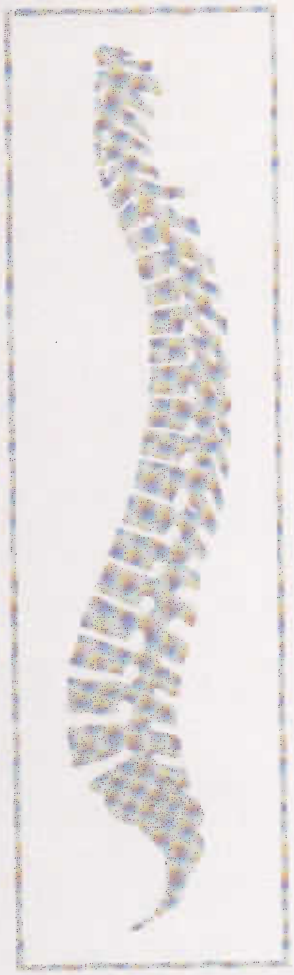


THE CHIROPRACTIC REPORT

An international review of professional and research issues, published bimonthly.

Editor: David Chapman-Smith, LL.B. (Hons.), FICC (Hon.) November 1991 Vol. 6 No. 1

Professional Notes

The Humble Case Report

In a concise and powerful editorial in the current issue of JMPT (Journal of Manipulative and Physiological Therapeutics (October 1991) 14(8):447-449), Dana Lawrence DC, the editor:

- Reviews the importance of case reports
- Advises on how to write them
- Explains how JMPT selects them
- Calls for you and the profession to send him more of them, especially for "non-orthopedic and predominantly visceral conditions".

Lawrence explains that the time for case reports describing low back pain responding to adjustment is over - chiropractic has progressed to controlled clinical trials in this field of practice, and there is seldom enough that is "unusual and educational" to warrant publication.

The focus should be on cases that "help document the full breadth of what chiropractors treat, see in their offices, ... and are responsible for diagnosing". This is noted by the scientific community, since JMPT is available to all health science researchers through the major computer indexes, and provides a basis for clinical research. Thus, for example, an excellent case report on chiropractic management of dysmenorrhea published in JMPT in 1990, has led to a recent pilot

continued on page 3

Stress and Exercise – Natural Syndrome, Natural Remedy

A. Introduction

"The same stress that makes one person sick can be an invigorating experience for another".

"An ever increasing proportion of the human population suffers and dies from the so-called wear and tear diseases, or degenerative diseases, which are primarily due to stress ... disease processes which cannot be eliminated by the methods of classic medicine."

"... a man can be intoxicated with his own stress hormones ... I venture to say that this sort of drunkenness has caused much more harm to society than the other kind. We are on guard against external intoxicants ... it takes more wisdom to recognize and overcome the foe who fights from within ... curiously, the pituitary is a much better judge of stress than the intellect."

Hans Selye, MD PhD, *'The Stress of Life'*[1]

1. Stress is everywhere. Paradoxically the same stress produces fulfilment and depression, health for one person but disease for another. You can seek to combat harmful stress levels with artificial measures, such as medication, alcohol and caffeine, or natural measures, such as a better understanding of your physiology, rational exercise, diet and sleep. Each approach uses chemicals. The second, relying on the body's natural powers and chemicals, is the preferred method in chiropractic philosophy and practice. This Report reviews:

- The nature of stress
- Aerobic and anaerobic exercise.
- How appropriate exercise reduces stress - mentally and physically.

B.What is stress

2. Stress has three components:

a) *The invading stressor.* This may be physical (a microbe, allergen, extreme temperatures, etc) or mental (personal challenges, abuse, etc.)

b) *Mechanisms for defence.* Hormonal and nervous system responses which defend against the stressor.

i) For physical stressors this may be inflammation - a defence process triggered by the nervous system and regulated by hormones released into the bloodstream. (See para 4).

ii) For mental stressors there are conditioned and complex emotional responses. These are still based, however, on biochemical (hormonal) change - every animal's response to a challenge is secretion of hormones to prepare the body for 'fight or flight'

c) *Mechanisms for surrender.* Hormonal and nervous system responses to moderate and dampen the mechanisms for defence.

