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**Exercise Physiology and Its Role in Preventive Healthcare**

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Faith makes things possible, not easy.

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INCE THE 1970s exercise physiologists have carried out their work almost exclusively in academic settings, research laboratories, and cardiac rehabilitation programs throughout the United States. In fact, the scientific body of knowledge that undergirds exercise physiology warrants its application in both the clinical and non-clinical sports and academic programs. Sports-specific applied physiology, anatomy, biomechanics, and nutrition help to reduce training problems by providing safer training guidelines. This is true for athletes of both genders and all ages and competitive levels.

Advancing performance-related exercise physiology will always be a major part of the exercise physiology profession. Understanding the specifics of physiologic and metabolic responses to exercise is a primary responsibility of all exercise physiologists. Also, of increasing importance in the healthcare sector, the breadth and depth of the EP curriculum provides exercise physiologists with a comprehensive and engaging application of psycho-physiological factors in the health effects of regular exercise.

In just the past 10 years, the exercise component of exercise physiology is now recognized as exercise medicine. Clearly, exercise physiology is a healthcare profession and not simply a research discipline! Regular exercise and other forms of physical activity have become increasingly recognized as an essential component of an individual’s overall health. This point has been recognized as since Hippocrates (460-377 BC) remarked that “if we could give every individual the right amount of nourishment and exercise, not too little and not too much, we would have found the safest way to health.”

In part, that is why ASEP is so important. Every exercise physiologist has a great responsibility to focus on important and safe guidelines (by way of an individually designed prescription) for either the prevention or the treatment of a broad range of clinical conditions. In the United States, cardiovascular diseases accounts for more than 34% of all deaths. More than 81 million people currently have one or more forms of CVD. Statistical evidence indicates that “physical inactivity” is a primary risk factor for atherosclerosis, while regular exercise helps to lower blood lipid levels.

Daily physical activity can help prevent heart disease and stroke by decreasing body fatness, which is associated with high blood pressure. Regular exercise raise high-density lipoprotein (HDL) levels while lowering low-density lipoprotein (LDL) levels (bad cholesterol). People who perform regular exercise decrease insulin resistance and improve insulin sensitivity and, therefore, are less likely to suffer from type 2 diabetes than sedentary people.

Physical activity helps to preserve muscle mass and improve the body's ability to use calories. When physical activity is combined with proper nutrition, it can help prevent obesity. By increasing muscle strength and endurance and improving flexibility and posture, regular exercise helps to prevent back pain. This is important given that ~80% of all adults experience back pain that limits their ability to function normally. Regular weight-bearing exercise promotes bone formation and may prevent many forms of bone loss associated with aging.

Regular physical activity can improve mood and the way we feel about ourselves. Thus, the improvement in fitness, appearance, and the ability to perform new tasks improves self-confidence. Researchers also have found that exercise reduces depression and anxiety and helps manage stress.

It has been shown to reduce fibrin levels in the blood, thus decreases the likelihood of platelet adhesiveness and the concentration of platelets in the blood. Aside from these benefits and more, such as “a lower risk for dementia” -- physiologically speaking, regular exercise lowers heart rate and increases stroke volume, stabilizes electrical activity of the heart while decreasing SNS control of the heart, increases O2 to the brain, improves coronary and peripheral circulation, and increases oxygen-carrying capacity of the blood and work capacity of the muscles.

But, for exercise to be safe and properly prescribed, all exercisers should participate in a cardiovascular screening prior to starting an exercise program. The screening should include a personal history of disease and an exercise examination (including where appropriate an electrocardiogram) designed to identify the potential for cardiovascular problems as well as a beginning point for starting a regular exercise program.

Periodic physiologic testing should be part of the exercise program protocol, particularly with respect to monitoring the effectiveness of the exercise prescription or the tracking of key physiologic variables to optimize performance and well-being. Of course, it is important that the prescription process is also “educational” with appropriate time spent to clarify the targeted effects of the training program on mind-body improvements.

Exercisers frequently encounter unanticipated questions and challenges in training. These include unexplained reasons for a specific exercise program or a combination of programs and failure to understand the training effect on different physiologic factors. Thus, the exercise prescription as exercise medicine should have an educational component that explains the expected changes in the exerciser’s physiologic profile. For example, if the exerciser’s economy of movement has decreased, emphasis on training techniques that are expected to improve specific physiologic variables and on explaining the role of variables that reduce or increase efficiency is appropriate.

Equally important, EPs must anticipate the need to educate and troubleshoot health problems associated with older exercisers and female athletes (with eating disorders, amenorrhea, and osteoporosis). While the triad of health problems is not always sports or activity related, regular exercise can add to the disturbance of caloric balance that triggers it. Increasingly, EPs, particularly Board Certified Exercise Physiologists, are using the findings of this research to design safe and progressive “exercise medical prescriptions” for better mind-body health through exercise.

