

OU-COM Research Day 2006
Poster Titles & Abstracts

(**Bold** = COM Faculty *Italic* = COM Students)

1) **Tympanic pneumaticity in theropod dinosaurs: Recognizing patterns of organization and homology.**

DL Dufeu and LM Witmer

Abstract

The tympanic cavity of theropod dinosaurs (including birds) gives rise to a variety of epithelial diverticula that pneumatize the bones of the braincase and suspensorium. Theropod pneumaticity is not very well understood with regard to its morphological variability and phylogenetic distribution. We present here a preliminary survey of the tympanic cavity of several members of Theropoda and comment upon the possible homologies and organization of the associated pneumatic recesses. Of particular interest are the similarities in the pattern of tympanic pneumaticity between theropod dinosaurs and extant archosaurs, particularly avian taxa. Focal theropod taxa include the abelisaurid *Majungasaurus*, the allosauroids *Acrocanthosaurus* and *Allosaurus*, as well as nonavian coelurosaurs such as tyrannosaurids, oviraptorosaurs, ornithomimids, troodontids, and dromaeosaurids. The main methods include computed X-ray tomography (CT) and 3D visualization of the CT scan data, providing a detailed examination of the pneumatic recesses relative to the tympanic recess, otic labyrinth and brain cavity. Additionally, CT scans of extant taxa allow us insight into soft-tissue associations within and surrounding the pneumatic recesses. Similarities in organization between examined fossils and extant taxa allow us to make statements about the homologies of these pneumatic recesses in a phylogenetic context, and test hypotheses regarding their potential functional role. The rostral tympanic recess is the most widely distributed of the paratympanic sinuses whereas the dorsal tympanic recess may be restricted to coelurosaurian clades.

2) **OU μ CT: The Ohio University MicroCT scanner as a tool for visualization and quantitative analysis of small subjects.**

LM Witmer and RC Ridgely

Abstract

In February 2006, a General Electric eXplore Locus *in vivo* small animal microCT scanner was installed in the Edison Biotechnology Institute at the Konneker Research Labs. It was purchased in connection with the NanoBioTechnology Initiative, which is one of the funded Ohio University Research Priorities. The facility went online in April 2006. The OU μ CT is similar to diagnostic computed tomography (CT or CAT scanners) found in hospitals in using x-rays to digitally and non-invasively explore the structure of subjects by generating serial slices through the subject. But whereas hospital scanners typically use slice thicknesses of 1–5 mm, occasionally using the lower limit of 0.625 mm, the OU μ CT can provide much higher resolution, with slice thicknesses of 27, 45, and 92 μ m (microns, one-millionth of a meter; 0.027, 0.045, and 0.092 mm, respectively) and a greater in-plane (X-Y) resolution. The slices can be re-stacked like a loaf of bread, and thus 3D visualization and analysis is possible and relatively straightforward. Moreover, because the scanning process essentially maps the subject into 3D coordinate space, quantitative analysis of such attributes as linear dimensions, areas, volumes, and bone mineral density is relatively trivial. Although the scanner's gantry accepts objects no larger than 10 cm in diameter, the OU μ CT has already provided data on a range of subjects, ranging from typical lab rats and

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mice to alligator embryos, lobster stomachs, insects, polyurethane foam, and dinosaur skulls. The high dynamic range and flexibility of the scanner allows resolution of not only hard parts like bone, but also different soft-tissue structures such as fat, muscle, and cartilage. Injection of radio-opaque contrast medium allows study of the vascular system. In the five short month since the facility opened, the OU μ CT has supported research in three colleges. The facility has been particularly well used by OUCOM faculty and their labs (e.g., Kohn, Holliday, Kopchick, Li, Malgor, O'Connor, Romoser, Schwartz, Stevens, Witmer), including OUCOM medical students.

3) From Armor to Anchor: Character Evolution in the Skin and Horns of Rhinos.

TL Hieronymus

Abstract

Rhinoceros horns, the bony horns of antelope and cattle, and deer antlers are all similar examples of cranial ornaments on large-bodied herbivores. These structures are all used in display and fighting behaviors that play a role in the breeding and feeding ecology of their bearers. While the timing of horn and antler evolution in antelope and deer has long been held to be related to the spread of grasslands in the Early Miocene (24 – 18 Ma), horn evolution in rhinoceros has been placed much earlier (45-42 Ma), based on interpretations of the morphology of fossil rhinos. New data on the anatomy of horn attachment in living rhinoceros allows more detailed reconstructions of skin anatomy, revealing a stepwise evolution of rhinoceros horns. New reconstructions place the evolution of rhinoceros horns in the Late Oligocene – Early Miocene (28 – 18 Ma), coincident with the evolution of horns and antlers in antelope and deer.

4) The Virtual Pig Head: Digital Imaging of Cephalic Anatomy

JD Tickhill and LM Witmer

Abstract

Domestic pigs are used as biomedical animal models for several human disease states such as in temporomandibular joint disorders and mastoid air cell infections yet no digital representations of their anatomy exist. To address this problem, the Virtual Pig Project uses digital datasets to construct virtual models for research and education. Thus far, two heads were scanned using computed tomography (CT) at O'Bleness Memorial Hospital, Athens, OH. These data were imported into the program Amira and such anatomical structures as bones, muscles, brain, air sinuses, and blood vessels were digitally extracted and visualized, rendering a virtual construction of the head. The utilization of this data in visual comparisons to CT-imagery of key human systems highlights interspecies similarities and differences. The Virtual Pig Head has already provided a series of often dramatic 3D visualizations, including virtual dissection and vascular traces, ultimately to be delivered through an interactive website. These virtual data provide an important new resource for researchers in the biomedical field and beyond.

5) **Heads and Skulls as Sediment Sorters: An Actualistic, CT-Based Study in Taphonomy**

JC Daniel

Abstract

Whereas fossilization is an uncertain process at best, soft-tissue preservation is particularly rare, typically found as impressions, casts, or stains. Soft-tissue preservation can be difficult to recognize, and interpretations are often hotly debated. Interpretations may be clarified by actualistic taphonomic studies. CT scans of fossil skulls frequently show density variations within rock matrix within the skull cavities (e.g., the matrix filling the pneumatic cavities of *Nanotyrannus* is clearly of lower density). These variations may be due to factors inherent in sediment infilling, biological activity or remains, or some combination. Due to their complicated construction, fleshy heads and dried skulls may sort sediment, and this sediment sorting may be influenced by soft tissue. If this hypothesis is valid, considerable anatomical information may remain in the matrix, even after the soft tissues themselves were degraded. For example, one might predict that finer sediments might infill the paranasal sinuses than the main nasal cavity, and that relatively coarser sediments might be found in the oral cavity. In exceptional cases, it may even be possible to distinguish remnants of nasal conchae and other major soft tissue structures. We are addressing this question in laboratory experiments in which we will bury a variety of heads (e.g., pig, alligator, ostrich), spanning the spectrum of decomposition from fresh heads to clean skulls and allowing control of both the aqueous depositional environment and the grain size of the sediment. After burial, the heads and surrounding “matrix” will be frozen and CT scanned. Variations in the CT density will be correlated with grain size by direct sampling of infilled sediment. These data will be compared with variations found in CT scans of fossil skulls. The experimental “modern fossils” will provide a baseline for interpretation of CT scans of matrix-filled fossils, potentially allowing us to extract more anatomical information than previously thought possible. Moreover, it may be possible to identify optimal soft-tissue preservational environments, such that field work can target promising rock units.



6) **Young adulthood metabolic syndrome components and physical activity: The Fels Longitudinal Study**

KE Remsberg, NL Rogers, R Wu, EW Demerath, SA Czerwinski, WC Chumlea, SS Sun, B Towne, and RM Siervogel

Abstract

Introduction: Increased risk for developing the metabolic syndrome (MS) is associated with physical inactivity.

Objective: To evaluate the effects of leisure and non-leisure physical activity on the MS and its components in young adulthood.

