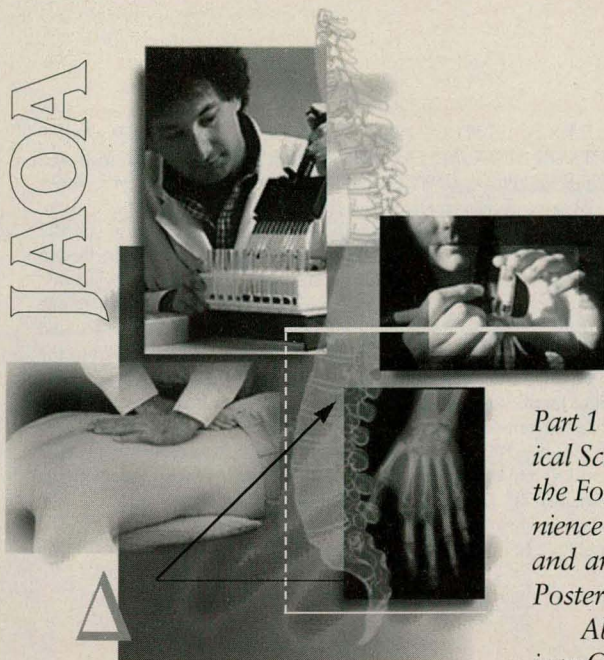




Fortieth Annual AOA Research Conference Abstracts, 1996: Part I

Part 1 contains abstracts in the Glaxo Wellcome Fellows, Biomedical Sciences, and Clinical Sciences categories to be presented at the Fortieth Annual AOA Research Conference. For the convenience of attendees, abstracts appear in their scheduled sequence, and are numbered for easy reference. Part 2, abstracts in the Poster Session, will appear in the September issue.

Abstracts are reproduced exactly as submitted. The American Osteopathic Association and The Journal of the American Osteopathic Association assume no responsibility for the content of the abstracts printed herein.

Glaxo Wellcome Fellows F01

THE NATURAL HISTORY OF HERNIATED NUCLEUS PULPOSUS CHONDROCYTES", J.S. Brault, D.O., W.A. Earman, D.O., R.D. Cook, B.S., R.E. Kappler, D.O., S.L. Lee, Ph.D., Midwestern University, Biochemistry Department, Downers Grove, IL 60515

The purpose of this study was to determine if ectopic herniated human lumbar intervertebral disk tissue is viable, mitotic, both, or neither. Surgically excised human lumbar disk samples were collected from 5 male and 5 female patients (24-46 years) by primary limited-approach discectomy. The operative disk sites were L5-S1 (60%) and L4-L5 (40%). Each disk specimen was divided post-operatively into five equal weight aliquots. Four of these were incubated *ex vivo* in sterile tissue culture media at 37 C for 24 hours with radiolabelled glycine or proline (protein precursors), uridine (RNA precursor), and thymidine (DNA precursor) as measures of viability and mitotic activity. The control for non-specific absorption to each specimen was a tissue aliquot at 4 C to which radiolabelled precursors were added and then washed out within 5 minutes (no incubation). Incorporation of radiolabelled precursors into RNA, protein and DNA was measured by liquid scintillation counting after Trizol fractionation. The fifth aliquot was fixed in formalin, embedded in paraffin, and then sectioned and stained for light microscopy. Measured incorporation for incubated samples, relative to control samples, was 7-fold, 6-fold, and 1.35-fold higher for protein, RNA, and DNA respectively. These data establish that the disk samples produced RNA and protein, but not DNA. Our biochemical and morphologic results are evidence that ectopic herniated human disk tissue is viable but not mitotic.

Supported by a Glaxo Wellcome Research Fellowship, an Andrew MacKenzie Research Award from CCOM and by a grant from Midwestern University

F02

THE PREVALENCE OF SYNCOPE IN A POPULATION OF HEALTHY YOUNG ADULTS. T. A. Silberstein, D.O., M. M. Cox, M.D. NSUCOM, Dept. of Internal Medicine, NMB, FL 33162 and University of Miami School of Medicine, Miami, FL 33101

Background: Syncope is a common clinical problem, but information about the prevalence of syncope in a population of healthy adults is limited.

Methods: 401 healthy medical students from Nova Southeastern University and the University of Miami answered a questionnaire determining the occurrence of syncope and near syncope. Syncope was defined as a transient loss of consciousness and presyncope was defined as an imminent sense of unconsciousness that included lightheadedness, dizziness, and visual disturbances. Synonymous terms of syncope were used to eliminate unfamiliarity, for example, loss of consciousness, fainting, and black-outs. Head trauma and alcohol as associated causes of syncope/ presyncope were excluded.

Results: 401 students responded to questionnaire (227 males and 174 females). The mean age was 25.4 years (range 18-47). 111 of 400 (28%) students who answered the questionnaire reported at least one episode of syncope. There were 44 men (44/125) (35%) and 81 women (81/125) (65%). All total, 20% of men (44/226) and 47% of women (81/174) had syncope and or presyncope. Fifty-two percent (55/105) had only one episode. Presyncope occurred in an additional 14 of 400 (4%) of the respondents. Sixty-six percent (72/109) reported that their events took place between 8:00am-4:00pm. The most common precipitating factors surrounding the syncopal/presyncopal episodes were heat (18%) and postural change (18%). The most common associated symptom was visual disturbances (23%). 23 of 105 (22%) underwent a cardiac work-up as a result of their syncope. Fourteen respondents felt their syncopal events altered their lives by contributing to lacerations, motor vehicle accidents, and torn ligaments. The duration of unconsciousness was reported to have lasted less than two minutes in 73% (43/59). Of the 81 positive women, 27% noticed an association between their syncopal/presyncopal episodes and their menses.

Conclusions: In a healthy population of medical students, 28% reported an episode of syncope (65% were women and 35% were men). A small percentage sought medical attention as a result of their episodes. A majority of events were associated with vagal symptoms and causation was clearly identifiable suggesting no further work-up necessary. However, those with adverse outcomes should undergo a medical examination to identify an etiology and prevent further injury. Supported by a Burroughs Wellcome Fellowship.

F03

EMERGENCY DEPARTMENT EVALUATION OF OSTEOPATHIC MANIPULATIVE THERAPY IN THE ACUTE ANKLE SPRAIN; A. Eisenhart, D.O., T. Gaeta, D.O., H. Ettlinger, D.O., L. Rampil, D.O., M. Rosario, L.P.N., St. Barnabas Hospital; Dept. of Emergency Medicine; Bronx, N.Y. 10457.

Osteopathic Manipulative Therapy (O.M.T.) is too often thought to be a tool relegated to O.M.T. specialists and family practitioners. The purpose of this study is to evaluate the efficacy of O.M.T. in the Emergency Department (E.D.) treating acute ankle sprains.

Patients over 18 years of age with first or second degree ankle sprains which occurred within 24 hours of E.D. presentation were eligible for enrollment. Patients were randomly assigned to either the treatment or control group. Data was obtained on three independent variables: edema (described as a circumferential measurement about the medial and lateral malleoli), range of motion (expressed in terms of flexion/extension goniometric angles), and subjective pain (using a 1-10 visual analog pain scale). Each value was then expressed as a percentage change from the contralateral ankle.

