, 57.14%) cannot reach the performance of the studens from experimental group (n=9, 69.23%; P<0.05). When asked additionally, the students from the experimental group share that functional approach is more understandable than conventional one.

Discussion

The diagnostic process is logically connected with symptoms. As symptoms are signs of functional disorders, physician in fact follows functional logic to diagnose disorders and functional classification could helps diagnosis. This logic could be referred to the understanding the mechanisms of the pathologic processes in pathophysiology.

When classification is not consistent, one could learn the content only by memory. Consistent classification allows one to add thinking to the memory. Structural (desctiptive) classification of the functional matter could be learned by using mainly memory because it is functionally inconsistent. Logical contradictions between both descriptive and functional classifications come from the different viewpoint. In fact structural and functional approaches are not in conflict and have no different content. In the structural medical sciences like anatomy and surgery structural classification is really the best. On the contrary, the object of pathophysiology and internal medicine are functions and functional classification is best for them. Medical student and practitioner must use appropriately both viewpoints to be proficient in the field.

The limitations of the pilot study do not allow final conclusions, but results show that the functional method may be able to increase the effectiveness of teaching pathophysiology. The better performance of the experimental group is possibly due to improved understanding of the disease mechanisms. Without this advantage the students from the control group probably use more extensively memory than thinking, which increases the time of preparation and derease the quality of learning pathogenesis.

Conclusion

Despite the limitations of the pilot study, functional classification of the content of some medical science seems more logical than structural one and must be available, if not as a basis, at least as an additional alternative for medical students.

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