Methods: Cross-sectional data for physical activity (PA) were utilized from a subset of 212 female and 198 male participants in the Fels Longitudinal Study, aged 18 to 40 years, mean 30.3 years for women and 29.8 years for men. MS and its components – fasting glucose, HDL, abdominal circumference (AC), triglycerides and blood pressure – were dichotomized into presence/absence variables according to the definitions used by the Third National Health and Nutrition Examination Survey. Leisure and non-leisure physical activity were determined using the Baecke Questionnaire of Habitual Physical

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Activity.

Statistical Analysis: The effects of physical activity, age and other lifestyle factors on risk for MS and its components were assessed with multiple logistic regression models.

Results: The prevalence of MS in this population was 18.7% for men and 14.2% for women. Greater total PA for men was associated with lower risk for MS [Odds ratio = 0.60 (95% Confidence interval: 0.39, 0.92)], lower AC [OR = 0.48 (95% CI: 0.24, 0.96)], lower triglycerides [OR = 0.72 (95% CI: 0.55, 0.95)], and higher HDL [OR = 1.52 (95% CI: 1.16, 2.00)]. In addition, among men, increased leisure PA reduced SBP [OR = 0.26 (95% CI: 0.11, 0.64)], while sport PA was related to reduced MS [OR = 0.33 (95% CI: 0.15, 0.70)], AC [OR = 0.25 (95% CI: 0.07, 0.88)], triglycerides [OR = 0.54 (95% CI: 0.35, 0.84)] and increased HDL [OR = 1.89 (95% CI: 1.22, 2.86)]. For women, increased sport PA was associated with increased HDL levels [OR = 1.75 (95% CI: 1.11, 2.78)].

Conclusions: Overall, increased physical activity was related to reducing risk for the metabolic syndrome in young adult men. It was generally not associated, however, with the metabolic syndrome or its components in women.

7) **Caloric need in households headed by Luo grandparents.**

AM Zidron, J Yogo, E Juma, and GH Ice
Ohio University, Athens, Ohio

****Poster will be presented at 11:00 a.m.****

Abstract

A major problem facing the continent of Africa as a result of the HIV/AIDS crisis is malnutrition. Current research investigating the nutritional status of orphans is conflicting in results and conclusions. Several studies suggest that orphans suffer from a loss of food security and therefore are more susceptible to the effects of malnutrition, including increased morbidity, stunting and wasting. However, there are researchers that suggest that orphans living with their grandmothers have an adequate nutritional status and do not differ in nutritional status from nonorphaned children. Furthermore, it has been suggested that having children in the home can be advantageous to caregivers. As part of the interview portion of the Kenyan Grandparents Study, 389 Luo grandparents (age 73 ± 8) were asked specific questions regarding each child in the household including age and sex. The caloric need for each child in a household was determined using the American Heart Association's "Dietary Recommendations for Children" and a caloric need per household was then calculated. Caloric need was significantly higher in households headed by caregivers (3069.38 ± 20863.025 vs. 589.33 ± 1246.413 , $p\leq 0.001$). No significant difference existed between the number of adults in caregiving and noncaregiving households (3.36 ± 2.149 vs. 3.00 ± 2.069 , $p=0.217$), thus it is probable that any extra food required for the household must be acquired through extra work performed either by the grandparent or child. Caloric need was not found to be significant with either anthropometric measures or socioeconomic status. These results suggest that children are either not getting the required calories, grandparents have to work harder or that children are contributing to enable adequate household food.

8) **Current Topics in the Evolutionary and Functional Morphology of Dinosaur Feeding**

CM Holliday, Dept. of Biomedical Sciences, OUCOM

Our understanding of dinosaur cranial form and function is constantly growing. The feeding apparatus is a key component to expanding our knowledge of anatomy, function, and evolution of dinosaurs and their kin. The adductor chamber, which is part of the feeding apparatus, is built by bony elements such as the braincase, palate, and mandible, and houses the jaw muscles, trigeminal nerve, and other soft tissues. This study seeks to address basic questions such as where particular jaw muscles attach as well as complicated ones such as how different taxa ate (e.g., bite force reconstruction, cranial kinesis), when changes in the head and feeding apparatus occurred during dinosaur evolution (e.g., the evolution of the avian condition), and how changes in the adductor chamber might affect its neighboring structures such as the eye, brain, pharynx, and middle ear cavity.

9) **Predictors of Parenting Stress Among Luo Grandparents: A Pilot Study**

AC Lader, BA, J Yogo, MA, and GH Ice, PhD, MPH

Ohio University College of Osteopathic Medicine, Department of Social Sciences
Athens, OH

****Poster will be presented at 11:10 a.m.****

Abstract

Due to the HIV/AIDS crisis in Africa, 1.1 million orphaned children in Kenya are living without one or both parents. Grandparents are increasingly assuming the role of caregiver for these orphaned children as their own children die. In addition to the typical stressors of aging, these grandparents must also cope with the loss of their child and raising their grandchildren, adding further psychological, financial, and physical stressors. This pilot study aims to investigate predictors such as caregiving status, general health, social support, and select background variables, of parenting stress in Luo grandparents. It was predicted that the Parenting Stress Index-Short Form (PSI-SF) scores would be positively associated with age, more children in the homestead, decreased social support, health, and socioeconomic status. Additionally, it was hypothesized that the score would be higher among caregivers, females, and single grandparents. General health and parenting stress was assessed via interviews using the Short Form-36 General Health Survey (SF-36) and PSI-SF, respectively, in 44 Luo caregivers (age 70 ± 5) and 20 non-caregivers (age = 71 ± 7). PSI-SF was higher among those who were caregivers. PSI-SF was positively correlated with the number of the children in the homestead (orphans & non), socioeconomic status, social support, and mental health, physical function and vitality as measured by the SF-36 ($p < 0.05$). Age was negatively associated with the Parental Distress subscale. There was no association between PSI-SF scores and sex or marital status. These results are not consistent with previous findings. This study suggests that further research is needed before implementing typical interventions for reducing parenting stress in grandparents.

10) **The Relationship between Somatic Dysfunction and Chronic Pain in Luo Elders**
TR Neely, SL Horwitz, GH Ice, and JM Burns

****Poster will be presented at 11:20 a.m.****

Abstract

Few studies have examined the relationship between somatic dysfunction (SD) and chronic pain in the elderly. Osteopathic physicians can incorporate osteopathic manipulative treatment (OMT) into their treatment of SD to help alleviate chronic pain symptoms. This study assessed five chronic pain complaints in 305 Luo Elders and tried to identify patterns of SD. It was predicted that the areas with chronic pain would have more SD, and adjacent areas would have less severe SD. Luo Elders were first interviewed to identify areas affected by chronic pain (pain > 2 months). The area with the most severe pain, as well as the region above and below, was evaluated using the TART format. Severity scores for each area were determined using the TART format. In lower back complaints, the area with the most severe dysfunction was the lumbar region (Mean=3.72), followed by the sacrum (2.81) and innominate (2.47). For knee pain, the most dysfunctional were the innominates (2.76), followed by the left and right upper part of the lower extremity (2.36 and 1.78 respectively). For neck pain, cervical region was most affected (3.81), followed by upper thoracic 1-4 region (2.42). The cervical region was also most severe in chronic shoulder pain complaints (3.20). For chest pain, the abdominal diaphragm and superior thoracic aperture were most severe (2.97 and 2.47 respectively). Osteopathic physicians may use these patterns to help identify areas of somatic dysfunction in elders with chronic pain. Identification of these areas during an osteopathic exam will help guide the osteopathic physician during their OMT treatments.

11) **Does Gastric Acid -Suppressive Therapy (GAST) Increase the Risk of Pneumonia in Older Hospitalized Adults?**

U Acharya, BS; MS Khan, BS; and J-T Gau, MD, PhD

Department of Geriatric Medicine; Ohio University College of Osteopathic Medicine; Athens, OH 45701

****Poster will be presented at 11:30 a.m.****

Abstract

Context: A population study has revealed that current use of gastric acid -suppressive therapy (GAST) was associated with an increased risk of community-acquired pneumonia.