Patients in the study group were then evaluated and treated using O.M.T. Repeat measurements were obtained after treatment. Patients in both groups received the current standard of care for ankle sprains (rest, ice, compression, elevation, and analgesics). All patients were instructed to return in 5-7 days for follow up measurements.

Preliminary results of the patients in the treatment group show an initial decrease in edema, an increase in range of motion, and a decrease in subjective pain immediately following O.M.T. Analysis of the one week follow up data also suggests improved recovery in the group treated with O.M.T.

The efficacy of O.M.T. has been demonstrated in multiple settings. This study illustrates an approach to a common presentation in emergency medicine utilizing osteopathic principles and practices; early data indicates improved immediate and long term outcomes.

Sponsored by a grant from Glaxo Wellcome

F04

MODULATION OF CARDIOVASCULAR RESPONSES TO MUSCLE CONTRACTION BY ACTIVATION OF 5-HT_{1A} RECEPTORS IN THE VENTROLATERAL MEDULLA. D.C. Carangi, R.J. DiGiaccio, D.J. Mokler, D. Koester, A. Ally, Univ. New England, Coll. of Osteopathic Med., Depts. of Pharmacology/Biochemistry/Anatomy, Biddeford, ME 04005.

Static muscle contraction, a form of exercise, evokes reflex increases in mean arterial pressure (MAP) and heart rate (HR) in both conscious and anesthetized animals, including human. Activation of various neural mechanisms in the ventrolateral medulla (VLM) have been shown to modulate these cardiovascular responses. The present study determined the effects of administering 8-hydroxy-2-(di-N-propylamine) tetralin (8-OH-DPAT, a 5-HT_{1A} subtype of serotonin receptor agonist) into the VLM on the cardiovascular responses elicited during static contraction of the triceps surae muscle using chloral hydrate-anesthetized Sprague Dawley rats. A microdialysis probe was inserted into the VLM at coordinates AP:-2.2; L:+1.9; H:-2.6 with respect to the calamus scriptorius, ipsilateral to the muscle being contracted using a stereotaxic guide. Static muscle contraction, evoked by stimulation of the tibial nerve at 3 X motor threshold, 0.1 msec duration, and 40 Hz frequency for 30 sec, increased MAP and HR by 25±3 mmHg and 24±4 bpm, respectively. The developed tension during muscle contraction was 299±35 g (n=10). Microdialysis of 8-OH-DPAT (10 mM) for 40 min did not affect baseline values of MAP or HR. However, 8-OH-DPAT attenuated the contraction-evoked changes in MAP (8±2 mmHg) and HR (11±5 bpm), without a change in the developed tension (292±30 g). In contrast, microdialyzing a 1 mM concentration of 8-OH-DPAT had no attenuating effects on MAP or HR despite similar developed tensions (n=5). Prior administration of an equimolar concentration of NAN-190, the 5-HT_{1A} receptor antagonist, blocked the attenuating effects of subsequent microdialysis of 8-OH-DPAT (n=5). These results suggest that activation of 5-HT_{1A} receptors within the VLM can inhibit the pressor and heart rate responses elicited during static muscle contraction. Furthermore, it appears that the 5-HT_{1A} receptors, which are blocked by the 10 mM dose of NAN-190, do not have a tonic influence on HR and blood pressure. Also, the 5-HT_{1A} receptors have no tonic effect on the neurons mediating cardiovascular responses during muscle contraction. (Supported by a 1995-1996 Burroughs-Wellcome/AOA fellowship)

F05

STIMULUS AMPLITUDE AND NMDA RECEPTOR ANTAGONIST EFFECTS ON HINDLIMB FLEXION IN THE RAT. E. Reiner, M.S. and B.J. Winterson, Ph.D., UNECOM, Dept. Physiol., Biddeford, ME 04005

Somatic dysfunction may arise from prolonged noxious stimulation. Properties of the flexion reflex in rat has been used as a model of somatic dysfunction. A matrix method (2X2) to evaluate components of the flexion reflex is investigated. Pentobarbital anesthetized female Long-Evans rats (225-275g) transected at T6-T7 had wound clips applied midshank of one hindlimb. A stereotaxic frame stabilized the hips and the foot was secured to a force transducer. A constant current stimulator was connected to the wound clips. The constant current stimulator and force transducer (for data acquisition) were computer controlled via an A/D board. The protocol was as follows: determining threshold, stimulating at the critical current (7ms, 100Hz, 2X or 3XT, duration: 30 sec), infusing saline (control) or MK-801(3mg/kg) into the 'test' animals, and stimulating a second time with the same parameters. Data from the second stimulation were subtracted from the corresponding points from the first (or baseline) stimulation. Temporal and amplitude trends were evaluated with an the 2X2 array:

$$P_i = \sum_{j=1}^2 C_{ij} f_j \quad i=1,2$$

where: P_i represents a sum of effects, C_{ij} represents the flexion reflex, a function, subscript i represents the stimulation amplitude, and subscript j represents infusion medium. The evaluation of such a matrix model may be applied to other interactions within this system and should prove to be beneficial in assessment and interpretation the effects of prolonged stimulation and neurotransmitter effects.

(supported by Burrough's Wellcome Fellowship F95-11)

F06

EXTRAHYPOTHALAMIC REGULATION OF VASOPRESSIN BY STEROIDS. R.D. Dickerman, N.Y. Zachariah, Ph.D., T. Fungwe, Ph.D., and W.J. McConathy, Ph.D. Departments of Biochemistry and Medicine, University of North Texas Health Science Center, Fort Worth, TX, 76107.

Age-related decline of systemic sex hormones and sex differences in aging brain documented by MRI, suggest age-related changes in neuronal systems may be due in part to changes in the hormonal milieu. The objective of this study was to relate sex hormone levels to neuronal function and behavior. In the rat, vasopressinergic neurons are responsible for many of the behavioral and neurophysiological functions that are impaired in aging. Vasopressin (VP) and VP mRNA in rat neurons show decline in senescence. Testosterone (T) reverses the senescent decline in VP mRNA in rats. Thus, we measured systemic VP and T by RIA in elderly males, athletes with elevated T levels and an age-matched control group with normal T levels; and administered a Beck depression inventory to the athletes. While T levels were significantly different between the groups, VP levels were not. In the athletes, T demonstrated a significant correlation with the Beck depression score (r = -0.85, p < 0.0001). Lastly, we incubated a human tetracarboxinoma cell line of neurons (hNT, Stratagene) with T, dihydrotestosterone (DHT), and estrogen (E) and quantitated VP in the media. An increase of neuronal protein synthesis by ³⁵S-methionine labeling with DHT and T stimulation was accompanied by elevations in vasopressin secretion. Secretion in E treated neurons paralleled controls. Thus androgens regulate VP secretion at the neuronal level and could be associated with subsequent behavioral alterations. Supported in part by a Glaxo Wellcome Fellowship and Stratagene.