(Your body does everything on a majority vote. Different nerve cells (neurons) in the nervous system signal yes and no in response to each stimulus, and the nerve cells in the majority prevail. Response to stress is the same. Some neurons say defend, some surrender. This averaging process avoids over-reaction).

Resistance and adaptation to stress depend upon a proper balance of the above three factors.

3. Many emotional and physical disorders arise from poor adaptive response to stress rather than the inherent and direct damaging power of stressors - disorders such as insomnia, irritability, hypertension (high blood pressure), gastric ulcers, and various rheumatic, allergic, cardiovascular and renal diseases. These are known as 'disorders of adaptation'. We have the power to influence adaptation, to improve adaptive response, so that the response to a given stressor is health and wellbeing rather than disease and anxiety.

Biochemical Response to Stress

4. Stress produces the following biochemical responses:

a) Chemical alarm signals go to centres of coordination in the nervous system and the endocrine glands. These glands, especially the pituitary just underneath the brain, and the adrenals above the kidneys, produce *adaptive hormones.*

b) These hormones, soluble chemicals which travel throughout the body via the bloodstream, are coded to influence limited parts of the body on a selective basis. Some hormones act directly, others indirectly through another endocrine gland or relay station.

c) Adaptive hormones are either *pro-inflammatory* (e.g. aldosterone) stimulating defensive reaction, or *anti-inflammatory* (e.g. cortisone and ACTH) dampening excessive defense.

d) The effects of these adaptive hormones are moderated by other hormones (e.g. epinephrine, commonly known as adrenalin). They are also influenced by nervous system responses, exercise, diet, heredity and past tissue experience of exposure to stress. All these influences are summarised in Figure 1.

Local and General Response.

5. Response to stress is body-wide. Physical stressors, such as bacteria causing infection, seem local, and mental stressors seem to be all in the mind, but both cause very real physical changes throughout the body. These include alterations in chemical composition of the blood, loss of body weight, and shrinkage of lymphatic organs. Under sustained stress these various changes produce the 'wear and tear' disorders that dominate western life today, such as ulceration of the gastrointestinal tract, hypertension, heart problems and arthritis.

6. Selye termed all these changes the general adaptation syndrome' (GAS). With animal experiments, exposing rats to stressors such as cold, continuing muscular exertion, infections and drugs, he showed that our physical stress response goes through three phases:

a) Alarm reaction. During this initial period resistance is lower than normal. (The adrenal cortex reacts non-specifically secreting increased cortisone and ACTH. White blood cell numbers decrease, a person is more prone to shock and disease).

b) Stage of resistance. Capacity to resist rises above normal. (One becomes conditioned)

c) Stage of exhaustion. Resistance is lower than normal once more.

7. In one experiment illustrating this Selye placed 100 rats (Group A) in a refrigerated room for 48 hours. They appeared to withstand this well, but on sacrifice and dissection of 10 rats there were typical physical signs of alarm reaction to stress - large fat-free adrenals, small thymuses and stomach ulcers.

20 rats from Group A were then placed in a colder environment with rats that had lived at normal temperatures (Group B). The Group A rats, which had had their adaptive powers already depleted by the initial alarm reaction to 48 hours of moderate cold, fared worse - they were still less than normally resistant. (Still in the 'alarm reaction' phase).

Five weeks later, now fully adapted/ conditioned to the second cold environment, Group A rats were placed in an even colder chamber with rats not acclimatized to cold (Group C). Group A rats survived - they were now in the second adaptive stage, the stage of resistance - Group C rats did not. However, after several months of perfect wellbeing in the cold, a third stage set in - the stage of exhaustion. Although still well-nourished Group A rats could not continue to survive.

The Message

8. When we review this information on stress a few simple truths become apparent, namely:

a)It is an unintelligent approach to health to consider yourself well until symptoms emerge - be it the common cold, back pain, persistent headaches/migraine, ulcers, high blood pressure - and then attack these symptoms with medication.

b) If stress factors are an underlying cause for these conditions, and we have the innate power to adapt our stress response to avoid them, we should be concerned to understand and modify stress in our lives at all times.