Objective: To examine the association between the GAST and occurrence of pneumonia that was treated in hospital.

Design, Setting, Participants: Patients aged ≥ 65 years with a discharge diagnosis of "pneumonia" in a community hospital during the year 2004 were reviewed. A total of 79 patients fit to the diagnostic criteria of pneumonia. The control group included patients aged ≥ 65 , admitted *not* for pneumonia, obstructive lung disease, or aspiration pneumonia during the period of January 1 to March 31, 2004. After excluding those aged < 65 years, dead during the hospital stays, and those patients with the above discharge diagnosis, 154 charts were reviewed and as the control group for data analysis.

Measurements: Pneumonia was defined by the presence of new infiltration by chest radiography and

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clinical symptoms or signs. Demographic data, medical history, medications, length of hospital stay, and admission laboratory tests were recorded.

Results: GAST users had a significantly higher prevalence of congestive heart failure and gastro-esophageal reflux disease (GERD) than the non-GAST users. The prevalence of pneumonia was not different between these two groups. The case-control data revealed the pneumonia group had a significantly higher prevalence in smoking history, congestive heart failure, coronary artery diseases, history of pneumonia and COPD, taking anti-psychotropic medication and antihistamine, a higher white cell count on admission and a longer hospital stay, but not in the GAST uses.

Conclusion: Our study did not support the association between current use of gastric acid -suppressive therapy and an increased risk of pneumonia treated in hospital settings.

Limitation/Future study: We will increase the sample size of the control group by including those patients admitted from April to December, 2004.



12) **Diabetes Care in Extended Care Facilities: Appropriate Intensity of Care?**

RM Holt, OMSII, Ohio University College of Osteopathic Medicine, Athens, OH; and **JH Shubrook**, D.O., Ohio University College of Osteopathic Medicine, Athens, OH

****Poster will be presented at 11:40 a.m.****

Abstract

Objective: Few studies have evaluated diabetes control and treatment in extended care facilities. The American Diabetes Association (ADA) does not recognize different treatment goals for this group, nor has it outlined specific recommendations for this population. The purpose of this study was to examine physician management of patients with type 1 and type 2 diabetes residing in extended care facilities and to compare this management to ADA Standards of Care for outpatient adults with diabetes.

Research Design and Methods: This retrospective chart review included data from 108 residents with physician documented type 1 or type 2 diabetes at 10 extended health care facilities in the midwest. The study included review of the medical problem list, medication list, laboratory reports and all physician and consultation notes during the study period. Frequencies were used to display trends, and descriptive analysis (Pearson Chi-Square, Mann-Whitney U) was used to compare variables.

Results: Blood glucose was monitored in 98.1% of the subjects, but only 38.0% of subjects met glucose goals. HbA1c goal (< 7.0%) was met in 54.6% of patients. Insulin use directly correlated with the number of HbA1c measures per year ($P = 0.013$) and inversely correlated to glucose goals being met ($P < 0.001$). Sliding scale correction was inversely related to HbA1c goals being met ($P = 0.02$).

Blood pressure was checked in 94.4% of patients, and 54.6% of patients were meeting goals (140/90 mmHg). Blood pressure goal was less likely to be met with the use of an ACEI or ARB ($P = 0.02$). Lipids were checked yearly in 30.6% of patients, and 58.3% of those checked met goal. Yearly EKGs were reported in 37.0% of patients; 6.5% of patients had urine checked for the presence of microalbumin; and 41.7% of patients were on an aspirin regimen. Eighty-six percent of patients received foot exams (58.3% received podiatrist consultations), 40.7% received dilated eye exams, 88.0% received influenza vaccinations, and 45.4% received pneumococcal vaccinations. Depression was documented in 42.5% of the patients with 48.1% of patients receiving pharmacological treatment and 16.7% receiving a psychiatrist consult.

Conclusion: Care of the institutionalized elderly with diabetes fails to meet the challenge of adhering to ADA Standards of Care for the outpatient adult. Separate practice guidelines are needed for people with

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diabetes who reside in extended care facilities in order to improve quality and consistency of care.

13) Effectiveness of Insulin Treatments in a Community Hospital

R Mills OMS 2, JH Shubrook D.O. FACP, Ohio University College of Osteopathic Medicine OU-COM Diabetes Center Athens OH 45701

****Poster will be presented at 11:50 a.m.****

Abstract

Objective: To determine the effectiveness of various insulin treatment modalities in a community hospital.

Method: Using a pharmacy generated list of inpatients who used insulin between January 2006 and June 2006 (N=178) the author looked at sex, age, ethnicity, length of stay, diabetes 1 or 2, complications, admissions glucose, hemoglobin A1C, average fasting glucose, preadmission insulin administration, method of inpatient insulin administration, time to fasting euglycemia, time to random euglycemia, number of times with a mild hypoglycemic event, number of times with a severe hypoglycemic event, number of days between discharge and readmission, admission serum glucose levels and serum glucose level triggering insulin treatment in order to determine treatment efficacy.

Results: Patients' high glucose levels (mean of 277 mg/dL) are not being treated soon enough in concordance with ADA/AACE guidelines (180 mg/dL). Times to reach fasting and random euglycemia are ranging from 220 to 29,265 minutes (fasting) and zero to 9,690 minutes (random) if euglycemia is achieved at all. There is no connection between the insulin treatment modality and an improved patient outcome.

Conclusion: Current insulin treatment modalities are not being used effectively. Recommended guidelines for the amount of time required to achieve euglycemia, both fasting and random, need to be researched and developed. Physicians need to look at the level of aggressiveness used to treat diabetic inpatients' hyperglycemia.

14) The Effect of Respiration on Paraspinal Muscle Compliance at T3, T7, and L4

M Streng, B Rockey, W Ji, R Conatser, and J Howell

****Poster will be presented at 11:00 a.m.****

Abstract

This study is part of a project which focuses on developing a protocol for objectively measuring muscle stiffness. Tissue compliance measurements will be taken using the "Back Poker 7.0" (Williams, R.L. et al., 2006), a non-invasive haptic device (PHANTOM 3.0, SensAble technologies). When using the haptic device to measure muscle stiffness, the subject must hold his or her breath while the measurements are taken since any movement will alter the data. An important variable to consider is the thoracic volume taken in by each subject. If measurements at different inspiratory volumes vary, it will be necessary to control for breathing in future experiments. To better understand the effects of respiration on tissue compliance of the back paraspinal musculature, this study uses a respirometer and

oscilloscope with the subjects to evaluate the effects of a normal breath, two times normal breath, three times normal breath, and maximum inspiratory effort. Results showed excellent reproducibility between compliance measurement trials, and no significant differences were noted in the data at T3 ($p=0.444$), T7 ($p=0.518$), or L4 ($p=0.892$) between varying levels of respiration.

15) Aluminum effects on reactive oxygen species levels and cell death in neurons and thymocytes

J Tuneva and D Carpenter, Institute for Health and the Environment, School of Public Health, State University of New York at Albany, Albany, NY, USA; I Birman, New York State Department of Health and School of Public Health, State University of New York at Albany, Albany, NY, USA; **P Johnson**, Department of Biomedical Sciences, Ohio University College of Osteopathic Medicine, Athens, Ohio, USA; A Boldyrev, MV Lomonosov Moscow State University, Moscow, Russia

Abstract

Aluminum (Al) is one of the most prevalent elements in the modern environment. Thus its intake by humans is a public health concern. Historically, exposure to Al has been linked to a variety of health problems, and its neurotoxic properties have been demonstrated experimentally. Considerable interest has centered on the observations that excessive levels of Al have been detected in the senile plaques and neurofibrillary tangles of Alzheimer's disease patients. In order to further investigate the neurotoxic effects of Al, we have used flow cytometric analysis of cerebellar granule cell neurons to investigate the effects of Al on reactive oxygen species (ROS) generation, elevation in $[Ca^{2+}]$, and cell death. In these experiments ROS were detected using the fluorophor CDCF, intracellular calcium with Fluo-3 and cell death was measured by staining of dead cells with propidium iodide. Incubation of mouse cerebellar granular cells with concentrations of $AlCl_3$ between 25 μM and 500 μM resulted in increased granularity and size of the cells, with accumulation of calcium ions and elevation reactive oxygen species (ROS) levels, cell death via the necrotic pathway. The time dependencies of Al-induced ROS generation and necrotic cell death were similar, but suppression of ROS levels with N-acetylcysteine, a membrane-permeable antioxidant, was not accompanied by protection against necrotic cell death. It was concluded that Al-toxicity stimulates Ca-induced ROS accumulation, and perturbs membrane integrity and intracellular signaling mechanisms, which are the primary reasons for cellular death. Thus aluminum-induced oxidative stress appears to be a secondary event not directly involved in immediate neuronal cell death.