THE EFFECTS OF OSTEOPATHIC MANIPULATION IN THE TREATMENT OF CARPAL TUNNEL SYNDROME

K. Ramey DO, R. Kappler DO, FAO, J. Hohner DO, A. Mizera DO; C.O.R.E.D., CCOM, Midwestern University, Downers Grove, IL, 60515

The initial pilot study examined the effects of osteopathic manipulation on nerve conduction parameters in a patient group meeting the electrodiagnostic criteria for Carpal Tunnel Syndrome. Changes in nerve conduction studies (NCVs) were correlated with changes in pain ratings, wrist measurements, thermograms and somatic dysfunction information. Five patients (3 males, 2 females) were diagnosed as having Carpal Tunnel Syndrome using NCVs. These tests were initially performed one week before the first treatment and were repeated one week after the fourth treatment and one week after the sixth treatment. Each patient received a total of six osteopathic treatments. The numeric data was compared and contrasted using t-test statistics. Significance probabilities of $P < 0.05$ were computed. Statistically significant changes were noted in the sensory conduction velocities, which increased from 36.5 to 50.4M/S. It was noted that changes in nerve conduction studies do not correlate to the degree of patient disability. Three patients had improvements in both hand symptoms and nerve conduction parameters. One patient had an improvement in hand symptoms but no significant changes in nerve conduction parameters. One patient had no changes in hand symptoms but significant changes in nerve conduction parameters. Subjectively, four patients responded to the treatments and one did not. Important clinical observations were made. All five patients had a predominance of acute changes in the upper thoracics and upper ribs. Most patients had tension in the flexor muscles of the forearm. The second study incorporates wrist MRI measurements into the above protocol. We are attempting to use MRI images to assess changes in fluid content in both the carpal tunnel and median nerve after OM treatment. Seven patients are enrolled in the study. Data is undergoing analysis.

SECOND MESSENGER STIMULATION IN CULTURED PORCINE SPINAL ARACHNOID CELLS.

M.T. Taylor, D.O./Ph.D. and E.L. Orr, Ph.D., University of North Texas Health Science Center, Department of Anatomy and Cell Biology, Fort Worth, Texas 76107.

In vivo, structural and biochemical interactions between arachnoid cells form the basis of the CSF-blood barrier which separates the CSF in the subarachnoid space from the blood vessels and sinuses of the dura mater. Using our recently developed methods to isolate and culture porcine spinal arachnoid cells in vitro, we have initiated a series of studies to assess the types of receptor and second messenger systems expressed in arachnoid cells that may be involved in regulating the permeability of the CSF-blood barrier. Agonist mediated activation of phospholipase C (PLC) was measured by monitoring the conversion of 3H-myo-inositol to 3H-inositol phosphates. Adenylate cyclase (AC) activity was measured by preincubating the cells in 3H-adenine to form 3H-ATP. Basal and agonist induced conversion of 3H-ATP into 3H-cyclic AMP were then measured. Carbachol and histamine concentration-dependently stimulated PLC at EC50s of 34 μ M and 11 μ M, respectively. The effect of carbachol was dose dependently inhibited with atropine. The histamine effect was inhibited by H1-receptor antagonists, but was unaffected by H2-receptor antagonists. Arachnoid AC activity was concentration-dependently stimulated by forskolin and prostaglandin D2. Histamine did not stimulate AC activity, indicating that H2-receptors were not present on porcine arachnoid cells. In fact, histamine inhibited the stimulation of arachnoid AC by forskolin and prostaglandin D2. These receptors may be involved in regulating the arachnoid cell dependent permeability of the CSF-blood barrier.

(Supported by a Bourroughs Wellcome Osteopathic Research Fellowship and a grant from the National Multiple Sclerosis Society)

*1995 Glaxo Wellcome Fellow Abstract published in August 1995 JAOA but not presented.

MOTOR UNIT RECRUITMENT DURING ECCENTRIC

CONTRACTION. J.N. Howell, Ph.D., A.J. Fuglevand, Ph.D., M.L. Walsh and B. Bigland-Ritchie Ohio Univ. Col. of Osteopath. Med., Athens, OH 45701 and The John B. Pierce Lab., New Haven, CT 06519.

The purpose of the study was to compare motor unit recruitment patterns during eccentric contraction with the well-established patterns during isometric and concentric contractions. With intramuscular, fine wire electrodes we examined firing patterns of 21 motor units of the 1st dorsal interosseus muscle (FDI) in humans during isotonic shortening-lengthening cycles (load = 2% of max. voluntary force). For details see Howell et al., J. Neurophysiol. 74:901, 1995. 18 units were recruited during muscle shortening, i.e., during the concentric phase. Their discharge rates increased as shortening progressed and decreased during muscle lengthening, i.e., during the eccentric phase. This pattern is consistent with that described for isometric and concentric contractions. A different pattern was observed in 3 units, which had relatively high isometric thresholds. These units were recruited during the eccentric phase, at a time when other units were decreasing their discharge rates or falling silent altogether. This pattern resembles that reported by Nardone et al., 1989 in the triceps surae during eccentric contraction and suggests the existence of synaptic distributions within the cord which permit the nervous system to activate certain motor units selectively for eccentric contraction. The reason for this selective activation of higher threshold units during eccentric contraction is not known. This pattern may, however, account for the apparent decrease in precision of motor control during eccentric compared to concentric activity.

RESPONSES OF STRETCH AND HOFFMANN REFLEXES TO INITIAL MUSCLE LENGTH AND TO THE JENDRASSIK

MANEUVER. J.N. Howell and R.R. Conatser, Somatic Dysfunction Research Laboratory, Ohio University College of Osteopathic Medicine, Athens, OH 45701

Korr hypothesized that the effectiveness of osteopathic manipulation in treating somatic dysfunction may result from alteration of the stretch reflex (JAOA, 74: 638, 1975). In developing the necessary expertise for quantitative characterization of the stretch reflex in order to test Korr's hypothesis, we have assessed the responses of both the mechanically-induced stretch reflex (SR) and the so-called Hoffmann, or electrically-induced, reflex (HR) to changes in muscle length and to the Jendrassik maneuver. The SR was induced in the triceps surae by quick (40 msec) dorsiflexion (5°) of the foot. The HR was induced by stimulation of the tibial nerve in the popliteal fossa. Subjects were seated in the same apparatus for both measurements, with the knee at 130° and the ankle at 90°. Alteration of the initial ankle angle in the direction of plantar flexion from 90° to 120° caused a progressive decrease of the evoked electrical response of the soleus to quick stretch, measured as the area under the curve of the rectified electrically recorded response. The HR was unaffected by ankle angle, i.e., by muscle length. In the Jendrassik maneuver experiments subjects squeezed a tennis ball. EMG output of the finger flexors was used to assess the degree of effort. Increasing the Jendrassik effort increased the reflex response to stretch, but not to tibial nerve stimulation. Had the changes in the reflex responses resulted from changes in motoneuron sensitivity, one would have expected to see changes in both the mechanically and electrically evoked responses. The responses to altered muscle length are likely to result from mechanical stretching of the spindles; the responses to the Jendrassik maneuver may result from altered spindle sensitivity associated with γ -motor activity, but direct evidence in support of this is lacking. (Supported by AOA Grant 93-08-069)

003*

EFFECT OF IN VIVO *ESCHERICHIA COLI* LIPOPOLYSACCHARIDE ADMINISTRATION ON CYCLOOXYGENASE-2 EXPRESSION IN RAT ALVEOLAR MACROPHAGES. E.C. Hedlund, E. Presto, S. Brenic, J.D. Peuler, K. Ramsey, K.B. Glaser and A.M.S. Mayer. Department of Pharmacology, Midwestern University, Downers Grove, IL 60515.

