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A New Healthcare Profession: Exercise Physiology

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A new profession must be created.

Please tell me how I can become a Board Certified Exercise Physiologist, is one of the most frequent calls to the ASEP National Office. The desire to be somebody grows more acutely months and years after graduating from college. It takes time, but reality hits home they realize that academic programs that are profession-specific are designed to give value to the college degree. After all, who isn't interested in graduating and finding a great job with an excellent salary? Isn't that what a college degree is all about?

College administrators have worked well with the faculty to develop some amazing academic degree programs that do in fact help college students become successful in finding good jobs when they graduate. But, there are also meaningless degree programs without the opportunity of a profession-specific career. While this may be obvious to some people, it certainly is not that obvious to thousands of young men and women in college. If it obvious, why are they wasting their time, money, and future majoring in useless degree programs?

To press the point a step further, what is the value in majoring in exercise science when college advisors encourage students who are about to graduate to complete an application for physical therapy? I have heard faculty members share such thinking for decades. Often, students will say, "But, I'm not interested in spending more money on another degree." Then, the exercise science advisor says, "You will when you can't find a job." For a moment the student sits quietly, then, you hear the comment: "Are you saying there are no jobs in exercise science?"

The most common response by most advisors is, "You can always get certified as a personal trainer." Many students are heard saying, "Certified! Why get certified? I am already a trainer." After taking a few breaths, you can hear the advisor say to John at the door, "Come in. Sit over there." "I will help you with the completing the PT application." Bob looks at his advisor and says, "Really, you are going to help John apply to PT and not

help me get a job!" Then, Bob says in desperation, "I don't understand. Why didn't we have a class about career opportunities? Why didn't the faculty tell us the truth?"

Answers to these questions are obvious once college teachers find the time to think beyond their own interests (particularly, their need for personal recognition at regional and national meetings, and of course they are always thinking academic promotion, their salary, and tenure). A major difference exists between the public's view of college and the reality of why it actually exists for members of the academy. If one thing is powerfully important, it is "research" and doing more research. The more college teachers publish the more influence they have in gaining approval of their personal agendas (e.g., traveling, laboratory equipment, fewer classes to teach, etc).

Either the lack of teacher professionalism and honesty is real or they simply refuse to understand the students' dilemma. This is a huge problem for the college administrators, deans, department chairs, and faculty who have turned a blind eye to the students' needs. Of course they don't it is a problem, but nonetheless it is and young people and their parents suffer in countless ways when college graduates return home because there are no jobs. The purpose of getting a credible college degree is not complicated. Recent high school graduates go to college with the expectation of transitioning from college into a financially secure career from which they can build their own future without having to move back home. Yet, the bottom line is this: Increasingly, more college graduates are living with the mom and dad (or their aunt or uncle). In fact, according to Jordan Weissmann, a senior associate editor at *The Atlantic* (1), the number of college graduates living at home or with grandparents is 45%.

While widely accepted as the norm, the way in which the college faculty operates to empower itself must change. I suggest the first thing they should do as teachers is to recognize their professional responsibility to teach and care for their students. This means upgrading the curriculum to maintain a solid and credible professional foundation from which the students understand how to access profession-specific career opportunities. The next question is this: "Where is the profession with the healthcare infrastructure to support and promote the involvement of college graduates in the healthcare community?" Said somewhat differently, where is the exercise medicine profession that dedicates its efforts to the prevention and management of chronic lifestyle-related diseases? Where is it? For certain, it is not within the context of the Health and Physical Education degree or the exercise science degree. So, where is it? Actually, it is not complicated. The exercise physiology degree that is accredited by the American Society of Exercise Physiologists (ASEP) is the academic degree that prescribed exercise medicine. Exercise physiology is "the" 21st century healthcare profession to help prevent and manage acute and chronic lifestyle-related diseases.

