Anatomy & Physiology: Current Research
ISSN: 2161-0940

Chapple, Anat Physiol 2013, 3:2
DOI: 10.4172/2161-0940.1000e125

Editorial Open Access

Anatomy and Physiology in the Modern Era: Blurring the Borders of Traditional Disciplines

Will Chapple *

646 E. Gorham St., Madison, WI 53703, USA

This editorial discusses the attempt to specialize in a discipline of medical science while working with the vastly interconnected, transcending and diverse organism of the human body. Highlighted is the importance of breadth of knowledge as well as interdisciplinary collaboration. Commensal microflora is discussed as an example of a non-traditional area of study that has a role in many different systems. Finally, clinical research is used to generate new research questions and to shine a light on the possibility of new areas and fields of basic science research.

The practice and science of medicine has slowly but continuously expanded beyond the segregated disciplines that have been passed to us from our forbearers. For example, a cell's machinery is subject to genetic heritance [1,2]. Genetic heritance is subject to the epigenetic factors that facilitate gene expression or post-translational modification. These epigenetic factors may have been influenced by endocrine secretions, which in turn may have been influenced by physical activity, diet or a psychological state [3-6]. Yet our social and economic environments have influenced even these factors. So when examining the function and population of a cell's organelles, one must even consider the psychological and nutritional status of the cell's source. In a broad sense, we must remember external validity and study an object in the context in which we desire the results to be useful.

The seemingly endless interplay of factors that integrate a multitude of disciplines can and should be considered when we are examining a problem in medical science. This is the blooming era of systems thinking. Modern medical schools train a physician to consider the economic, social, cultural, spiritual and public health factors during a patient visit [7,8]. This may affect the presentation of the diagnosis and treatment plan, the types of treatment, or even the brand of medication. Similar to the astute physician, the medical science researchers should consider the breadth in addition to the depth of a research question [9]. This is important when considering what research to undertake; who does this help, how does this help and is this the best use of our global community's resources [10]? A good knowledge base outside of one's discipline is also very helpful when planning an experiment. Adequate breadth of knowledge can help us plan for confounding factors [11].

The bacterial ecosystem is often a forgotten part of human anatomy and physiology, and it offers a good example of how we approach a new frontier of physiology. It is well established that disruptions of our commensal microflora can affect pathophysiology- bacterial vaginitis and clostridium difficile for example. Recent research would have us consider the anti-inflammatory effects, immune modulating effects, enteric and central nervous system effects, endocrine effects, and nutritional effects of commensal microflora [12,13]. Should we now loosely consider commensal microflora as yet another essential gastrointestinal organ with wide ranging effects?

In some instances a breakthrough in anatomy or physiology can lead to a new treatment for a patient, which is often drug targets or more recently deep brain stimulation. However, research of a treatment can also lead to a breakthrough in anatomy or physiology. In regards to the latter, one has to ask why a randomized blinded trial of intercessory prayer (prayer by an outside group for participants in a study) would show statistically significant improvement in spiritual, emotional and functional well being [14]. One should also ask how a Chinese qigong practitioner could repeatedly make structural changes to an aqueous solution at the molecular level from 1,900 km away, while a control remains unchanged. Or how external qigong enables growth of fab protein crystals in a controlled trial that negates any effect from electrical fields, magnetic fields, electromagnetic radiation, ultrasonic radiation, or chemical reactions [15]. The answer may be found in the very real and very new field of quantum physics [16]. Most of the research that links positive thinking, meditation, and yoga to healthy physiology and anatomy can be explained by modern understanding of neurological, immune and endocrine pathways or basic principles of physics [17-19]. But the studies previously mentioned account for these factors and urge us to explore new horizons. Is it time for anatomy and physiology, like neuropsychology before it [20], to consider or even explore the influence of the tiny quantum world beyond the atom.

In summary, the more we know about anatomy and physiology the more we have to understand genetics, microbiology, physics, psychology, biochemistry, kinesiology, nutrition and much more. Modern society has amassed a large body of knowledge that is readily available to the world today. Discoveries throughout the centuries have increasingly blurred the borders of the disciplines that we work in. Now more than ever, breadth of knowledge, collaboration and interdisciplinary teams are essential to the success and accuracy of medical science research and clinical medicine today. Furthermore, we must keep looking to the future- riding the wave of recent advances in the fields of medical science.