The *in vitro* response of alveolar macrophages (AMΦ) to bacterial lipopolysaccharide (LPS) has been reported to lead to release and metabolism of arachidonic acid, enhanced synthesis of prostaglandin E_2 , and expression of the inducible isoform of cyclooxygenase (COX-2). The purpose of the current investigation was to determine the effect of an intravenous (i.v.) LPS challenge on AMΦ COX-2 expression. Sprague-Dawley rats (300-400 g) received a bolus i.v. injection of *Escherichia coli* LPS (1mg/kg) or saline via either the penile vein in ether anesthetized rats or through previously implanted femoral vein catheters in conscious rats. LPS responses on blood leukocyte counts and plasma tumor necrosis factor- α (TNF- α) levels were assessed at several time points following the i.v. LPS administration. Thereafter, AMΦ were isolated by lung lavage and expression of COX-2 was measured by gel electrophoresis and western blotting. Both plasma TNF- α levels and blood leukocyte kinetics demonstrated a response indicative of a biologically active LPS preparation. Western blotting of AMΦ showed an enhanced expression of COX-2 3-4 h post i.v. LPS. An unexpectedly sustained COX-2 expression was observed in catheterized rats in the absence of LPS. Our findings appear to suggest that both the i.v. LPS administration as well as the implanted catheter may lead to AMΦ COX-2 expression. These *in vivo* observations could possibly influence the design of therapeutic approaches for treatment of the adult respiratory distress syndrome resulting from bacterial sepsis and/or endotoxemia. Supported by Midwestern University.

004

MECHANISM OF ACID SECRETION IN THE DISTAL RENAL TUBULE: ALKALOSIS INHIBITS THE PROPOSED H/K EXCHANGE ATPase. S. J. Youmans, Ph.D., New York College of Osteopathic Medicine, Division of Preclinical Medical Education, Old Westbury, NY 11568.

Acid secretion by the terminal renal tubule has a component which requires potassium and is highly sensitive to inhibition by the vanadate ion, and which coworkers and I have ascribed to an H/K exchange ATPase (Biochem Biophys Res Comm 176:1285). In the present experiments a model of the collecting duct was employed, the urinary bladder of freshwater turtles, and the animals' acid-base status was manipulated to determine the effect on the acid-secretory apparatus. Turtles were made alkalotic or not with 40 mmol NaHCO_3 (ALK) or NaCl (control) per day for 3 days. On day 4, alkali-loading had elevated the blood pH by 0.38 units (7.81 ± 0.03 ALK vs 7.43 ± 0.08 control, $n=6$; $p<.005$) and the urine pH by 2.46 units (7.56 ± 0.14 vs 5.10 ± 0.49 ; $p<.001$). Cell membranes then were isolated from the bladder epithelium and suspended in a KCl buffer containing a K^+ ionophore (valinomycin) and a pH-sensitive fluorescent dye (acridine orange, AO). When baseline fluorescence became stable, ATP was added, and a progressive quenching of AO fluorescence was seen. This is consistent with sealed membrane vesicles becoming inside-acid in the presence of ATP. In controls, vanadate (10^{-5} M Na_3VO_4) reduced the initial rate of fluorescence quenching, Vo , and the maximum degree of quenching, Q_{max} (respectively, $-24 \pm 2\%$, $p<.01$; and $-29 \pm 3\%$, $p<.02$; $n=3$). In contrast, in membranes from ALK turtles, vanadate had little effect on Vo ($-6 \pm 3\%$, $p<.005$) and no effect on Q_{max} ($0.4 \pm 4.5\%$, $n=3$, $p>.9$). Thus, membranes from ALK animals had lost virtually all vanadate-sensitive H^+ transport ($p<.005$, Vo or Q_{max} , NaHCO_3 - vs NaCl-loaded). In contrast, vanadate-insensitive H^+ transport, present in both control and ALK membranes, was not decreased by alkalosis ($p>.6$). The results fit a model in which (1) both a vanadate-sensitive H/K exchange ATPase and a vanadate-insensitive H^+ uniport ATPase acidify the distal urine and (2) in alkalosis, are inactivated by removal from the apical membrane into separate populations of cytoplasmic vesicles. We also suggest that the vanadate-sensitive transport of H^+ serves as a marker of the actively H^+ -secreting cells.

005*

Experimental Replacement Of Thoracic Aorta With Inverted Autologous Jejunal Grafts

C. E. Selgrath, M.S. II, G. J. Lynch, D.O., C.H. Green, Ph.D., with the support of the P.C.O.M. Cardiovascular Surgery Research Team; Physiology Department; Philadelphia College of Osteopathic Medicine; Philadelphia, PA. 19131

Although great progress has been made in the development of vascular graft materials, infection of arterial prosthetic grafts and lack of autologous vein and/or arterial replacement continue to be two significant complications of vascular surgery. The focus of this research is concerned with the clinical presentation of a thoracic aortic aneurysm that cannot be repaired with a conventional prosthetic graft or has become infected. We are investigating the use of inverted autologous jejunum as a biological graft for the repair of the aortic tissue.

Three-way crossed adolescent pigs were chosen as the animal model because its heart and major blood vessels are analogous in anatomic and histologic structure to the human case and it also allows for excellent growth parameters to be measured.

The animals were pre-operatively fasted, pre-anesthetized, intubated, and maintained using gas anesthesia. A midline incision was made in the abdomen and a 10 cm piece of jejunum was isolated and the abdomen was closed. A chest incision was made at the 5th intercostal space and the thoracic aorta was exposed 3 cm distal to the left subclavian artery. The jejunal graft was inverted, made isodiametric with the thoracic aorta, and soaked in 10% Neomycin. The aorta was cross-clamped, the inverted jejunal graft was sewn into the site, the aorta was unclamped, and the chest was closed. Blood gas analysis and vital signs were monitored throughout the procedure and the graft was monitored using femoral pulse palpation and a Doppler stethoscope post-operatively.

The surgical complications have been reduced so that the entire protocol can be carried out in a timely fashion. The next objective will be to maintain the viability of the model so that the maturation of the graft can be observed using both histological and physiological techniques.