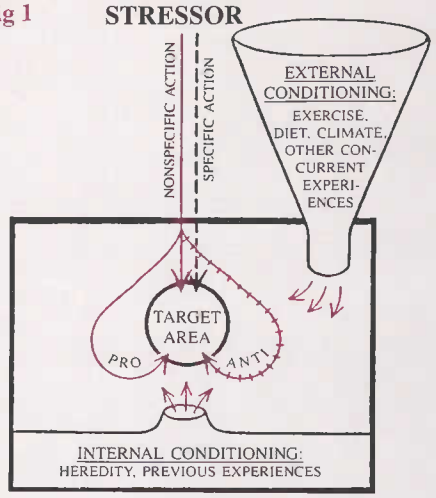
c) This is especially important since adaptation to stress not only avoids harm (through fewer stressors and increased resistance) but positively promotes wellbeing (deriving benefits from stressors, 'rising to the challenge'.)

d) The task is to adopt a lifestyle that reduces stressors and expands resistance. Selye did that artificially for his experimental rats, we must do it for ourselves.

Your Areas of Control

9. The rat experiments involved a singular, sustained, and ultimately fatal stress. Our lives feature daily diverse stress and many conditioning factors regulate our response. Some are beyond our control - for example the biological fact of decreased resistance during the alarm phase, and inherited genetic factors that moderate our response to stress. However there are many important conditioning factors one can influence, greatly altering level of stress and impact on health.

Fig 1



10. Taking charge of stress in your life has two starting points:

a) Understanding how stress works, and the intimate links between physical and mental states in stress.

b) Identifying the stressors you need to work on - inappropriate work pressures, unresolved family pressures, unbalanced diet, poor pattern of exercise.

11. The link between physical and mental states is a two-way street being:

i) *Psychosomatic.* Most people at some time face nsignificant irregularities in physical dysfunction such as joints that crack unexpectedly, minor allergies, heart palpitations, intestinal upsets. Whether or not these irregularities progress to become significant disorders depends upon a person's level of anxiety, his/her stress reaction.

ii) *Somatopsychic.* This, the effect of bodily changes and actions on the mind, is less understood. At the simplest level this means that looking fit and well helps one to be fit and well. That is why armies strengthen morale through appearance and activity. Similarly, as psychologist Denis Waitley explains, "smile even though you feel depressed/upset or angry ... this will make you feel better".[2]

12. Understanding these links between physical and mental states reduces stress in itself, but also provides a basis for intelligent individual decisions on how to reduce stress.If, for example, you are tense and unable to sleep it is helpful to know

continued on page 5

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study at National College supported by FCER, which is the basis for a full trial now proceeding.

What case reports has JMPT published recently? Here is a summary of case reports appearing in the last three years:

1988

Need for multiple diagnosis in the presence of spondylolisthesis

Hass' disease

Thermographic imaging of myofascial trigger points

Postmyelographic cauda equina syndrome in an asymptomatic acquired spinal stenosis of a young acromegalic

Traumatic volar dislocation of the second, third and fourth carpometacarpal joints

Chondromalacia patellae

Anterior interosseous nerve paralysis: cubital tunnel (Kiloh-Nevin) syndrome

Elongation of the anterior tubercle of a cervical vertebral transverse process

Unilateral intermittent claudication of the left lower extremity

Fracture of the fabella

Chiropractic distractive decompression in the treatment of pelvic pain and organic dysfunction in patients with evidence of lower sacral nerve root compression

Traumatic manubriosternal joint subluxations in two basketball players

Acute lumbosacral myofascitis associated with Reiter's syndrome

Chronic obstructive pulmonary disease

1989

Osteochondrosis of the tibial tubercle (Osgood-Schlatter disease)

Omovertebral bone

Atypical brachydactyly

Aberrancy of the midtarsal locking mechanism as a causative factor in recurrent ankle sprains