Since the founding of the ASEP organization in 1997, the profession of Exercise Physiology is the identification of physiological mechanisms underlying physical activity and regular exercise, the comprehensive delivery of treatment services concerned with the

analysis, improvement, and maintenance of physical and mental health and fitness, the rehabilitation of heart disease and other diseases and/or disabilities, and the professional guidance and counsel of athletes and others interested in athletics and sports training" (2). Exercise physiologists who work in academia need to recognize and support the efforts of the ASEP leadership in providing the professional infrastructure for exercise physiology to grow as the new healthcare profession. This includes supporting the vision and mission of the ASEP organization and ASEP professional meetings. It means promoting the ASEP accredited exercise physiology degree programs throughout the academic institutions in the United States. It means defining and establishing an exercise physiology profession-specific healthcare link in the workplace.

In addition to the students graduating with a solid education in exercise medicine, the amazing world of entrepreneurialism will be the exercise physiologists' transition into full healthcare recognition and employment. With the exercise medicine-based approach to healthcare, the practice of Exercise Physiology shall include the use of equipment that enables the Board Certified Exercise Physiologist to **measure, examine, analyze,** and **provide instruction** to evaluate the components of physical fitness. *Such practice is applied to apparently healthy individuals, as well as to individuals with known disease or ill-health.* The goals for such practice are to: (a) promote health and wellness; (b) improve the components of physical fitness; (c) prevent disease and disability (via the identification of risk factors and behaviors that may impede mind-body functioning); (d) assist in restoring health to clients with disease and/or disability; and (e) rehabilitate clients to their optimal functional level following physical or mental illness.

The equipment used in the practice (scope) of exercise physiology may include the use of submaximal and maximal testing using treadmills and various ergometers to make evaluations and recommendations regarding, but not limited to, metabolic processes, the cardiorespiratory system (VO_2 max tests), the musculoskeletal system (strength and power tests), and body composition (% body fat tests). The measurement**,** examination**,** analysis, and instruction will be done for the purpose of research, counsel, and enhancing athletic performance and improving physical and/or emotional well-being. Nothing in the above description authorizes the Board Certified Exercise Physiologist to diagnose disease either by using the electrocardiogram or by any means resulting from other exercise physiology laboratory procedures.

However, due to the use of exercise as a diagnostic tool in many medical fields, the Board Certified Exercise Physiologist may be used by medical personnel to conduct tests that assist in the medical diagnosis of disease. Having concluded that the Board Certified Exercise Physiologist exercise physiologist does not diagnose disease or perform clinical services that infringe on the practice of others (particularly the medical community) does not mean that he or she does not have the right to identify and discuss signs and symptoms that otherwise correlate with diseases and/or clinical dysfunctions. Also, exercise testing of clients with known risk factors for coronary artery disease should be perform with the

supervision of a physician who is responsible for ensuring that the exercise laboratory is properly equipped to handle emergencies. The physician is ultimately responsible for interpreting the ECG data from testing, and any timely administration of drugs, defibrillation (if required), and any other appropriate medication.

The Board Certified Exercise Physiologist is responsible for: (a) assisting in the supervision of the exercise laboratory and personnel; (b) preparing the client/subject for placement of the electrodes; (c) taking a resting blood pressure and 12-lead ECG strips; (d) determining the exercise ECG response to the exercise protocol; and (e) ruling out any contraindications to continuing the test. The Board Certified Exercise Physiologist is also responsible for acknowledging the scientific and medical findings that associate with specific diseases and/or dysfunctions along with the appropriate language for sharing the same (i.e., primary and secondary risk factors) with the client/subject, monitoring the subject's cardiovascular status (using metabolic equipment to determine oxygen consumption and related cardiovascular responses) throughout exercise and recovery periods, and instructing the client/subject how to prepare for the test.

Testing for symptom-limited maximum oxygen consumption (primarily in post-myocardial infarction patients) or maximum oxygen consumption, VO_2 max, (i.e., the greatest amount of oxygen a person can use performing dynamic exercise involving a large muscle mass) is one such test to identify and discuss signs and symptoms that might associate with disease and/or dysfunction. VO_2 max represents the amount of oxygen transported and used in cellular metabolism. Maximum oxygen consumption is product of maximum cardiac output (Q) and maximum arteriovenous oxygen difference (i.e., tissue extraction of O_2). Since Q is equal to the product of heart rate (HR) and stroke volume (SV), the test helps to evaluate the role of both in the transport of blood to the tissues.