006*

ISOLATION AND CHARACTERIZATION OF HIGH MOLECULAR WEIGHT INTRACELLULAR VITAMIN E BINDING LIPOPROTEINS FROM HEART AND ERYTHROCYTES. Kenneth G. Judson, Jr., B.S., Kevin A. Thomas, B.S., Renee C. Peters, B.S., Elliott Berlin, Ph.D., and Melanie A. Banks, Ph.D., Biochemistry Department, Lake Erie College of Osteopathic Medicine, Erie, PA, 16509 and Beltsville Human Nutrition Research Center, ARS, USDA, Beltsville, MD, 20705

Vitamin E is emerging as an increasingly important antioxidant nutrient which affords protection against many chronic diseases including cardiovascular disease and cancer; hence it has become important to understand how it becomes available intracellularly. We have isolated, purified, and partially characterized high molecular weight vitamin E binding proteins from rat and pig heart and rat and human erythrocytes. Vitamin E is known to be transported in the circulation by HDL and LDL. Lower molecular weight (15kD and 30kD) intracellular vitamin E binding proteins have been isolated and purified from heart and liver, with the liver 30kD species functioning to package vitamin E into VLDL. However, those proteins were isolated using sulfhydryl reducing agents which are known to disrupt protein structure; hence they may not represent the physiologically functional native proteins. We are reporting on higher molecular weight lipoproteins of intracellular origin as isolated without dithiothreitol and *B*-mercaptoethanol. Fatty acid analyses of these lipoproteins yielded similar composition (C16:0 , C18:0 , C18:1w9 , C18:2w6 and C20:4w6) regardless of species or tissue origin. The isolated proteins exhibited approximate molecular weights of 100-300kD by gel exclusion chromatography with Sephadex G-200. SDS-PAGE using *B*-mercaptoethanol indicated similar subunit composition for both the intact and delipidated proteins with subunits of 160kD, 140kD, 100kD, 66kD, 50-60kD, 30kD and 25kD present in most species and tissues. Further investigation of the ability of these proteins to transfer vitamin E between subcellular organelles is in progress.

*Presentation for student prize competition.

STUDENT EVALUATION OF BIOCHEMISTRY CASE WORKSHOPS (WKS) AT LAKE ERIE COLLEGE OF OSTEOPATHIC MEDICINE. R.C. Sexton, Ph.D., R.T. Dowell, Ph.D., M.R. Nassiri, D.Sc., M. Hourigan, Ph.D., and A.S. Stano, Ph.D. Lake Erie College of Osteopathic Medicine. Division of Biochemistry & Molecular Genetics, Erie, PA 16509.

OBJECTIVE: This study examined the pros and cons of biochemistry case WKS from a student perspective, and considered whether gender influenced their liking of the case method of learning biochemical principles. **METHODS:** Seventy-five students (55 males, 20 females) were randomly divided into 3 large groups of 25, each with a facilitator. The large groups were further divided into smaller discussion groups of 5 students. The small groups were responsible for developing answers to the case questions. The large groups were responsible for developing a final concept map. After four case presentations, a survey was distributed. **RESULTS:** A total of 60% of the class responded (65% male, 45% female). Most students (75%) enjoyed the WKS, yet only 53% wanted more WKS in the curriculum. Most students (84%) thought the WKS helped integrate biochemical principles into the clinical setting. More females (89%) than males (67%) preferred to learn biochemical principles using the case WKS method. Females (100%) indicated no gender bias was expressed by other students or facilitators and that facilitators were readily available, whereas, males (6%) noted some bias by other students and only 64% felt facilitators were available. No gender difference was noted in regards to small group participation. There was a strong gender difference among students who took a leadership role in developing required concepts maps in front of the large group, males (29%) females (13%). **CONCLUSIONS:** (1) Most students preferred the case methods of studying biochemistry to that of the lecture. (2) Most students reported an enhanced understanding of the integrated concepts of biochemistry in a case setting. (3) Males tend to be more active than females in leading large group presentations but not necessarily leading small group discussions.

NUTRITION EDUCATION AT LECOM. Melanie A. Banks, Ph.D., C.N.S., Yasmin Mughal, R.D., Dawna T. Mughal, Ph.D., R.D., F.A.D.A. and Russell C. Sexton, Ph.D. Lake Erie College of Osteopathic Medicine, Erie, PA 16509 and Gannon University, Erie, PA 16541.

Nutrition is an integral part of preventive medicine and it is particularly relevant to osteopathic medicine, yet the adequacy of nutrition education in medical schools continues to be questioned. The American Society for Clinical Nutrition has recommended that 25 hours of instruction in basic and clinical nutrition be offered to physicians in undergraduate training. Recommended "essential" topics include: basic nutrition, nutrition through the life cycle and nutrition and disease, as well as related topics. LECOM has followed these guidelines and has established such a nutrition course. We evaluated medical student satisfaction with the course, which was presented in the 2nd year Gastrointestinal System curriculum. A short (12 questions; 1=Strongly Agree to 5=Strongly Disagree) survey was administered to the students after completion of the course. Results (36 responses) indicate increased awareness of the importance of nutrition in medicine (1.69/5.0), increased appreciation for the role of nutrition in disease prevention (1.81/5.0), enhanced understanding of the necessity of individualized dietary treatment by an appropriately trained nutritionist (1.86/5.0), and increased appreciation for the role of the Registered Dietitian as an active member of the health care team (2.08/5.0). To a lesser extent, students also indicated that their participation in a Nutrition Assessment laboratory (anthropometrics, diet analysis and mock counseling session) increased their understanding of patients' potential difficulties in adhering to dietary advice (2.30/5.0) and was of value to them as individuals (2.53/5.0). Fifty percent considered a dietitian, 27.8% a nutrition scientist, and 11.1% a physician, the most appropriate individual to teach applied nutrition. We conclude that student satisfaction with the didactic part of the course is relatively high but that obtaining personal nutrition and health information was less relevant to the students. Opinions are divided on the type perceived best nutrition educator.

COMMUNITY HEALTH FAIRS AS CLINICAL TRAINING FOR SOPHOMORE MEDICAL STUDENTS. Patricia M. Hudgins, Ph.D., Barbara Thymius, R.N. and Craig Boisvert, D.O., West Virginia School of Osteopathic Medicine, Lewisburg WV 24901

For several years we have offered a free women's health screening clinic to provide medical students with an opportunity to perform history and physical examinations on live patients. This fall we offered a free men's health screening clinic for the first time. The fairs are part of our course in physical diagnosis. Lecture and laboratory instruction precede the fairs. Newspaper advertisements are placed ahead of time and clinic appointments are scheduled on a first come basis eight patients/hour on a Saturday from 8 a.m. to 3 p.m. A waiting list is used to replace missed appointments. Six interview and six examination rooms are used. Students are assigned to a patient whom they interview and examine under close supervision by a faculty physician and clinic nurse. They measure blood pressure, height, and weight. Women receive a pap smear, manual breast examination and digital rectal examination (DRE). Men receive a testicular examination, DRE and are examined for inguinal hernia. Blood is drawn by the student for prostate specific antigen (PSA) determination. This year abnormal pap smears were reported in 56% of women (33/59) and manual breast examination detected a mass in 15%. These women were referred to their family physician for follow-up. Eligible women had free mammography via the WV Breast and Cervical Cancer Early Detection Program. Twelve men (23%) had abnormal DREs, none of these had elevated PSA. Two men had elevated PSA at 4.8 and 5.2 mg/ml, respectively. All these men were referred to a urologist. The health fairs are well accepted by the community and by our medical students. We believe it is an important opportunity to expand prevention education and service in the community. Demographic analysis of patient data suggests to us that education in risk factor reduction should be incorporated into future health fairs.