Lumbar intervertebral disc herniation treated by rotational manipulation

Avascular necrosis of the femur head

Stress fractures in athletes and nonathletes

Failure of clinical tests to predict cerebral ischemia before neck manipulation

Enuresis

"Snapping hip" and sacroiliac sprain

Traumatic spinal myoclonus

Thermographic imaging of pathoneurophysiology due to cervical disc herniation

1990

Rib fracture due to bench pressing

Anticoagulant therapy and subdural hematoma formation

Dysmenorrhea

Metastatic disease of the lumbar spine

Brucellosis as a cause of an unstable spine

Bronchogenic carcinoma presenting as neuromuscular pain

Ehlers-Danlos syndrome

Lyme disease

Myositis ossificans

Mechanically induced pelvic pain and organic dysfunction in a patient without low back pain

Radiation induced fracture of the scapula

Clinical instability of the lumbar spine

Patellofemoral pain syndrome

Utah WCB Study - more evidence of chiropractic cost-effectiveness

'Cost per Case Comparison of Back Injury Claims of Chiropractic versus Medical Management for Conditions with Identical Diagnostic Codes', Jarvis KB et al, J Occ Medicine (August 1991) 33(8):847- 852.

7 of 8 studies of workers compensation cases since 1980 have shown fewer time-loss days and/or lower compensation costs for chiropractic management of back injuries than medical management. With respect to this new study, published in the Journal of Occupational Medicine:

• This is the first study of US WCB data to compare patients with identical ICD (International Classification of Diseases) codes. Accordingly there was a good match of patient populations on an objective standard.

• The study compared the cost of management of back injuries by medical physicians (MDs) and chiropractors (DCs).

• It involved all back injury claims to the Utah Workers Compensation Fund (WCF) in 1986 that were treated by MDs or DCs and had complete files - except surgical cases which were excluded.

3,062 (40.6%) of 7,551 back injury claims met the inclusion criteria. The large number excluded for incomplete data was not "excessively weighted in either provider group (MD or DC)."

• Claims data were extracted by an independent researcher at the end of 1988 and included all costs on the claims initiated in 1986 to that time.

• Results were:

a) Number of visits for cases managed by DCs (12.9) was 3 times higher than number of visits for MDs (4.9), and time under care was longer with DCs (54.5 days) than MDs (34.3 days) - but actual treatment costs were "significantly higher" for MD cases ($684) than DC cases ($527).

b) Of greater note, average compensation costs per case managed by MDs ($668) was more than 10 times the cost of chiropractic cases ($68).

These results reinforce the clear trend emerging in WCB studies and clinical trials. The more active chiropractic approach to management means more frequent patient visits and longer time under care, including supportive counselling and treatment after return to work and recovery from acute pain. However this leads to fewer surgeries and chronic cases, and greatly reduced compensation and overall costs in comparison with the more passive medical approach which still relies on rest and medication, and involves less patient education and personal involvement in rehabilitation.

Points

• Chiropractic has been getting some excellent press recently. Time Magazine (September 23, 1991) ran a major article reporting that "several authoritative studies have confirmed that chiropractic-style spinal manipulation is effective for the treatment of lower back pain", advising that "about 1 in 20 Americans now see a chiropractor in the course of the year," and noting the major change in relations between the chiropractic and medical professions. Chiropractic is now "winning adherence and respect" from mainstream medicine.

• McLeans', Canada's equivalent to Time or Newsweek, ran a cover story on back pain which included an interview with Dr. Hamilton Hall, a Toronto orthopedist and entrepreneur widely known to the public as 'the back doctor'. His verdict on his competitors - "chiropractors are generally just as good as doctors at relieving back pain." (September 30, 1991).

continued on page 4

• New independent evidence that chiropractic manipulation of the sacroiliac joint improves biomechanics comes from Walter Herzog PhD at the Faculty of Physical Education, University of Calgary, Canada. After sophisticated locomotion studies with symptomatic sacroiliac joint patients he concludes "manipulation was associated with changes in the mechanics of walking ... in particular sacroiliac joint patients were found to become more symmetrical in their ground reaction force patterns with increasing exposure to manipulation .... it is reasonable to assume that these changes are caused by changes in the musculoskeletal or neuromuscular system that was treated." ('Biomechanical Studies of Spinal Manipulative Therapy', Walter Herzog, JCCA 1991; 35(3):156-164).