16) The effect of unique stressors on the risk of developing cardiovascular disease in Luo elders

SL Horwitz, BA, **GH Ice***, PhD, MPH, J Yogo*, E Juma**
Ohio University College of Osteopathic Medicine
Department of Social Medicine
Athens, Ohio

*Department of Social Medicine

**Kenya Medical Research Institute

**** Poster will be presented at 12:10 p.m. ****

Abstract

The prevalence of HIV continues to dramatically increase throughout Africa. The disease has created over 11 million orphans whose care has fallen upon their grandparents. It has been suggested that this renewed parenting responsibility presents Luo elders with unique and added stressors, such as increased economical strain, nutritional deficits, cultural conflicts, and psychological problems. While there is an increased awareness of the HIV/AIDS epidemic, little is known about how it affects those that survive. At the same time, mortality due to cardiovascular disease has continued to increase in Africa, accounting for 9.2% of all deaths in 2001. Therefore, it was hypothesized that stress due to caregiving may increase risk of cardiovascular disease. The Framingham score was utilized to assess the chance of acquiring coronary artery disease (CAD) in the next 10 years. We hypothesized that there would be an increased risk for developing CAD in caregivers versus non-caregivers due to the added stress of taking care of orphaned children. 386 Luo elders (age = 73 ± 8), divided into caregiving and non-caregiving groups, were recruited from the Nyanza Province, Kenya to participate in the study. Total cholesterol, HDL cholesterol, and glucose were measured by a simple finger stick and the Cholestech LDX Analyzer. Blood pressure was recorded using a sphygmomanometer, and age, sex and smoking status were determined through an interview with a translator. No significant difference was found between the Framingham risk scores of caregivers and non-caregivers. However, when only fasting blood measurements were considered, there was a significant difference in HDL levels, with caregivers having lower HDL levels (42 vs. 46 mg/dl, $p < 0.05$). Post hoc analysis demonstrated that triceps skinfold (OR = 1.3, $p < 0.05$) and subscapular skinfold (OR = 1.4, $p < 0.05$) increased the risk of falling in the highest quartile of Framingham scores, and suprailiac skinfolds (OR=0.77, $p < 0.05$) and calf skinfolds (OR = 0.80, $p < 0.05$) predicted decreased risk of falling in the highest quartile of risk. The lack of difference between the two groups' Framingham scores may be due to the short duration of these new stressors. Many components of the score, such as blood pressure and cholesterol may only adapt after a more chronic stress is imposed. This study does suggest, however, that trunk fat measurements are risk factors for cardiovascular disease among Kenyans.

17) Characterization of Macrophage Markers in bGH Mice with Kidney Damage

N Obichere, B.A and K Coschigano, Ph.D.

****Poster will be presented at 11:10 a.m.****

Abstract

Macrophage associated kidney damage has been demonstrated in several mouse studies including aging and diabetically-induced mouse models. A study with aging mice showed that older mice with glomerulosclerosis had an upregulation of inflammatory genes and macrophage accumulation as compared to younger mice with no kidney damage. Furthermore, a study with diabetically-induced kidney damage showed a macrophage chemokine to play a critical role in the development of mouse diabetic nephropathy. Moreover, kidney damage has been found in bovine growth hormone (bGH) transgenic mice, induced to inappropriately express growth hormone. These mice have kidney damage that is characteristic of the early stages of diabetic nephropathy. There rests uncertainty over the cause of

kidney damage in these mice. Since the role of macrophages in these mice has not been studied, the goal of this study was to identify a possible correlation between macrophage markers and kidney damage in bGH mice. The expression of macrophage markers in bGH mice compared to non-transgenic (NT) mice was assessed. Macrophage marker expression was expected to be higher in bGH mouse kidneys as compared to NT mouse kidneys if a correlation exists. Real-time RT/PCR was used to quantify the mRNA levels of several macrophage markers and kidney damage markers in whole kidneys. Of the seven macrophage markers examined, CD68, MCP-1, and MMP-12 showed a statistically significant increase in expression in bGH mice. The other macrophage markers showed trends toward increased expression. Of the four kidney damage markers, all except alpha3COL4 showed trends toward increased expression in the bGH mice. Based on the data obtained, macrophage infiltration appears to be prevalent in bGH mice and can be associated with their kidney damage.

18) **A Study of the Role of *Drosophila* CLIC in Programmed Cell Death**

R Huff, S Tanda, I Miller, and M Berryman

**** Poster will be presented at 11:20 a.m. ****

Abstract

Chloride intracellular channel (CLIC)4 has been implicated in programmed cell death (apoptosis). Suppression of the CLIC family causes apoptosis in squamous cancer cell lines and inhibits tumor growth in mice. Studies also show an interaction between CLIC4 and p53 tumor suppressor. One CLIC exists in *Drosophila melanogaster*. Through the development of mutant *Drosophila* that fail to make CLIC, we observe that these flies have a smaller body size, shorter lifespan, and are very sensitive to heat stress in terms of viability compared with wild type. Thus, we hypothesize that DmCLIC may have a role in protecting cells from apoptosis in some fashion. Our aim is to determine if DmCLIC plays a role in apoptosis and whether or not it interacts with Dmp53 (a major player in the apoptotic response to cell damage) representing possible conserved functions of CLIC. In using *Drosophila* larvae imaginal discs to study apoptosis in response to ionizing radiation (IR) – a form of stress known to cause programmed cell death in *Drosophila* – we show that mutant *Drosophila* have considerably more apoptosis in response to IR than wild type. With scanning electron microscopy, we demonstrate that CLIC knockout mutants phenotypically have rougher eyes indicating increased sensitivity to IR compared with wild type. We also show that there is a strong genetic interaction between DmCLIC and Dmp53. This work establishes a foundation upon which further studies can be done to ultimately provide the basis to establish *Drosophila* as a model for studying the mechanism of CLIC's interaction with p53 and overall role in apoptosis, which is of potential therapeutic importance for inducing tumor cell death.

19) **A telemetry system for studying jaw-muscle activity in free-ranging primates: pilot data from howling monkeys (*Alouatta palliata*) at La Pacifica, Costa Rica.**

SH Williams¹, CJ Vinyard², KE Glander³, MF Teaford⁴, M Deffenbaugh¹, CL Thompson^{2,5}.

¹Department of Biomedical Sciences, Ohio University, ² Department of Anatomy, NEOUCOM, ³ Department of Biological Anthropology and Anatomy, Duke University, ⁴Center for Functional

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Anatomy and Evolution, Johns Hopkins University School of Medicine,⁵ Department of Anthropology, Kent State University.

Abstract

Laboratory-based electromyographic (EMG) studies are integral for understanding primate masticatory function and evolution. By directly linking jaw-muscle function during chewing to mandibular form, these studies provide the foundation for adaptive hypotheses relating primate jaw form to diet. However, because these studies elicit mastication using foods not consumed by wild primates, their ecological and evolutionary relevance is unclear. This lack of an ecologically-relevant biological role is further confounded by the fact that jaw-muscle activity is influenced by food mechanical properties, which may influence primate food choice in the wild. To more critically test adaptive hypotheses of primate masticatory form and function, jaw-muscle EMGs need to be analyzed in an appropriate environmental context.