ASSESSMENT OF ATTITUDES OF GRADUATING OSTEOPATHIC MEDICAL STUDENTS

H. H. Baker, Ph.D.; M. K. Cope, Ph.D.; A. Hassen, Ph.D.; M. A. Wager, D.O.; and K. M. Steele, D.O.
West Virginia School of Osteopathic Medicine (WVSOM)
400 N. Lee Street, Lewisburg, WV, 24901

WVSOM conducts an on-going assessment program. As part of this program, graduating seniors complete an anonymous survey of attitudes toward the osteopathic profession and clinical practice. In May 1995, 49 of 58 WVSOM graduating seniors (84%) returned the survey, which included 18 statements which students were asked to rate on a five point scale, from "Strongly Agree" to "Strongly Disagree." The percentage indicating that they "agreed" or "strongly agreed" for representative items is given below.

Primary care: "Family Physicians should be recognized as the most important component of the US Health Care Delivery System," - 72% agreed or strongly agreed; "There is a critical need in this country for more primary care physicians" - 89%; "Physicians who go into primary care tend to be less capable than physicians who go into other specialties" - 9%.

Osteopathic profession: "Use of OMT (osteopathic manipulative treatment) will enhance my practice" - 61% agreed or strongly agreed; "Manipulative therapy has been validated by clinical results achieved over many years of use" - 69%; "It is important for the osteopathic profession to maintain its distinctiveness ..." - 39%; "Overall, the value of OMT is limited ..." - 10%.

Results suggest that graduating students support both primary care and osteopathic principles, but that enhancements may still be needed in some areas of the curriculum.

Clinical Sciences

011

CRANIOSACRAL MANIPULATION AND TOUCH INDUCE AUTONOMICALLY MEDIATED CARDIOPULMONARY RESPONSES: PRELIMINARY REPORT.

HJ Robbins, DO^{1,2}, S Reisman, PhD³, AM Davis, MD^{1,2,4}, TW Findley, MD PhD³, Univ. of Medicine & Dentistry of NJ: ¹Dept. of Phys. Med. & Rehab., ²Dept. of Neurosciences, ³Neuromuscular Inst.-School of Osteopathic Medicine; ⁴Kessler Inst. for Rehabilitation; ⁵NJ Inst. of Technology. ¹² Newark, NJ 07103; ³Stratford, NJ 08084; ⁴West Orange, NJ 07052.

While manual therapies promote relaxation, distinguishing treatment results from placebo effects remains a challenge. Osteopathic manipulation practitioners empirically link relaxation responses to maneuvers such as "compression of the fourth [cerebral] ventricle" (CV4) and sacral mobilization. In particular, CV4 advocates maintain that gentle, sustained occiputotemporal compression alters cerebrospinal fluid circulation through the fourth ventricle so as to influence brainstem regulatory centers and augment vagal tone. The purpose of this study is to verify whether clinical responses, such as deepened respiration and slowed heart rate, can be documented using autonomic analytic methods. We hypothesize: (1) CV4 and certain other manipulations increase parasympathetic activity; (2) effects can be quantified using time frequency analysis (TFA) of heart rate variability and ventilatory variability.

Five healthy volunteers (mean age 31.6 yrs, range 26-36; 3 male, 2 female) were recruited. Before testing, each participant trained to take 10 paced breaths per minute throughout a 30-min. (48-min. for one subject) session. Surface electrocardiography and pneumographic impedance signals were recorded continuously. The protocol was single-subject design, alternating timed periods of not touching with touching the cranium (CV4), sacrum (mobilization with iliac bridging), or shoulders ("sham" deltoid squeezing). Confounding factors were minimized by randomizing tactile intervention sites and performing regional light palpation before and after manipulation. Normalized high frequency (nHF, 0.15-0.40Hz) and low frequency (nLF, 0.03-0.15Hz) TFA were plotted against event times to quantify parasympathetic and mixed autonomic responses, respectively. Prolonged rise of nHF occurred during 5 of 5 sacral, 4 of 5 cranial, and 1 of 5 shoulder interventions. Because longer nontactile periods more clearly demonstrate return to baseline activity, subsequent sessions will last 48 minutes for new and retested subjects. Thus, preliminary findings corroborate parasympathetic responsiveness to craniocervical manipulation.

013

CURRENT PRACTICE PATTERNS AMONG PRIMARY CARE PHYSICIANS IN MANAGEMENT OF BENIGN PROSTATIC HYPERPLASIA AND PROSTATE CANCER SCREENING

A Fawzy, MD, C Fontenot, MD, MM Baudier, MD, R Guthrie, MD, R Siegel, MD

Louisiana State University Medical Center, Department of Urology New Orleans, LA 70112

Our objective was to establish practice patterns among primary care physicians (PCPs) in treating benign prostatic hyperplasia (BPH), usage of the American Urological Association (AUA) symptom score and prostate cancer screening. We distributed surveys to PCPs attending national and regional medical meetings.

Survey responses were received from 344 PCPs. Overall, 34% of PCPs treat $\geq 60\%$ of their patients with symptomatic BPH, with 68% of PCPs referring $\leq 40\%$ to urologists. Approximately 61% said they are aware of the AUA symptom score, although only 58% of these are currently using it. For PCPs treating BPH, treatment options include long-acting alpha blockers (68%), watchful waiting (44%) and finasteride (24%). In men >50 years old, digital rectal examination (DRE) is performed routinely by 84% of PCPs, and annual serum prostate specific antigen (PSA) measurement is routinely requested by 69%. If not routinely ordered, PSA is indicated by abnormal DRE (88%), patient request (74%), urinary symptoms in men >50 years old (68%), family history of prostate cancer (68%) and African Americans >40 years old (17%).

A significant percentage of men with BPH symptoms presenting to a PCP are treated initially by the PCP. Alpha blockers and watchful waiting are the most common treatment for BPH. Although the majority of PCPs are aware of the AUA symptom score, it is not being widely used at present. Most PCPs perform routine DREs and PSAs. Practice patterns of prostate cancer screening are generally consistent with current AUA recommendations, with the exception of African Americans >40 years old.

012

The Effect of Smokeless Tobacco on Taste Thresholds

C.H. Greene, Ph.D., Sarinia Michaelson and Mary Mazel, B.S.