• Gone is the era when the benefits of the chiropractic adjustment could be dismissed as the laying on of hands, placebo and natural remission. Many objective effects have now been documented during the research explosion of the 1980s. Add one more - the September 1991 issue of JMPT reports refined work from a research team at National College led by Patricia Brennan PhD and Katrina Kokjohn DC finding that "Substance P Plasma levels are significantly altered by a single spinal manipulation." Substance P not only plays a role in the transmission of nociceptive stimuli but is now also thought to play "a prominent role in inflammation and immunoregulation." ('Enhanced Phagocytic Cell Respiratory Burst Induced by Spinal Manipulation: Potential Role of Substance P', Brennan et al, J Manipulative Physiol Ther 1991; 14:399-408).

Standards of Practice

• The Mercy Center Consensus Conference, to be held near San Francisco January 25-30, 1992, has been called to provide current practice guidelines for the chiropractic profession in the following 15 areas:

Initial patient evaluation
History and Physical Examination\
X-ray and other imaging
Instrumentation
Clinical laboratory
Record keeping and patient consent

Case Management
Clinical impression
Modes of care
Frequency of care
Reassessment
Record keeping

Outcomes
Outcome assessment
Collaborative care
Management of complications
Maintenance, prevention and supportive care
Professional development

This important project, the most comprehensive effort to establish guidelines for chiropractic practice, is uniting the profession as never before. Sponsoring organizations now include the great majority of all chiropractic professional, educational, research and licensing bodies throughout North America.

Preparations are on schedule. The Consensus Group of chiropractors, now expanded from 30 to 35 to provide the best possible representation, has 15 committees - one for each topic. These committees have now presented the second draft chapter on each topic - the third and final drafts pre-conference will be forwarded to all Consensus Group members during the first week of January.

For a full discussion of the Consensus Conference and consensus methods see the March 1991 issue of The Chiropractic Report (Vol 5 No. 3.)

• A valuable and timely publication is '*Chiropractic Standards of Practice and Quality of Care*', edited by Herbert Vear DC FCCS LL.D. Dr Vear, President Emeritus, Western States Chiropractic College, Portland, Oregon, writes the foundation chapters himself - on scope of practice in education, diagnostics and therapeutics, and the place of objectives and standards of care in the development of chiropractic as a health discipline.

A number of chapters deal with standards in specific areas - diagnostic imaging (Cynthia Peterson DC DACBR), thermography (Susan Vlasuk DC DACBR), contraindications to spinal manipulative therapy (Meridel Gatterman MA DC), vertebral artery syndrome (Donald Henderson BSc DC DACBR), interprofessional relations (Robert Anderson MD PhD DC) and third party relationships (Charles Simpson DC DABCO and Richard Tilden DC). In addition there are a number of good specialty chapters on topics such as the history of quality assurance (Daniel Hansen DC), the relationship between philosophy and chiropractic standards (Joseph Keating PhD and William Meeker DC MPH), an approach to analysis of chiropractic methods (Robert Boal PhD, Mark Kaminsky MS and others) and legal and malpractice considerations (Robert Hirtle JD).

('Chiropractic Standards of Practice and Quality of Care' (1992) edited by Vear HJ, Aspen Publishers Inc., Gaithersburg, Maryland, 300 pages).