To this end, we developed a telemetry system for recording jaw-muscle EMGs during mastication by free-ranging wild primates feeding in their natural habitat. The telemetry system amplifies, filters and transmits up to eight electrode signals as an FM radio signal to a receiver. This signal is digitally recorded and demultiplexed producing separate EMG waveforms for each electrode. Prior to use in the field, we verified that the system performed similarly to a non-telemetered system used in collecting primate EMG data. We tested the telemetry system in the field on mantled howling monkeys at La Pacifica, Costa Rica. Jaw-muscle EMGs were collected from two individuals during the mastication of leaves and berries, revealing a qualitative variation relative to food toughness. This study demonstrates the feasibility of integrating laboratory-based experimental techniques with field research on primate feeding ecology.

Supported by NSF BCS-0507074, BCS-0552285, IOB-0520855, and the Ohio University Research Committee.

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**20) Stress resistance in short lived adult *Drosophila* Clic mutants**

**M Berryman<sup>1,3</sup> and S Tanda<sup>2,3</sup>**

<sup>1</sup>Department of Biomedical Sciences

<sup>2</sup>Department of Biological Sciences

<sup>3</sup>Molecular and Cellular Biology Program

**Abstract**

Clics are physiologically important proteins encoded by a multigene family in humans and other vertebrates, however, their principal cellular and molecular functions are poorly understood. Here we take advantage of the fruit fly *Drosophila melanogaster* as a simplistic model to elucidate Clic function. We show that loss of the single *Drosophila* Clic compromises pre-adult viability and adult life span in a temperature-dependent manner. Structurally, vertebrate and invertebrate Clics belong to the glutathione S-transferase superfamily of redox proteins, raising the possibility that they could function as cellular antioxidants. Given that one of the theories of natural aging is that progressive accumulation of oxidatively damaged macromolecules contributes to the overall demise of cell function, we tested the effects of various oxidative and non-oxidative stressors on survivorship of adult Clic null mutant and

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wild-type control flies. Surprisingly, Clic mutants showed similar resistance to wild-type for all stressors tested, with the exception of heat. Results of genetic crosses between Clic mutants and heat shock protein mutants were indicative of a strong genetic interaction between Clic and Hsp83, an essential chaperone that influences the activity of many proteins required for cell proliferation, survival, and homeostasis. The ability of Clic to protect against thermal stress coupled with the observed genetic interaction between Clic and Hsp83 indicates that Clic acts in concert with Hsp83 to modulate essential thermolabile signal transduction pathways in the fly.

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**21) Nutrition Transition and Health Consequences Among Kenyan Elders**

*KN Jackson*, BS, *SL Horwitz*, BA, *J Yogo*, MA, **GH Ice**, PhD, MPH

Ohio University College of Osteopathic Medicine, Department of Social Medicine  
Athens, OH 45701

**\*\*Poster will be presented at 12:20 p.m.\*\***

**Abstract**

For centuries, third world countries have been devastated by undernutrition. Currently, however, more nations have encountered a dual burden of both overnutrition and undernutrition within the same households. This phenomenon has been labeled by some as the “nutrition transition”. With overweight and obesity on the rise, many have predicted increasing prevalence of chronic diseases, such as cardiovascular disease and diabetes. Few studies have focused on Africa in regards to the nutrition transition. This study aimed to examine the prevalence of undernutrition, overweight and obesity among Kenyan Luo elders, and to examine associated disease prevalence. 389 Luos (age  $73 \pm 8$  years) were recruited from Western Kenya. A number of anthropometric measurements were taken to assess levels of body fat, and glucose and lipids were assayed by finger stick. Undernutrition was found in 116 individuals, normal weight in 234 individuals, overweight in 28 individuals, and obesity 12 individuals. BMI categories were associated with total cholesterol ( $p=0.002$ ), glucose ( $p=0.02$ ) and systolic and diastolic blood pressures ( $p=0.006$  and  $p<0.001$ , respectively). Several anthropometric variables (waist, tricep, calf and subscapular skin folds and arm, waist and calf circumferences) were associated with BMI, blood pressure, body weight and total cholesterol. This study demonstrates that the dual burden of overnutrition and undernutrition co-exist in this population, and with increasing levels of weight and obesity, there are significant health consequences.

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**22) Role of ET-B Receptors in the Cardiac Contractile Force Effects of Endothelin-1.**

**LC Wince**, Department of Biomedical Sciences

**Abstract**

The myocardium of mammalian species contains two subtypes of endothelin (ET)-1 receptors: ET-A and ET-B receptors. The ET-A receptor has been found in some species to be important for the positive inotropic effect (PIE) of ET-1. However, the myocardial effects of selective ET-B receptor stimulation remain to be clearly defined. The purpose of this study was to investigate the role of ET-B receptors in the contractile force effects of ET-1 in isolated rat left atrium (IRLA). The importance of nitric oxide

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(NO) in the effects produced by selective ET-B receptor stimulation in IRLA was also examined. After dissection, rat left atria were mounted in tissue baths and electrically stimulated (1 Hz) to elicit contractions. Changes in contractile force upon exposure to ET-1 and IRL-1620 (a selective ET-B agonist) were then studied in the absence and presence of BQ-788 (a selective ET-B antagonist) and L-NAME (an inhibitor of NO synthesis). The concentration-response (CR) curve for the PIE of ET-1 was significantly shifted to the left by pre-incubation with BQ-788 ( $10^{-6}$  M). Pretreatment with L-NAME ( $10^{-4}$  M) also produced a smaller left shift of the CR curve for ET-1, but the magnitude of the shift was statistically nonsignificant. IRL-1620 produced a somewhat biphasic concentration-related negative inotropic effect (NIE). Pretreatment with L-NAME ( $10^{-4}$  M) did not significantly attenuate the NIE of IRL-1620. These results suggest that the ET-B receptor mediates a modulatory negative inotropic influence on the PIE of ET-1 in IRLA. This effect involves largely NO-independent mechanisms.

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**23) A comparison of vertebral kinematics of Hatinh and Delacour's langurs in the Cuc Phuong National Park of Vietnam.**

**NJ Stevens**, KA Wright, HH Covert, and T Nadler; Ohio University College of Osteopathic Medicine; Johns Hopkins Medical School; University of Colorado at Boulder; Endangered Primate Research Center, Cuc Phuong National Park, Vietnam

**Abstract**

Locomotor kinematics of the folivorous primates of Vietnam have until recently been understudied. Research conducted in the Endangered Primate Research Center examined back posture during arboreal quadrupedal locomotion among two similarly sized leaf monkeys, Delacour's langurs (*T. delacouri*) and Hatinh langurs (*T. laotum hatinhensis*). Housed in seminaturalistic enclosures, subjects were filmed walking along horizontal supports approximately 2 inches in diameter. Cameras were positioned in lateral view at a distance sufficient to reduce parallax. Frame rates were optimized to catch rapid movements, and shutter speeds were set to reduce motion blur. Video clips were imported into Peak Motus and kinematic points along the back were digitized at limb touchdown, midsupport and lift off events. Rank-transformed data were analyzed using ANCOVAs with locomotor velocity as the covariate. Results indicate marked differences in back posture between species. In *T. laotum hatinhensis*, the back remains relatively straight throughout the stride cycle, whereas in *T. delacouri*, the vertebral column maintains a pronounced flexion. These patterns may reflect locomotor preferences, as Delacour's langurs appear to engage more frequently in bounding and leaping behaviors than do their congeners. Continued research on postural and locomotor adaptations of these taxa is critical for their conservation and captive management. This research was supported in part by the Zoological Society of San Diego.

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**24) Gender Differences in Obese Diabetic Zucker fa/fa Rat**

**FV Nowak**, M Koloze, M Johnson, E Jackson, and SR Inman. Biomedical Sciences, Ohio University, Athens, OH, United States, 45701.