The continued demand for an economically sound and physiologically evidence-based proven medicine in the form of regular exercise requires that exercise physiologists and medical practitioners work together to optimize health and exercise performance. But, having said that, it is the responsibility of the exercise physiology profession to promote and prescribe regular exercise as a personalized medicine. This means optimizing exercise dosing strategies to maximize health benefits while minimizing psychological barriers to participation by increasing the educational relevance of physiologic-driven preventive health interventions such as exercise medicine.

This means first acknowledging that only 5% of United States adults obtain the recommended 30 minutes per day of physical activity. Also important is the fact that less than half of children aged 6 to 11 years and only 8% of adolescents achieve this goal. Then, second, it means that exercise physiologists must learn to think proactively to become part of the preventive as well as therapeutic interventions that focus on exercise medicine.

This is where the client’s individualized exercise prescription in the form of an individualized exercise medicine that has been professionally developed by an EPC can increase the efficacy of exercise prescriptions. Such work by exercise physiologists could have strong implications not only for the improvement of healthcare outcomes, but also for the exercise physiology profession. Such targeted thinking and interventions are likely to combine nutritional and other forms of therapy with chronic exercise training.

But, the truth is that more work must be done to understand exercise-mediated improvements and physiologic health and well-being. Exercise physiologists have not investigated the effects of interventions that use spirituality and home-based as well as entrepreneur-based exercise strategies to optimize the beneficial effects of personalized exercise regimens and career opportunities. And yet, to date, it is common knowledge that less than a one-third of all doctors advised their patients to engage in regular exercise or physical activity. Almost assuredly, far fewer have taken an active role in prescribing exercise. Many do not understand the benefits of aerobic exercise, resistance training or a combination of the two in persons with type 2 diabetes mellitus or other chronic diseases.

It is the opinion of the ASEP leadership that it is past time to think of preventive medicine strategies that include “the expertise of Board Certified Exercise Physiologists” for prescribing exercise medicine. In their opinion, the personalization of exercise prescription has potential to improve the patients’ awareness of the importance of regular exercise to preserve function as clients age, to improve quality of life, and to enhance mental and psychological functions. To this end, it is equally important that society is made aware of the fact that physical inactivity is a major risk factor for hypokinetic diseases, including but not limited to, coronary artery disease, hypertension, stroke, and certain forms of cancer.

The ASEP organization is poised to promote and build upon this thinking to enhance dialogue and exchange of ideas to increase the involvement of exercise physiologists in the overall health assessment and well-being of target populations. The leadership understands that exercise lowers the risk for early death, helps to control weight and reduce the risk of heart disease, stroke, type 2 diabetes, depression, and some types of cancer, including the fact that it lowers the risk of cognitive decline and hip fractures.

Hence, there isn’t any question that regular exercise should be considered as a viable alternative to or in combination with medications. Yes, understandably, it is tempting to believe that popping a pill will cure all our ills … but it hasn’t while rather basic healthy lifestyle changes (such as being physical active and eating well) have proven effective in improving well-being and adding years of quality living. For example, statistics suggest that modest changes in physical activity patterns and nutrition can prevent more than 400,000 deaths annually.

But, here again, the key to the “exercise medicine prescription” is first understanding and, second, correctly applying the scientific evidence-based “principles of regular exercise” such as the: Principles of Overload, Progression, Specificity, Reversibility, Dose-Response Relationship, Diminished Returns, and Rest and Recovery. Clients also need instruction as to frequency, intensity, and time commitment as well as the physical and psychological benefits. After all, feeling better and a sense of personal accomplishment are huge (regardless of age).

Who would have imagined decades ago that neuroscientists, psychologists, and medical doctors would agree that “exercise is the best thing a person can do for his/her brain.” In fact, the latest research shows that cognitive decline is not inevitable and that aerobic exercise reduces the level of brain loss and keeps cognitive abilities sharp.

The role of exercise physiology in preventive healthcare isn’t complicated. It is matter of assessing the client’s physiologic capacity. This can be done with the use of expensive metabolic equipment or it can be done as a stepwise process of determining the client’s overall physiologic responses with the use of proven regression equations. What is important here is that the professional that drives the process is a Board Certified Exercise Physiologist and not the so-called “fitness professional” or “exercise practitioner.” Either a college degree means something or it doesn’t. If it does mean something, then, it should provide career opportunities for the college graduate.

As you can tell, I have considerable concern about the importance of a credible academic degree for students of exercise physiology, and the public’s healthcare (and we within ASEP think that more attention should be placed on both). For certain, sitting on our hands is no solution to the challenges that face exercise physiology and healthcare in the 21st century. That is why there must be a fusion of effort, courage, persistence, and imagination by exercise physiologists at all levels to realize the ASEP vision.