Figure 2

Stress and Exercise - Recommended Reading List

* = suitable for health professional only

Stress

'The Stress of Life', Selye H (1976), revised edition, McGraw Hill, New York. *The layperson's full guide to understanding stress, its consequences and how to adapt. An internationally renowned classic.*

Exercise and Nutrition

'Everyone is an Athlete', Maffetone P (1990) David Barmore Productions, Box 758, Miller Road., Mahopac, New York 10541, Tel: 914-628-1877. US$17.95. Purchase direct from publisher. *Excellent general review of exercise physiology, nutrition, suggested programs for serious athletes and 'average' people. Practical advice on warming up, stretching, heart monitoring, etc. Author is a New York chiropractor who works with many prominent athletes including current World Triathlon Champion Mark Allen '.*

'Power Foods', Applegate L (1991), Rodale Books, Emmaus, Pennsylvania. *On nutrition - the foods you should be eating for your chosen sports and exercise regimen.*

'Eat to Compete': A Guide to Sports Nutrition', Peterson M and K (1988), Year Book Medical Publishers Inc., Chicago. *Slightly more technical but still accessible for the layperson. More on biochemistry and energy-producing mechanisms.*

* 'Sports Medicine', Strauss RH (1991), 2nd edition, W.B. Saunders Co., Philadelphia. *For professionals. See especially Chapter 16 (Nutrition), Chapter 19 (Physiology of Exercise and Training), Chapter 20 (Psychological Aspects of Exercise and Sport), Chapter 34 (Exercise and Aging).*

* 'Exercise Physiology: Energy, Nutrition, and Human Performance', McArdle WD, Katch FI and VL (1991), 3rd edition, Lea & Febiger, Philadelphia. *A good balance of theory and practical applications in the areas of nutrition, energy transfer, exercise and training.*

* 'Clinical Assessment of Nutritional Status: A Working Manual', Pressman AH and Adams AH (1990), 2nd edition, Williams & Wilkins, Baltimore. *Guidelines and forms to help health professionals make a scientific assessment of their patients' nutritional status. Authors are Alan Pressman MS DC, President, ACA Council on Nutrition, and Alan Adams BS DC, Vice-President, Chiropractic Education, LACC.*

that you are not simply faced with a question of mental anxiety. Your stress has a chemical basis - your adrenal glands have poured too much hormone (epinephrine and corticoids) into your bloodstream. Don't expect counting sheep, or taking a hot bath, to help. Neither of these suddenly reduces the chemical composition of your blood. You are in a similar position to someone suffering insomnia because of artificial hormone levels - for example someone receiving large doses of cortisone for rheumatoid arthritis.At the time you can remedy the situation in two ways - artificially with medication or naturally through diversion of your thoughts with music or reading for 30 minutes allowing your adrenals to relax and your blood composition to change.(The latest evidence is that warm milk and cookies has something to offer. Milk contains the amino acid tryptophan which has been shown to cross the blood-brain barrier and induce sleep).

13. However what you really need to improve your sleep and health is an analysis of your sources of stress and how to condition your response to a productive level. This may involve less stimulation in the evening hours, altered diet, and/or a variety of other changes in lifestyle. However one of the most important conditioning factors for stress -available to all of us for natural stress reduction - is balanced exercise.

C. Exercise

14. During a few short decades this century, there has been a fundamental change in normal levels and patterns of exercise:

• Throughout history the human race has been constantly active to meet the needs of daily life.

• Modernized society is inactive at work, at home, and travelling in between. Today over 75% of the US work force sits down all day. There are similar statistics throughout the western world. As a result the world lives with weak muscles, joint restrictions, back strain and pain and resultant levels of back disability that are soaring to new heights.

• Our lives are filled with 'labour saving' devices. Seldom do we contemplate that these are 'exercise saving' devices or 'stress enhancement' devices.

• And when people do exercise it is often in an intemperate fashion - instead of balanced activity there is a jarring 'workout' (note the language, and its connotation of stress rather than recreation), a vigorous run on pavement, or a snatched 30 minutes on the tennis or squash court during 2 or 3 days of relative inactivity.

The result, as U.S. chiropractor Philip Maffetone records in his recent book '*Everyone is an Athlete*'[3] is that:

"The stress of adapting to such a drastic change within such a short time has been related to the increased incidence of heart disease, cancer, low-back problems and intestinal disease. Disease and dysfunction have resulted from a loss of that natural performance - activity. Muscles are meant to be used."