Myocardial oxygen uptake (MVO_2) is determined by the Board Certified Exercise Physiologist through the use of a regression formula, such as [MVO_2 = .14 (HR x SBP x .01) - 6.3]. The product of HR and systolic blood pressure (SBP) is called double product (DP). It is a linear relation between MVO_2 and coronary blood flow. During exercise, HR increases linearly with workload and VO_2. Systolic blood pressure rises with increased work as a result of the increase in Q while diastolic blood pressure usually remains the same or decreases somewhat. Failure of SBP to rise with exercise can be the result of aortic outflow obstruction, left ventricular dysfunction, or myocardial ischemia. Changes in blood pressure may also reflect peripheral vascular resistance, given that systemic vascular resistance (SVR) equals mean arterial pressure (MAP) divided by Q. Since Q is expected to increase with progressive increments in exercise work and MAP usually changes very little, then, SVR is expected to decrease with exercise.

Exercise physiology **measurement** and **examination** includes: (a) the administration of a health history questionnaire, a disease- or disorder-specific laboratory evaluation, as well as the assessment of the musculoskeletal system and/or cardiorespiratory system using standard laboratory equipment, exercise tests protocols, exercise programs, and risk factor

modification and/or measurements to assist in evaluating the client's overt and/or objective responses, signs, and/or symptoms for cardiorespiratory fitness of individuals who are apparently healthy, or who have disease including, but are not limited to, tests that measure body composition, range of motion (flexibility), muscle strength, endurance, work, and power; (b) tests that assist in the overall analysis of the central and/or peripheral components of oxygen consumption and energy expenditure; (c) tests of pulmonary function, and exercise prescription for cardiorespiratory fitness of individuals with metabolic disorders including, but not limited to, deficiencies of the cardiovascular system, diabetes, lipid disorders, hypertension, cancer, cystic fibrosis, chronic obstructive and restrictive pulmonary diseases, arthritis, organ transplant, peripheral vascular disease, and obesity; and (d) treadmill or other ergometer test protocols in conjunction with exercise electrocardiography (ECG) to identify the HR and ECG responses at rest and during submaximal and maximal (graded) exercise programs in addition to specific contraindications for continuing exercise.

Exercise physiology **examination** of clients does not include examining any person for the purpose of "diagnosing" disease or organic condition, as though the Board Certified Exercise Physiologist has licensure. Nothing herein, however is intended to preclude the Board Certified Exercise Physiologists from stress testing and/or using a variety of different ergometers in assessing, determining and/or finding the root cause of a problem, particularly when it comes to educating and consulting with clients. Exercise physiology instruction includes providing educational, consultative, or other advisory services for the purpose of helping the public with issues and concerns regarding fundamental and scientific information about mind-body health and fitness. Instruction pertains to matters that are believed to develop and/or maintain health, fitness, rehabilitation, and/or athletics is also included.

Instruction includes, but may not be limited to, the: (a) acute physiological responses to exercise; (b) chronic physiological adaptations to training; (c) designing resistance training programs; (d) measuring energy expenditure at rest and during exercise; (e) hormonal regulation and/or metabolic adaptations to training; (f) cardiorespiratory regulation and adaptation during exercise; (g) thermal regulation during exercise; (h) exercising at altitude, underwater, and in space; (i) optimizing sports training through the use of ergogenic aids and better nutrition; (j) appropriate body composition and optimal body weight and the role each plays in diabetes and physical activity; (k) growth and development of young athletes, aging and gender issues; (l) preventing cardiovascular disease through exercise, the prescription of exercise for health and performance; (m) biomechanical aspects of posture and sports and the physiological assessment of human movement; (n) stress testing protocols for athletics and special populations; (o) resting and exercise electrocardiography changes; (p) biobehavioral techniques for reducing stress and/or increasing running economy; and (q) biochemistry of nutrition and exercise.