References

1. Kelly RJ, Rouquier S, Giorgi D, Lennon GG, Lowe JB (1995) Sequence and expression of a candidate for the human Secretor blood group alpha(1,2) fucosyltransferase gene (FUT2). Homozygosity for an enzyme inactivating nonsense mutation commonly correlates with the non-secretor phenotype. J BiolChem 270: 4640-4649.
2. Birky CW Jr, Maruyama T, Fuerst P (1983) An approach to population and evolutionary genetic theory for genes in mitochondria and chloroplasts, and some results. Genetics 103: 513-527.
3. Jaenisch R, Bird A (2003) Epigenetic regulation of gene expression: how the genome integrates intrinsic and environmental signals. Nat Genet 33: 245-254.

***Corresponding author:** Will Chapple, 646 E. Gorham St Madison, WI 53703, USA, Tel: 1-812-390-5102; E-mail: chapple@wisc.edu

Received October 07, 2013; **Accepted** October 08, 2013; **Published** October 10, 2013

Citation: Chapple W (2013) Anatomy and Physiology in the Modern Era: Blurring the Borders of Traditional Disciplines. Anat Physiol 3: e125. doi:10.4172/2161-0940.1000e125

Copyright: © 2013 Chapple W. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

4. Collins A, Hill LE, Chandramohan Y, Whitcomb D, Droste SK, et al. (2009) Exercise improves cognitive responses to psychological stress through enhancement of epigenetic mechanisms and gene expression in the dentate gyrus. PLoS One 4: e4330.
5. Kaufer D, Friedman A, Seidman S, Soreq H (1998) Acute stress facilitates long-lasting changes in cholinergic gene expression. Nature 393: 373-377.
6. Zhang X, Ho SM (2011) Epigenetics meets endocrinology. J Mol Endocrinol 46: R11-32.
7. Betancourt JR, Green AR, Carrillo JE, Ananeh-Firempong O (2003) Defining cultural competence: a practical framework for addressing racial/ethnic disparities in health and health care. Public Health Rep. 118: 293-302.
8. Hall P, Weaver L (2001) Interdisciplinary education and teamwork: a long and winding road. Med Educ 35: 867-875.
9. Michener WK, Baerwald TJ, Firth P, Palmer MA, Rosenberger JL, et al. (2001) Defining and Unraveling Biocomplexity. BioScience 51: 1018-1023.
10. Rosenfield PL (1992) The potential of transdisciplinary research for sustaining and extending linkages between the health and social sciences. SocSci Med 35: 1343-1357.
11. Sonnenwald DH (2007) Scientific collaboration. Annu Rev Inform Sci 41: 643-681.
12. Kelly D, Campbell JI, King TP, Grant G, Jansson EA, et al. (2003) Commensal anaerobic gut bacteria attenuate inflammation by regulating nuclear-cytoplasmic shuttling of PPAR-gamma and RelA. Nat Immunol 5: 104-112.
13. Forsythe P, Kunze WA (2013) Voices from within: gut microbes and the CNS. Cell Mol Life Sci 70:55-69.
14. Olver IN, Dutney A (2012) A randomized, blinded study of the impact of intercessory prayer on spiritual well-being in patients with cancer. AlternTher Health Med 18: 18-27.
15. Yan X, Lin H, Li H, Traynor-Kaplan A, Xia ZQ, et al. (1999) Structure and property changes in certain materials influenced by the external qi of qigong. Mat Res Innovat 2: 349-359.
16. Sitko SP, Gizhko VV (1991) Towards a quantum physics of the living state. J Biol Phys 18: 1-10.
17. Pace TWW, Negi LT, Adame DD, Cole SP, Sivilli TI, et al. (2009) Effect of compassion meditation on neuroendocrine, innate immune and behavioral responses to psychosocial stress. Psychoneuroendocrinology 34: 87-98.
18. Kulkarni DD, Bera TK (2009) Yogic exercises and health – A psycho-neuro immunological approach. Indian J PhysiolPharmacol 53: 3-15.
19. Thayer JF, Lane RD (2002) Perseverative Thinking and Health: Neurovisceral Concomitants. Psychol Health 17: 685-95.
20. Schwartz JM, Stapp HP, Beauregard M (2005) Quantum physics in neuroscience and psychology: a neurophysical model of mind–brain interaction. Philos Trans R SocLond B BiolSci 360: 1309-1327.