15. The spirit of the times is either to be inactive or to take forced activity in small quantities, call it exercise, see the goal as fitness, and regard this as health. However 'health' and 'fitness' are, as Maffetone points out, quite different. His definitions:

Health: When all systems of the body - nervous, muscular, skeletal, circulatory, digestive, lymphatic, hormonal, etc. - are working optimally.

Fitness: The physical ability to perform athletic activity. Good 'health' requires sound 'fitness' but with inappropriate exercise one may be fit - but stressed out and unhealthy.

Aerobic and anaerobic exercise

16.Exercise may be:

a) *Aerobic.* Slower, repetitive, prolonged, low-intensity activity featuring endurance, such as walking, jogging, biking or swimming. Uses the aerobic muscle fibers (known as 'red', 'slow') which burn fats (fatty acids) as the predominant source of energy. Oxygen needs are supplied by breathing.

b) *Anaerobic.* Activity which is brief, intermittent, high-intensity emphasizing speed or strength, such as racketball, basketball, weightlifting, sprinting. Uses 'white' or 'fast' anaerobic muscle fibers with carbohydrates (sugar) as the primary energy source. Oxygen needs are supplied from the body's reserves. (People have very different capacities for delivering oxygen for aerobic exercise - capacity can be greatly improved through training. However everyone has about the same amount of oxygen - 40 litres - stored in the body and available for anaerobic exercise. 'Oxygen debt' refers to stored oxygen burnt during anaerobic exercise).

17. Relevant basic facts on human skeletal muscle fiber are:

a) There are three types - aerobic and anaerobic (similar to red and white meat in chicken) and a mixed fiber (a fat-burning aerobic fiber, but one that produces some power and speed as well as endurance).

b) One muscle has thousands of fibers, and each muscle has a combination of fiber types.

c) Aerobic muscle fibers are the smallest but most numerous. They comprise 95% of all muscle.

d) The different fiber types vary in speed of action, efficiency and endurance because of the different mechanisms used to produce energy.

In aerobic fibers dietary fats, the predominant energy source, are converted to energy in those parts of the muscle cell called the mitochondria. These power centres are relatively slow, but highly efficient in energy conversion during long term activity. (One reason for this efficiency is that fats have far more hydrogen than other food groups. It is hydrogen, when broken down at the cellular level, that is the root source of energy).

Anaerobic muscle fibers, by contrast, are less efficient. Their energy source is sugar and they are fast-acting, but they can only perform for a comparatively short time.

18. Exercise involves a combination of aerobic and anaerobic activity, as you would expect since muscles have both types of fibers and all exercise involves some speed, strength and endurance. Accordingly classification of exercise as either 'aerobic' or 'anaerobic' refers to the predominance of one muscle fiber over the other.

19. It is not usually the type of activity that decides whether exercise is aerobic or anaerobic Weightlifting, which relies principally on speed and strength, is always anaerobic, but walking, running, swimming and cycling may be either. The determining factor is the body's chemical response - whether it is burning fats (aerobic muscle fibers) or sugar (anaerobic fibers). This depends upon level of exercise intensity and heart rate - the lower the heart rate the more aerobic the exercise is.

Stress and exercise

20.Hormones are the body's chemical messengers delivering the 'fight or flight' response to stress. The body's only method of converting that message to action is through use of the muscles. Logic would suggest a close relationship between stress and muscular activity. Such a relationship exists, making exercise one of the best single ways to adapt your response to stress - but the effects of aerobic and anaerobic exercise on stress are very different.

21. *Anaerobic exercise.* As has been mentioned (para 4) the adrenal glands, lying just above the kidneys, produce a

number of hormones moderating the body's response to stress. Two important adrenal hormones are:

• Norepinephrine - a relaxant

• Epinephrine - an aggressive, stressful hormone produced as part of the 'fight or flight' defence mechanism.

Anaerobic activity, logically enough since it uses muscle fibers geared to quick response, speed and strength, increases production of epinephrine and depresses norepinephrine. The result is that anaerobic activity is a stressor - it alters the chemical composition of your body to increase overall stress.