Exercise physiology **analysis** and **treatment** includes hands-on contact to perform specific laboratory tests, with specific expectations for 'treatment' measures and activities. This may include, but not limited to, the following: (a) range of motion (flexibility) exercises; (b) muscle strength and muscle endurance exercises; (c) lean muscle tissue-fat analysis; (d) musculoskeletal and/or postural exercises; (e) sports nutrition programs; (f) sports biomechanics instructions for the enhancement of sports or occupational related skills; (g) stress management exercises; (h) sports training and the development programs; (i) cardiac and pulmonary rehabilitation (including, but not limited to, development of such programs, supervising testing, development of exercise prescription, and other functions such as the education and counseling of patients); and (j) exercise physiology instruction that pertains to all forms of sports training and athletics (3).

> *Dare I say it? Physical activity such as walking or other forms of aerobic exercise blended with resistance exercises produce the same benefits as traditional drugs. This is huge, but there is more! By more the emphasis is the prescription of exercise only. It is common knowledge that pharmaceutical drugs often come with many side effects. Exercise per se is a drug without negative side effects. Regular exercise, as a medical intervention, improves health and longevity. Exercise medicine has wide-ranging health benefits, particularly from a prevention point of view. Whether it is type 2 diabetes or some forms of cancer, there is enhanced function with age. There is also very strong research to support the prescription of exercise as the drug of choice in dealing with cognitive decline* (4).

There isn't any doubt that regular exercise is medicine. Hence, exercise medicine is medicine! Given this point of view, it should be prescribed by exercise physiologists. Yet, it is noteworthy that so many non-exercise physiologists feel compelled to believe they are experts in the prescription of regular exercise. Health and well-being of the general population are great expectations of the ASEP leadership. That is partly why they developed early on (rather than later) the first-ever code of ethics (5) for exercise physiologists.

Code of Ethics

The significance of the Code is that both students and professionals in the study and application of exercise physiology to health, fitness, exercise, preventive and rehabilitative services can turn to it for guidance in professional conduct. Adherence to the Code is expected, and is based on the belief that exercise physiologists are self-regulated, critical thinkers who are accountable and responsible for their high quality competence in the practice and the delivery of exercise physiology concepts, ideas, and services.

1. Exercise physiologists should accurately communicate and provide health and fitness, educational, preventive, rehabilitative, and/or research services equitably to all individuals regardless of social or economic status, age, gender, race, ethnicity, national origin, religion, disability, diverse values, attitudes, or opinions.
2. Exercise physiologists should be responsible and accountable for individual non-medical judgments and decisions about health and fitness, preventive, rehabilitative, educational, and/or research services.
3. Exercise physiologists should maintain high quality professional competence through continued study of the latest laboratory techniques and research in preventive and rehabilitative services.
4. Exercise physiologists are expected to conduct health and fitness, preventive, rehabilitative, educational, research, and other scholarly activities in accordance with recognized legal, scientific, ethical, and professional standards.
5. Exercise physiologists should respect and protect the privacy, rights, and dignity of all individuals by not disclosing health and fitness, rehabilitative, and/or research information unless required by law or when confidentiality jeopardizes the health and safety of others.
6. Exercise physiologists are expected to call attention to unprofessional health and fitness, preventive, rehabilitative, educational, and/or research services that result from incompetent, unethical, or illegal professional behavior.
7. Exercise physiologists should contribute to the ongoing development and integrity of the profession by being responsive to, mutually supportive, and accurately communicating academic and other qualifications to colleagues and associates in the health and fitness, preventive, rehabilitative, educational and/or research services and programs.
8. Exercise physiologists should participate in the profession's efforts to establish high quality services by avoiding conflicts of interest and endorsement of products in the health and fitness, preventive, and/or rehabilitative services and programs.
9. Exercise physiologists should participate in and encourage critical discourse to reflect the collective knowledge and practice within the exercise physiology profession to protect the public from misinformation, incompetence, and unethical acts.
10. Exercise physiologists should provide health and fitness, preventive, rehabilitative, and/or educational interventions grounded in a theoretical framework supported by research that enables a healthy lifestyle through choice.