Department of Physiology and Pharmacology, Philadelphia College of Osteopathic Medicine, Philadelphia, PA. 19131

The purpose of this pilot study is to determine if smokeless tobacco adversely affects taste thresholds as does smoking tobacco, when measured using electrogustometry. Many users incorrectly judge smokeless tobacco to be a healthier alternative to smoked forms of tobacco. Human volunteers were selected from our medical school student, faculty, and employee populations as the subjects for this study. The subjects are assigned to one of three experimental groups on the basis of their case history: Group 1. Smokeless Tobacco users; Group 2. Smoked and smokeless tobacco users; 3. Control subjects matched by age and sex who have never used either smoked or smokeless tobacco. The total number of subjects will be 40/group at the completion of the study. This report is based upon the analysis of 7 subjects in Groups 1 and 7 subjects in group 3. The types of smokeless tobacco used include Plug, twist, and moist snuff. All used the oral method of administration rather than olfactory snuffing. The electrogustometer provides numerical data which was statistically compared using a two-way factor analysis of variance.

Each of the four quadrants of the dorsal surface of the tongue was tested sequentially. Results obtained from quadrant 1 in both groups were statistically significant at the 5% level of probability and trends were noted for quadrants 3 and 4 (probabilities more than 5% but less than 10%). It is anticipated that additional subjects added to these groups will confirm the significance of these trends. Future analyses include the comparison of the these results to the anatomic site of tobacco placement in the mouth.

014*

ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: INCIDENCE, DIAGNOSIS AND TREATMENT PRACTICES AMONG OSTEOPATHIC PEDIATRICIANS

F.J. Condon, D.O.*, R. A. Mapes, D.O., J.A. Aldrich, D.O.
Kirkville College of Osteopathic Medicine, Department of Pediatric and Adolescent Medicine, Kirkville, Mo. 63501.

The objective of this study was to ascertain the incidence, methods of diagnosis, and treatment practices of Attention-Deficit/Hyperactivity Disorder (ADHD) among osteopathic pediatricians. To this end members of the American College of Osteopathic Pediatricians were surveyed, by mail, in order to obtain this data.

Of the 264 questionnaires initially sent out 158 were returned for an overall response rate of 60%. The 158 respondents included 82 pediatricians that were still in practice, and had adequately filled out the questionnaires. These 82 would constitute the study group. The patient population seen by the study group represented a total of 131,375 patients in an average practice size of 4,406. One hundred percent of these physicians regularly saw children diagnosed with ADHD in the previous twelve months. In excess of ninety-nine percent of the physicians surveyed treat ADHD children themselves without referring the patients, with the exception of adjunctive counseling and/or psychometric testing. There was a consensus among the pediatricians surveyed that treatment should be multi disciplinary and that there was not a single curative pharmaceutical agent.

Recently anecdotal reports, particularly in the media, suggest that ADHD has been over diagnosed. The data in this study demonstrated that patients with the diagnosis of ADHD represented an average of 3.5% of the practice population. This figure is well within the accepted estimates of an incidence of ADHD nationally of 3-5%. This study also demonstrated that osteopathic pediatricians consistently use adequate means and measures to diagnose their patients who are suspected of being afflicted with ADHD. The respondents were further divided into socioeconomic practice types. The incidence of ADHD in each of these divisions was as follows: Urban pediatric practices 3.7%, Suburban 3.9%, Rural 2.9%.

*Presentation for student prize competition.

The Role of New Oral Antibiotics in Community-Acquired Pneumonia.
M. Reza Nassiri, Jeffrey S. Kushner, and Michael P. Mahalik.
Lake Erie College of Osteopathic Medicine, Erie, Pennsylvania.

In the United States, community-acquired pneumonia (CAP) affects more than two million adults annually. CAP also results in more than 800,000 hospitalizations and about 50,000 fatalities. The mortality rate among patients hospitalized with CAP ranges from 8% to 22%. In the past few years, a generation of new oral antibiotics with broad spectrum of activity has been introduced. This includes the combination of a β -lactam and β -lactamase inhibitor, second and third generation oral cephalosporins, macrolide antibiotics, and fluoroquinolones.

Several multicenter trials showed that the β -lactam antibiotics, amoxicillin-clavulinate, the second and third generation cephalosporins as well as loracarbef, are highly active against most community-acquired lower respiratory tract pathogens. Differences among these agents are slight. These agents are well tolerated; however, they are relatively expensive and also lack activity against many atypical pathogens.

Beneficial properties of clarithromycin and azithromycin include an expanded *in vitro* spectrum of activity and suitable pharmacokinetic parameters that allow less frequent dosing and good oral bioavailability. In comparison to erythromycin, these agents are also better tolerated. Clinical trials of azithromycin and clarithromycin showed that these agents have comparable activities to those of erythromycin. Thus, the major factors for selection among the macrolides are tolerability and cost of treatment in CAP.

The fluoroquinolones appear to be highly active against most community-acquired lower respiratory tract pathogens, including many atypical pathogens.

RESOLUTION OF SCIATICA IN PATIENTS WITH A WORK-RELATED HERNIATED DISC THROUGH A MOO DOE (MARTIAL ART)-BASED PHYSICAL THERAPY PROGRAM. Gregory M. Kisling D.O., Ph.D., William L. Preston M.D. and Patrick B. Massey M.D., Ph.D., ALT-MED and the Alexian Brother's Medical Center, Elk Grove Village, IL 60007

This is a retrospective evaluation of 43 patients with a work-related back injury resulting in at least one herniated lumbar, intervertebral disc and chronic sciatica who enrolled in a Moo Doe-based physical therapy program (ALT-MED). This program was approved by the Investigational Review Board of the Alexian Brother's Medical Center.

43 patients had history, physical findings and MRI consistent with: 1. Work-related back injury. 2. Evidence of at least one herniated disc. 3. Sciatica (pain below the knee). 4. Chronic-failed at least three common medical therapies. The patients practiced between three and seven specific ALT-MED movements for 20-30 minutes each day. The movements were tailored to each individual patient and were upgraded every 3-4 days depending upon the level of improvement. The program lasted 120 days. Compliance with the program was high (97%). 39 patients (91%) had complete resolution (pain free) of the sciatica symptoms and resumed normal work routines. 2 patients had partial resolution and 2 patients opted for other therapy before completion. A weekly, home-based, maintenance program was also implemented after completion.

The movements originate from the Chung Moo Doe style of martial art (Chinese). Daily practice of the movements may accelerate the body's natural healing processes by effectively stimulating circulation, reducing muscle spasm and increasing flexibility and strength. This resulted in the rapid resolution of chronic sciatica pain. These data suggest that this approach is particularly efficacious in chronic sciatica and promote an early return to work.

APPLICATION OF A "DYNAMIC SKULL MODEL" AS A TRAINING TOOL FOR PALPATION OF THE CRI. M.A. Lewandoski, B.S., E. Drasby, B.A., M. Morgan, B.A., R. Dorin, B.S., S. Madonna, B.F.A., M.F. Zanakis, Ph.D. NY Coll. Osteo. Med., Depts. Biomech. & Bioengin., Physiology & Neurosci., Old Westbury, NY 11568.

The aim of this study was to determine the effectiveness of a Dynamic Skull Model (DSM) as a tool for training students to palpate the human Cranial Rhythmic Impulse (CRI). Freshman medical students, all of which were untrained in cranial palpation, were randomly divided into 2 groups; Group T (trained with the DSM) and Group U (untrained with the DSM).