22. *Aerobic exercise.* This, conversely, increases secretion of norepinephrine, the body's natural muscle relaxant. The feeling of wellbeing and stress reduction generated by aerobic exercise is not just personal satisfaction that you had the discipline to go for your run/swim/bikeride - it is a healthier, stress-reducing chemical balance in your body.

(The adrenal glands, a very important part of the aerobic system, also produce the hormones aldosterone (allowing regulation of sodium, an important aerobic muscle fiber nutrient, and water) and the glucocorticoids (regulating blood sugar and inflammation)).

Aerobic exercise reduces stress in these other ways also:

a) Because the body is using more fats for energy, sustained aerobic exercise increases energy level, enhances performance, and produces weight loss - all of which have a strong impact on mental attitude and thus response to stress.

b) Again because the body is using more fat than sugar for energy, level of blood sugar remains more stable. This reduces the mood swings experienced by many people. (The brain and nervous system as a whole rely almost exclusively on sugar as the source of energy).

23. Has it ever occurred to you as you feel anger or tension mounting in every day confrontations at meetings, on the telephone, and in personal relationships that your body has already responded naturally to its animal heritage? Quite beyond your conscious control epinephrine is flowing into your blood asking for a muscular, physical response. In the words of Selye, the medical scientist who has dominated the research linking stress and hormonal response to mental and physical illness, you are becoming "intoxicated with your stress hormones", overcome by "the foe who fights within."

Aerobic exercise will not only isolate you from your sources of stress for 60 minutes but will provide a muscular response to reverse the hormonal imbalance. The important role of regular aerobic exercise in response to mental stress and physical tension is evident.

Exercise Recommendations

24. Many factors govern choice of exercise for each person. For detailed recommendations on exercise programs and diet see books on the suggested reading list (Figure 2). However these general principles apply to exercise aimed at reducing stress:

a) Exercise should be regular, ideally each day, especially for those subject to high stress. (Mick Jagger has run several miles a day for the past 10 years. President Bush and Billy Graham each have their daily run).

b) The majority of exercise (80-95%) should be aerobic. This will be low-intensity with an emphasis on building endurance rather than speed or strength.

c) Exercise should be varied, and anaerobic exercise should be reduced in times of increased stress. (Replace two hard squash/basketball games per week with more social ball games combined with distance running, swimming or biking).

d) Time your exercise to prevent peak buildup of stress. For those fortunate enough to be able to arrange the time and facilities, 40 minutes of aerobic activity at lunchtime is ideal. If your stress level rises from 1 to 10 during the course of an uninterrupted working day, exercise at lunchtime may mean you start the afternoon at stress level 2 instead of 6, and never get beyond level 6.

e) Leave time to warm up and warm down. 'Squeezing in' exercise time can generate as much stress as the exercise alleviates.

D.Conclusion

25. The significance of stress to chiropractic practice is readily apparent:

• Stress is quickly manifested in disturbance of the neuromusculoskeletal system. First changes are asymptomatic but apparent on chiropractic examination - muscle tension (hypertonicity, trigger points) and joint dysfunction (restricted ranges of movement).

• Prolonged stress brings the symptoms most commonly seen in chiropractic practice - cervical headache and migraine, neck and back pain, and referred pain from the spine.

Preventing and correcting these disorders, as with all intelligent health care, requires a team approach. The chiropractor's responsibility is correction of the musculoskeletal dysfunction and its neurological effects, and giving advice on postural stress, general stress, and lifestyle. The patient's responsibility is to identify sources of stress then alter his/her lifestyle to reduce stressors and improve resistance.

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1. Selye H (1976) 'The Stress of Life', revised edition. McGraw Hill, New York.

2. Waitley DE (1989) 'The Psychology of Winning', audiotape series 'Great Ideas for Successful Living'. Nightingale- Conant Corp., Chicago, Illinois.

3.Maffetone P (1990) 'Everyone is an Athlete', David Barmore Productions, Mahopac, New York.