Also, at approximately the same period of time, they developed the first-ever academic accreditation (6) for exercise physiology degree programs and, then, board certification that links to their professional practice. In short, when their effort is viewed from the big-picture perspective, they understood that many of the chronic diseases (such as diabetes, colon cancer, osteoarthritis, osteoporosis, and obesity) could be (and should

be) managed by exercise physiologists who are board certified. Imagine the power of exercise, it even helps to relieve symptoms of depression and anxiety, thus improving mood and promoting a person's sense of well-being. Exercise medicine is medicine and it should be administered by Board Certified Exercise Physiologists.

ASEP Accreditation: Brief History, Purpose, and Academic Guidelines (6)

The American Society of Exercise Physiologists was founded in 1997 to unite exercise physiologists and promote the professional development of exercise physiology. Thus, it serves to protect the well being of exercise physiologists by enhancing the recognition of their work and educating the public about their role in athletic, fitness, allied health and medical fields. ASEP also fosters the exchange of ideas and research among exercise physiologists, and provides a forum for the continual advancement of the profession.

The first national meeting was held at The College of St. Scholastica in Duluth, Minnesota in October of 1998. ASEP publishes two peer-reviewed electronic journals: (a) the Journal of Exercise Physiologyonline; (b) the Professionalization of Exercise Physiologyonline; and (c) ASEPNewsletter. The ASEP web site serves as a sounding board for issues important to exercise physiologists. For more information about ASEP, please visit the Internet site:www.asep.org

Among the goals and objectives of ASEP is the development of standards for the profession of exercise physiology. Such standards include a formal Code of Ethics, Standards of Professional Practice, Board Certification (EPC), and a nationwide accreditation program. While certification evaluates the competence of the individual, accreditation is a system for ensuring that the academic programs preparing students for the exercise physiology profession are of a high quality.

Work began on the development of the accreditation program in early 1998, shortly after the inception of ASEP in 1997. Through the collaborative efforts of exercise physiologists from around the country, the accreditation guidelines manual was submitted for final approval by the Board of Directors at the 1999 national meeting. The manual represents a compilation of two years of work by exercise physiologists who identified the minimal standards acceptable for educating students for a career in exercise physiology.

Academic accreditation is an important and essential component to any profession. The Board of Accreditation works with academic programs to ensure that standards are met and graduating students are worthy of the title -- Exercise Physiologist.

Several benefits of academic accreditation include: (a) academic programs are critically evaluated and improved; (b) students are better prepared for the Board Certification exam; and (c) he public is confident that exercise physiologist are credible healthcare professions. In time, students will gravitate to ASEP-accredited programs, as there will be little incentive to enroll in a program not recognized by ASEP. Should you need help or additional information, contact the ASEP Office by email (tbooneasep@gmail.com).

ASEP Board of Accreditation

The ASEP Board of Accreditation approves and administers the accreditation plan.

Purpose Statement

The purpose of the ASEP Board of Accreditation is to establish academic standards for the exercise physiology profession, verify the credibility, integrity, and quality of academic programs that prepare students for professional work in exercise physiology, and identify institutions that have attained the ASEP standard.

ASEP Board of Accreditation

The Board of Accreditation works cooperatively with the educational institutions to ensure that graduates entering the exercise physiology profession are professionally prepared. The 10-member Board is comprised of representation from the college and university communities, the clinical cardiopulmonary rehabilitation sector, pure and applied exercise physiology research, the fitness industry, and health/wellness promotion. The vast array of professional experience and expertise of the Board in leadership and exercise physiology professionalism provides assurance that accreditation is fair, reliable, and effective.

Accreditation Objectives

Define the accepted standards of academic responsibility of an institution voluntarily seeking accreditation. Through accreditation, demonstrate levels of academic performance, integrity, and quality that entitle exercise physiologists to the confidence of the profession, the communities they serve, and the general public.