**Abstract**

Diabetes is reaching epidemic proportions, with a worldwide prevalence of 150 million persons. Renal

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disease in patients with type 2 diabetes is the leading cause of terminal renal failure and a major health care problem. Oxidative stress is a well established contributor to the pathophysiology of diabetes and its complications. There is a need to elucidate the mechanisms by which increased oxidative stress accelerates the development of diabetic complications, in order to expand prevention and treatment options. There is also a need to explore gender differences in the progression of type 2 diabetes, its complications, and the response to therapy. We are using the obese Zucker (fa/fa) rat as a model for type 2 diabetes associated with obesity. Renal function, including glomerular filtration rate (GFR) as measured by iohexol clearance, plasma glucose and urinary nitric oxide levels were measured in both males and females at 20 weeks of age.

Body weight, blood glucose and blood pressure were increased, and GFRs decreased, in the obese males and females compared to the lean controls. Despite the fact that blood glucose in the obese females was half that in the obese males, GFRs were the same in both these groups. Alterations in levels of nitric oxide (NO) can lead to the formation of peroxynitrites and potent reactive oxygen and nitrogen species. Therefore, an optimal combination of antioxidant nutrients to alleviate the burden of oxidative stress in diabetic patients would be beneficial. Our next step is to examine the effect of an antioxidant fortified diet on renal function and the expression of nitric oxide synthases (NOSs) in diabetic male and female Zucker rats, to determine if there is a gender related response to therapy. The ultimate goal of these studies is to establish better therapies that may include antioxidants, to prevent the long term complications of diabetes.

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25) **BQ-123 and BQ-788 Effects of ET-1 Induced Vasoconstriction in C57BL/6J Mice**  
*HL Herrera, KC Conrad, SB Bender, and RE Klabunde*, Department of Biomedical Sciences, Ohio University

**\*\*Poster will be presented at 11:30 a.m.\*\***

**Abstract**

Type 2 diabetes mellitus (T2DM), along with obesity, plays a role in endothelial dysfunction. Past studies have shown augmented vasoconstrictor responses to ET-1 in type 2 diabetic mice. This study was designed to confirm these augmented vasoconstrictor responses to ET-1 in type 2 diabetic mice, as well as to determine the effect of dual inhibition of ET<sub>A</sub> and ET<sub>B</sub> receptors on ET-1 induced vasoconstriction. We hypothesize that in the diet-induced obese C57BL/6J mouse model, there will be augmented ET-1 vasoconstrictor responses and that the vasoconstriction is abolished by blockade of both endothelin receptors. C57BL/6J mice were fed either control or high-fat, high-carbohydrate diets. Hearts were removed and perfused with Krebs-Henseleit buffer; coronary perfusion pressure was set at approximately 60 mmHg. Our results showed a 36% increase in blood glucose, and a 41% increase in body weight levels in diet animals compared to control animals. Coronary vascular resistance (CVR) changes to L-NAME (nitric oxide synthase inhibitor) between control and diet groups were not different. ET-1 vasoconstrictor responses in control vs. diet mice also showed no significant difference. CVR changes to L-NAME plus BQ-123 (ET<sub>A</sub> blocker) and BQ-788 (ET<sub>B</sub> blocker) in control mice were not statistically different from diet mice. ET-1 + BQ-123 and BQ-788 resulted in percent changes of  $-15.4 \pm 12.0\%$  and  $13.9 \pm 5.7\%$  in control vs. diet mice, respectively ( $p < 0.05$ ). Within the diet animals, coronary responses to L-NAME alone and L-NAME + the receptor blockers were different. There was

no difference within the diet group between L-NAME + ET-1 alone and L-NAME + ET-1 in the presence of the receptor blockers. We found no evidence that blockade of ET<sub>A</sub> and ET<sub>B</sub> receptors abolished ET-1 vasoconstrictor responses in control or type 2 diabetic/obese mouse hearts. In diet hearts, part of the L-NAME vasoconstriction was produced by endogenous ET-1.

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**26) Nutritional status, gender and caregiving among Luo elders.**

**G Ice.** J Yogo, E Juma  
Social Medicine

**Abstract**

The high mortality rate of adults with HIV/AIDS has produced approximately 11 million orphans in Africa, the care of which has largely been left to grandparents. While there is an increasing awareness of the effect of HIV/AIDS on families and family structure, little is known about the effect of caregiving on older adults. Previous studies of the Luo indicated that there was a gender difference in the impact of caregiving on nutritional status. In this study, 389 Luo elderly (age =73±8) were recruited from Nyanza, Province, Kenya participate. Participants were interviewed for demographic and social variables. Anthropometric measurements were used to assess nutritional status. In this sample, arm circumference, triceps skinfold and BMI were all larger among caregivers compared to non-caregivers (p<0.05). Opposite of previous finding elders caring for more orphans had higher levels of fat (p<0.05). Although these samples differ somewhat, it is not clear why the relationship between gender, nutritional status and caregiving have changed over the year. This poster will describe several possible explanations.

This project was funded by the National Science Foundation under Grant No.0515890

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**27) The effect of head-bobbing on the movement of the center of mass during terrestrial locomotion in birds**

J Hancock and A Biknevicius

**Abstract**

Head-bobbing is the fore-aft movement of the head relative to the body during terrestrial locomotion in birds. It is considered to be a visual response, yet some studies have suggested that the movement of the head is correlated with the movement of the limbs. Regrettably, these studies only analyzed slow speed locomotion. This study analyzed the terrestrial locomotion of the Elegant-crested Tinamou at a range of speeds and found that the head-bobbing cycle can occur any time during the stride cycle, thus the movement of the head is not correlated with the movement of the limbs. However, the movement of the head does affect the pitching of the body and, hence, the movement of the center of mass. This effect is evident in the vertical ground reaction force profiles and graphs of the body angle against time.

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**28) Foot Ankle Biomechanics: Effects of Manipulative Intervention on Plantar Fasciitis Subjects**

*A Morton, A McGrew, J Burns, E Karadogan, R Conatser, J Howell*; Interdisciplinary Institute for Neuromuscular Research, Ohio University College of Osteopathic Medicine, Athens, OH

***\*\*Poster will be presented at 12:30 p.m.\*\****

**Abstract**

**Introduction:** Counterstrain, an Osteopathic Manipulative Medicine (OMM) technique that involves passively shortening painful tissues, has been shown in prior OUCOM research to significantly decrease plantar fasciitis pain. Efforts to investigate its mechanism of action revealed increased peak force production as well as time needed to reach peak force; alluding to possible involvement of passive mechanical tissue properties of the foot/ankle complex. The current study examines passive myofascial tissue properties independent of any muscular reflex activity.

**Methodology:** Following informed consent per OU IRB, 9 plantar fasciitis and 6 control subjects have participated. The foot of the supine subject was slowly (five degrees within 500 msec) dorsiflexed by a motor driven apparatus 10 times followed by a 30 second rest then repeated 10 times, while force (Torque) against the foot plate, was recorded. This was done at baseline and following two manipulative interventions: 1) a 90 second hold of the plantar fascia in a shortened position and 2) a 90 second stretch of the plantar fascia. Subjects were randomized to receive either stretching or shortening first. The Achilles tendon reflex was not elicited, as verified by Electromyography.

**Results:** RMANOVA statistical analysis revealed no difference, following either intervention, in peak force production or in time needed to reach peak force

**Conclusion:** The increases in peak force production or in time needed to reach peak force do not appear to have resulted primarily from an alteration in the passive biomechanical components of the foot-ankle complex. Another variable affecting force generation under the ball of the foot is the action of the intrinsic foot muscles. Measurement of these muscles is the subject of a future study. Additional subject recruitment is currently ongoing in order to achieve appropriate statistical power.



**29) Predicting Six Month Mortality in the Nursing Home: A Case-Controlled Pilot Study**

*TL Marx, DO, OUCOM*

**Abstract**

**OBJECTIVES:** Many Americans will die in nursing homes without the benefit of hospice, which has been shown to improve patient and family satisfaction with care at the end-of-life. Since hospice eligibility requires remaining life expectancy of less than six months, an inaccurate assessment at best, we designed this study to determine if the Minimum Data Set Mortality Risk Index (MMRI) accurately predicts six month mortality in Ohio nursing home residents.