All students were trained in the vault hold technique. Group U palpated a plastic skull for 10 minutes. Group T was also trained for 10 min., but instead used the DSM. For the first 5 min. the DSM was adjusted to move at high (500 μ) amplitude. For the next 5 min. it was set at low (220 μ) amplitude. Both amplitudes were set at 10cpm. Visual cues for maximum flexion were always provided, except during the second half of the low amplitude trial.

All students then palpated the CRI of a volunteer for 30 seconds, while reporting maximal flexion with a foot switch. Simultaneously, a computer-based kinematic system (JAOA, 1995, 95(8):016,017) monitored the actual motion of the volunteer's cranial bones. Accuracy and mean decisional delay time (DDT) of each student was determined.

The results showed that mean DDT in the trained group was approximately half (ie., less delay) that of the untrained group. Furthermore, the trained group was approximately twice as accurate in discerning CRIs compared to the untrained group. These data strongly support the use of the DSM as a learning tool for palpating the small amplitude motions associated with cranial mobility.

DESIGN & DEVELOPMENT OF A "DYNAMIC SKULL MODEL" FOR TRAINING STUDENTS IN CRANIAL MANIPULATION: M.A. Lewandoski, B.S., R. Areman, D.C., D. D'Agate, B.S., M.F. Zanakis, Ph.D. NY College Osteopathic Med., Depts. Biomechanics & Bioengineering, Physiology & Neuro, Old Westbury, NY 11568.

The development of a dynamic skull model (DSM) may help to improve performance in detecting the Cranial Rhythmic Impulse (CRI) by untrained medical students. A DSM must meet the following criteria: It must be, 1) silent (free of noise or vibration), 2) reliable (perform consistently over time for uniform flexion/extension), 3) adjustable within the human CRI's range of motion, 4) adjustable for rate, 5) provide physiologic motion similar to human cranial motion (ie, cycles of flexion/extension), and 6) allow the student to palpate the CRI using several different techniques (ie, vault hold or fronto-occipital hold).

Components of the DSM include: 1) 2 piston assemblies arranged perpendicularly inside a plastic skull in sagittal and coronal planes (tolerances +/-1.0 μ), 2) a draw wire assembly powered by a gear-driven motor via braided wires within a conduit to the skull, 3) a motor mounted in a sound-proof container at a remote location, 4) a cue lamp indicating maximal flexion, and a foot switch for one to acknowledge palpation of flexion. Each braided wire will pull to apply tension alternately in coronal or sagittal planes. Adjustment of the DSM's rate and amplitude can be made according to the student's learning abilities. The drive system allows one to hold the DSM in any position.

The prototype DSM provided flexion/extension cycles as shown kinematically (for methods, see JAOA, 1995, 95(8):016,017), with amplitudes ranging between 50-800 μ . After 24 hours of continuous operation, it maintained its preset amplitudes (adjustable in 25 μ increments) and rates (adjustable from 1-15cpm). Dynamometer tests showed no vibration above background. We conclude the prototype DSM is appropriate as a training tool for pilot studies.

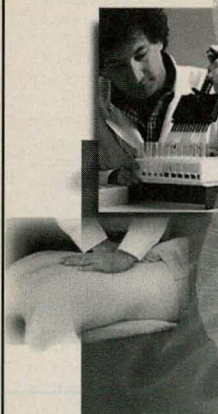
*Presentation for student prize competition.

EXERCISE-INDUCED MUSCLE INJURY: DYNAMICS AND THERAPEUTIC APPROACHES, J.N. Howell, Ph.D., A.G. Chila, D.O., G.C. Chleboun, Ph.D. and R.R. Conatser, M.S., Ohio University College of Osteopathic Medicine, Somatic Dysfunction Research Institute, Athens, OH 45701

Exercise-induced muscle injury can be produced experimentally in humans under uniformly controlled conditions and offers a unique opportunity to study the effects of therapeutic interventions on healing. In four separate studies involving 151 subjects, **no effects** of NSAIDs, therapeutic exercise, ice application, or osteopathic manipulative treatment on soreness, swelling, stiffness, or muscle strength could be detected in the two week recovery period following injury to elbow flexors through a regimen of eccentric exercise. (For experimental details see Howell et al., J. Physiol. 464:183, 1993.) The studies with the NSAIDs, flurbiprofen (0.3 g/day) and ibuprofen (1.6 and 3.2 g/day), were double blind. The two therapeutic exercises were 1) isometric (35% of max. voluntary contraction) and 2) movements through the full range of motion. 3-4 treatments over 2 weeks were provided by two experienced D.O. specialists in manipulation, who were instructed only to treat the subjects as if they were patients presenting with arm soreness. Power analysis indicated that we would have been able to detect intervention-induced changes of 20% or greater in any of the measured variables. Our results, together with other reports in the literature, suggest that the recovery from this type of acute injury is a highly stereotyped process not readily altered by therapeutic intervention. Like the other interventions, NSAIDs, despite their widespread use for postexercise muscle soreness, offered neither accelerated healing nor analgesia. (Funded by AOA Grants 90-08-259, 91-08-259, 93-08-369.)

40th Annual Research Conference

October 7-11, 1996
Las Vegas, Nevada



**Magnetic
Resonance
Imaging and
Osteopathic
Medicine**

*Under the sponsorship of
the Bureau of Research of
the American Osteopathic
Association*

**High Tech/
High Touch**

JAOA

CME quiz discussions

The following discussions relate to the CME quiz appearing in the July 1996 issue of JAOA.

1. (c) Microcalcifications with a mammographically detected dominant mass that was nonpalpable are more likely to be malignant. Lesions that meet this criterion are best followed up with needle-localized breast biopsy to determine their pathologic status.
2. (b) Although microcalcification with a dominant mass is more likely malignant than microcalcification without a dominant mass, this combination is not pathognomonic for malignancy. Eighty percent of lesions with microcalcifications followed up by needle-localized biopsy were histologically benign.
3. (e) Surgical removal is the treatment of choice because there is no effective chemotherapeutic agent for the treatment of eustrongyliidiasis.
4. (a) Eustrongyliidiasis should be included in the differential diagnosis of acute appendicitis.
5. (c) Fifteen percent of patients with chest pain resulting from an acute myocardial infarction will have a reproducible component to their pain. Facilitation of the upper thoracic spinal segments generate motion restrictions and reproducible pain in the corresponding vertebrae and ribs. (Tierney WM, Fitzgerald J, McHenry R: Physicians' estimates of the probability of myocardial infarction in emergency room patients with chest pain. *Med Decis Making* 1986;6:11-19.)
6. (b) False. If the physical examination is medically necessary, offering children a choice of which part they would like only opens the door to conflict and mistrust.
7. (a) True. Words that demystify and provide a sense of security will frequently result in enhanced cooperation.
8. (e) Metaplastic breast carcinoma is often further classified into subgroups of pseudosarcomatous metaplastic lesions, low-grade adenosquamous carcinomas, and spindle cell carcinomas.

(continued on page 496)