Process for Achieving the Objectives

Academic institutions that wish to seek ASEP accreditation of an existing or a developing exercise physiology education program must show evidence of having met the required curriculum consisting of:

1. Basic science core
2. Exercise physiology content
3. Learning objectives (cognitive and laboratory)
4. Internship

Curriculum and Basic Science Core

1.1 Curriculum: The curriculum should consist of:

- *basic science core*
- *exercise physiology core*
- *general education courses,* and
- *electives*

1.2 Basic Science Core: A strong science background provides a solid knowledge base so that the student can fully comprehend and appreciate the complexities of more advanced course work in the exercise physiology area. ASEP accreditation requires that a student complete a minimum of one course (3 units each) in three of the four major sciences (math, biology, chemistry, and physics). At least two of the basic science courses must contain laboratory experiences (at least 1 unit each). Thus, the minimal requirement in the basic science core is 3 courses with 2 labs (11 semester hours). Additionally, a course in computer science is desirable. Programs that do not require students to take a computer science course must be able to document that substantial experience in the use of a computer is being incorporated into other courses within the program. Although only 11 semester hours in the basic science core are required to meet accreditation standards, ASEP recommends additional units in the sciences be taken. A sample of a suggested basic science core is presented below:

Example: Suggested Courses in the Basic Science Core (29 units)

Math
College Algebra is essential for doing metabolic calculations and solving problems in biomechanics. College Trigonometry essential for solving quantitative problems in biomechanics

Biology
Human Anatomy Physiology courses may be offered separately but are often combined into an entire year; this is the basis for many of the more advanced courses in our field including kinesiology, biomechanics, and exercise physiology. General and/or cell biology is a good base for all other physiology courses and biochemistry

Chemistry
General Chemistry a basis for exercise biochemistry and helpful for sports nutrition

Physics
Introduction to Physics essential to fully grasp the concepts of kinesiology and biomechanics

Computer Science
Computer Skills the student should learn skills in word processing, spread sheet data entry, graphing, Internet navigation etc. to function as an exercise physiologist

1.3 Exercise Physiology Core: ASEP requires that the content listed in Section 2 and the learning objectives stated in Sections 3 and 4 are taught. The content and objectives can be met from a variety of course offerings typically taught within exercise physiology. However, it is strongly recommended that at least 24 units of exercise physiology-related

courses be taken in order to meet these requirements. A sample of a suggested exercise physiology core is presented below.

Example: Suggested Courses in the Exercise Physiology Core
(32 credits)

First Aid / CPR
Movement anatomy/kinesiology
Biomechanics
Introductory and Advanced Exercise Physiology
Exercise testing prescription (with ECG)
Exercise biochemistry
Sports nutrition
Statistics research design
Internship

1.4 Suggested Electives: The career options for a student of exercise physiology are varied and numerous. The basic science core and the exercise physiology core are intended to provide comprehensive, but general, academic preparation for all exercise physiologists. The basic science core and exercise physiology core should be supplemented with elective courses that compliment the student's career goals and interests. While ASEP does not place any requirements on what elective courses should be included in the curriculum, the following are some suggestions for various sub-disciplines or common career paths of exercise physiologists.

Final Thoughts

In sum, as I see it, there is much work to be done in bringing forth the full message of exercise medicine by exercise physiologists. But, is that possible if exercise physiology has become subservient to physical therapy and other healthcare professions? Also, is it possible if we have not taken the time to consider exercise physiology as a healthcare profession and not just as a research discipline? What seems logical is this: when a significant number of exercise physiologists and students get the big picture and prepare accordingly, then, the healthcare professionals within the established ranks of everyday care for clients and patients of all ages with acute and chronic diseases and exercise physiologists who are teaching just research and not teaching professionalism and exercise medicine are missing the message.

We can start by acknowledging that our society is in a new age of continuing failure in health and well-being. The inactivity, sedentary existence, obesity, diseases, and disabilities have reached extraordinary proportions. Yet, we are also in an age of increased knowledge where our leaders need to step up to the plate of responsibility. My point is that if exercise physiologists want to be leaders in prescribing exercise medicine, it is obvious they must be able to deal with power, politics, and greed of their colleagues and

organizations. They must learn how to anticipate and deal with the uncertainty and unpredictability of the change process. They must also accept the responsibility of educating and engaging all exercise physiologists in the ASEP vision. This means talking about the importance of professionalism, the exercise physiologist's code of ethics, the profession-specific certification and academic accreditation, and the unique standards of practice for all exercise physiologists (from the undergraduate degree through the doctorate degree). In the end, it is the "little things" that are important even when they are seldom talked about (7).

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