**DESIGN:** Retrospective case-controlled study as a pilot for a retrospective cohort study

**SETTING:** Ohio nursing home residents  
assessment

**MEASUREMENTS:** MDS variables were extracted and applied to a clinical algorithm to determine MMRI score.

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**RESULTS:** The mean MMRI score for deceased patients was 15.6 (95% CI 13.54-17.56, median 16.00, mode 16), compared with 14.0 (95% CI 12.63-15.37, median 14.00, mode 14) for those alive at six months (p=0.19).

**CONCLUSIONS:** Despite a trend of higher point value for those who died within 6 months, the Minimum Data Set Mortality Risk Index (MMRI) did not accurately predict death in the Ohio pilot study. These pilot data hint that the clinical algorithm has potential as a useful tool but a larger sample size is necessary.

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**30) There is a disconnect between the performance of an osteopathic exam in the acute care hospital setting and the AOA documentation requirements.**

*G Fennig Jr. and JH Shubrook*

**\*\*Poster will be presented at 12:40 p.m.\*\***

**Abstract**

**Objective:** To determine the incidence of osteopathic structural exams and the use of OMT in the acute care hospital setting.

**Methods:** The lists of patient charts were obtained from the IT and medical records departments for each of the participating hospitals. These charts included patients that were discharged during the month of February 2006. The inclusion criteria for the charts consisted of: admissions to a D.O. family physician, general internist, or geriatrician. The exclusion criteria for the charts consisted of: admission for observation only, newborn infants (<12 months), patients admitted for outpatient procedures only, and any patients that received care from the hospital OMT specialist.

**Results:** Data was collected from 9 participating hospitals. A total of 1319 charts were reviewed during this study. Two hundred seventy two charts did not meet the inclusion criteria and were excluded. The most frequent length of stay was 3 days (20.2%), 4 days (18%), 5 days (13.3%). The five top diagnoses were GI disease/colitis (14.7%), Pneumonia (8.5%), Angina, CAD, & ACS (8.5%), COPD (8.2%) and CHF (8.0%). OMT was performed in 63 cases (6.0%).

An AOA standard osteopathic structural exam was performed in 39.9% (418) of the cases. According to the AOA the remaining 629 patient charts did not meet the criteria to be considered an osteopathic structural exam. However, two hundred twenty (21%) of those charts actually had an osteopathic structural exam performed but they weren't documented correctly. The physician failed to report that the examination was performed in 2 or more positions. Therefore it wasn't considered documented according to the AOA guidelines. The reasons these should have been considered osteopathic structural exams is because a diagnosis of somatic dysfunction was given or the structural exam was executed all the way to segmental definition (in some cases both occurred). Of those 220 patients, 142 (64.5%) had house staff involvement. This was found to be statistically significant at p=0.0001.

**Conclusions:** During the study the numbers became somewhat misleading. In this study only 39% of patients received an AOA approved osteopathic structural exam. The remaining patient charts were considered to have not had an exam performed. Of these remaining charts, 21% actually had a detailed osteopathic structural exam performed all the way to segmental definition if not a somatic dysfunction diagnosis. The difference between the two is that the physician failed to document the patient positioning or a reason the patient couldn't be examined in more than one position. If you eliminate the

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requirement of the AOA documentation of 2 or more positions, then collectively you have 60% of patients receiving an osteopathic structural exam. This still isn't where we need to be as osteopathic physicians in the acute care setting but the number of patients receiving an exam is nearly doubled.

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31) **The description and pathophysiological explanation of a case study in opiate addiction**

S Clay and J Allen

**\*\*Poster will be presented at 12:50 p.m.\*\***

**Abstract**

Addiction to drug(s) and/or alcohol is a disease, and one encountered commonly in clinical medicine. However, many physicians report a lack of satisfaction in treating these disorders; some even harbor frankly negative attitudes towards these patients. One could speculate that such feelings towards patients with addictive disorders are rampant in other populations of individuals, as well. It may be that such attitudes are borne of the false impression that the development, persistence and relapsing nature of these disorders are due to deliberate, voluntary decisions on the part of addicts that refuse to listen and change. In reality, however, recent evidence has revealed both genetic and early environmental factors (i.e. risk factors that are not intentionally selected) which seem to predispose an individual towards the development of addiction. Further, the neuroanatomical structures through which drugs of abuse access processes such as incentive salience and cognitive decision making are now becoming better-defined. Extensive studies have elucidated three mechanisms by which relapse to drug-seeking occurs, demonstrating perhaps that drug addicts do not relapse intentionally. The focus of the present work is to explain with pathophysiological evidence the course of addiction in one particular subject, in hopes that a better understanding of the neurobiological principles involved in the development of this disorder will facilitate the expression of a more positive view towards these patients by physicians and others.

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32) **The Role of Zinc in Hemostasis: A Review of the Literature**

D Hartman and YV Li

Research & Scholarly Advancement Fellowship Program

Department of Biomedical Sciences, Ohio University College of Osteopathic Medicine

**\*\*Poster will be presented at 11:40 a.m.\*\***

**Abstract**

The physiological importance of zinc has been well documented for years. The importance of this trace metal has become increasingly apparent in the process of hemostasis. Zinc deficient rats, guinea pigs and humans have all displayed an increase in bleeding time and a decrease in platelet function. Experimental data suggests many different roles for zinc in the hemostatic model. Zinc deficiency leads to a decrease in platelet calcium concentration during activation, an effect attributed to the decreased reuptake of calcium into the cytosol. Zinc has also been shown to induce platelet aggregation and affect ADP-induced aggregation in a synergistic manner. The role

of zinc on protein kinase C is also of importance due to the transmembrane messenger qualities of PKC on platelet activation. Outside of the platelet, zinc has shown an ability to increase fibrin thickness in the final blood clot and can influence several steps of the coagulation cascade. Such examples of zinc contribution during hemostasis necessitate further research in order to fully understand the hemostatic importance of zinc.

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33) **Identification of growth hormone specific serum protein markers: A proteomic analysis of serum from patients with acromegaly.**

S Okada<sup>1,2</sup>, S Sankaran<sup>1</sup>, *WG Horne*<sup>1,2</sup>, PU Freda<sup>3</sup>, JOL Jørgensen<sup>4</sup>, PJ Trainer<sup>5</sup>, **JJ Kopchick**<sup>1,2</sup>, Edison Biotechnology Institute<sup>1</sup>, Department of Biomedical Sciences, College of Osteopathic Medicine, Ohio University, Athens, OH<sup>2</sup>, Columbia University, College of P & S, New York, NY<sup>3</sup>, Aarhus University Hospital, Aarhus, Denmark<sup>4</sup>, Department of Endocrinology, Christie Hospital, Manchester, UK<sup>5</sup>

**\*\*Poster will be presented at 11:50 a.m.\*\***

**Abstract**

Acromegaly is a hormonal disorder resulting in excessive levels of growth hormone (GH) usually due to an adenoma of the pituitary gland in the brain. It commonly affects middle-aged adults and is associated with increased morbidity and mortality. Once recognized, acromegaly is treatable with surgery and/or medical (pharmacologic) therapy. Currently, the effect and success of treatment are assessed by a reduction in serum GH and/or insulin-like growth factor I (IGF-I). However, the relationship between the concentration of serum GH, IGF-I and clinical disease activity is not linear. Therefore, other serum markers that directly correlate levels of GH and the disease phenotype are needed.

As this is an ongoing research project, the original hypothesis was that there are serum proteins indicative of the activity of GH-axis in addition to IGF-I. We set out to determine the serum proteome of 34 patients with acromegaly before and after surgery or medical treatment. When serum proteins smaller than 60kD were quantified using 2D-gel electrophoresis and photometry, 30 to 50 proteins were found to be up regulated and 30 to 40 proteins down regulated by more than 2- fold before and after surgical treatment. Among these, 13 of the increased and 22 of the decreased proteins were common in all patients. When patients were treated with the GH-antagonist, Pegvisomant (Somavert), 20 proteins increased and 29 proteins decreased by at least 2-fold. 9 of the proteins that increased and 13 that decreased were found to be common between surgical and pharmacological interventions. The identification of these proteins is in progress. Together, these results indicate that serum proteins other than IGF-I may be utilized to assess disease activity in acromegalic patients.

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**34) C10, Diabetes, Insulin Resistance, and Leptin: Is It All Connected?**

*M Sawvel, A Holder, K McCall, F Schwartz, and L Kohn*

**\*\*Poster will be presented at 12:10 p.m.\*\***

**Abstract**

Visceral obesity has been identified as a major risk factor in DM2 due to its correlation with insulin resistance. The reason why is still not completely clear, but it is thought that chronic inflammation and toll-like receptors are involved. Inflammatory mediators such as tumor necrosis factor- $\alpha$ , interleukin-1 and -6 have been shown to have an increased expression with obesity. TNF- $\alpha$  and IL-6 have been shown to induce insulin resistance by modulating suppressors of cytokine signaling (SOCS)-1 & -3. Toll-like receptors (TLRs) are a family of transmembrane proteins that have been shown to be involved in the inflammatory process and are expressed on both immune and non-immune cell types. With regard to DM2, activation of TLR4 signaling leads to the production of the same pro-inflammatory cytokines known to be involved in the induction of insulin resistance, notably TNF- $\alpha$  and IL-6. Free fatty acids like palmitate have been shown to induce insulin resistance through that activation of TLR4. In short, activation of TLR4 by LPS or FFAs leads to the production of IL-6 and IFN- $\alpha$ / $\beta$ , which leads to the activation of STAT-3, induction of SOCS-1 & -3, and consequent induction of insulin resistance. Phenylmethimazole (C10) is a drug, which inhibits the TLR4 signaling pathway, making it a promising novel therapeutic for the treatment of DM2. A cell line expressing only TLR4 receptors, HEK293-hTLR4, was used to demonstrate that C10 specifically inhibits palmitate induced SOCS-3 expression. In the Jak/STAT pathway, STAT-3 is activated, which induces SOCS-3. Further experimentation was performed with C10 to demonstrate its effect on STAT-3 activation. Because C10 has been observed to inhibit TLR expression and signaling in other models of autoimmune/inflammatory diseases the ability of C10 to inhibit TLR4 expression in adipocytes was evaluated. Although C10 did not appear to inhibit TLR4 expression in 3T3L1 adipocytes, it was effective in inhibiting palmitate-induced STAT-3 activation in 3T3L1 adipocytes and SOCS-3 expression in HEK293-hTLR4 cells, showing that C10 is effective at inhibiting palmitate-mediated TLR4 signaling which may be useful as a new treatment for DM2.

**35) Effect of a Zinc Chelator and 17 $\beta$ -Estradiol Administration on Bone Mineral Density of Ovariectomized Rats.**

*CO Molokwu and YV Li*

**\*\*Poster will be presented at 12:20 p.m.\*\***

**Abstract**

The objective of this research is to understand the effect of divalent ion **Zn<sup>2+</sup>** (zinc) by itself and in combination with estrogen (17 $\beta$ -estradiol) on bone mineral density in estrogen deficient female rats. The ovariectomized (OVX) rat is a useful model of ovarian deficient osteopenia, replicating many aspects of osteoporosis.

The central hypothesis is that zinc can increase the bioavailability of estrogen by interacting on estrogen carrier proteins, and subsequently increase bone mineral density. This hypothesis is supported by recent studies showing that zinc competes with estrogen on steroid transport protein, and regulates estrogen's

access to the target tissues. In this study, we will investigate the effect of zinc on bone mineral density of ovariectomized rats undergoing estrogen treatment. OVX becomes estrogen deficient soon after surgery and exhibits bone changes strikingly similar to those of postmenopausal women. The results will facilitate development of more rational, informed or targeted therapeutic strategies for osteoporosis.

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36) The effects of dose and extrinsic incubation period on the infection of different strains of Culex tarsalis Coquillett with Western Equine Encephalomyelitis virus

MV. Neira¹, F Mahmood², WK Reisen², WS Romoser¹

¹Ohio University, Athens, OH; ²University of California, Davis, CA

Abstract

Intra-specific variation in vector competence for western equine encephalomyelitis virus [WEEV] in different strains of Culex tarsalis Coquillett has been reported in the past. By performing immunocytochemical staining across an array of strains, infectious doses and incubation times, we attempt to elucidate mechanisms responsible for variation in vector competence.

Cx. tarsalis specimens from two laboratory strains selected for high (HVP) and low (WR) susceptibility to WEE virus, as well as the wild type geographic strains 'Coachella Valley' (COAV) and 'Kern River Wildlife Refuge' (KR) were orally infected with either 3 or 5 log₁₀ PFU WEE virus / 0.1ml blood via an artificial blood-feeding apparatus. At timed intervals (1, 2, 3, 4, 7, 14 and 21 days post infection) following blood-feeding, 5 specimens from each strain/viral dose combination were killed and fixed in 10% paraformaldehyde. Serial paraffin sections were prepared and stained using the avidin-biotin-peroxidase complex (ABC) procedure (primary antibody = WEEV-immune mouse ascites). Parameters analyzed in each specimen included gut infection, dissemination, salivary gland infection and pathology.

The WR strain was the least susceptible, followed by the KR strain. The HVP and COAV strains were most susceptible, presenting similar rates of gut infection, dissemination, and salivary gland infection. Salivary gland infection rates in COAV were markedly less than transmission rates estimated by a capillary tube method, indicating the possible operation of a salivary gland escape barrier.

Pathological midgut changes included cell rounding and sloughing, vacuolization, and tissue necrosis. Although cell rounding/sloughing was sporadically observed among negative controls, vacuolization and necrosis were exclusively associated with viral infection, and midgut necrosis was observed only in the more susceptible strains (HVP and COAV).

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**37) New Dinosaurs and other vertebrate fossils from the Cretaceous Red Sandstone Group, Rukwa Rift Basin, southwestern Tanzania.**

PM O'Connor, MD Gottfried, EM Roberts, NJ Stevens, and S Ngasala

**Abstract**

Recent discoveries of Cretaceous-age terrestrial vertebrates from former Gondwanan landmasses, including South America, Madagascar and supra-equatorial African have generated considerable debate

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surrounding Southern Hemisphere vertebrate biogeography. Notably, relatively few Cretaceous-age fossil-bearing sequences are known from sub-equatorial Africa during this time period, severely limiting the ability to rigorously test competing hypotheses. Hence, Gondwanan-wide paleobiogeographic hypotheses rely on negative evidence with regard to the presence or absence of a given taxon from continental Africa during the Cretaceous.

Here we report the discovery of new fossil-bearing localities in Cretaceous-age Red Sandstone Group deposits in the Rukwa Rift Basin (RRB), southwestern Tanzania. Expeditions conducted in the austral summers of 2002-05 have revealed a diverse fauna, with specimens ranging from isolated elements to semi-articulated dinosaurs. Vertebrate clades recovered include osteoglossomorph and ceratodontid fishes, turtles, crocodyliforms, two taxa of lithostrotian sauropod dinosaurs, theropod dinosaurs, mammals, and dinosaur eggshell.

Preliminary analysis of the RRB fauna indicates the presence of a number of vertebrate clades variably shared with different assemblages from Cretaceous locales throughout Gondwana. On a regional level, there appears to be some overlap with dinosaurian taxa known from the ~Aptian age Dinosaur Beds of Malawi. Given the relative scarcity of Cretaceous-age terrestrial faunas from sub-equatorial Africa, this portion of the East Africa Rift System holds great promise for refining continent and supercontinent-level biogeographic hypotheses that have been advanced to explain vertebrate distributions during the Cretaceous Period.

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**38) Memantine Improved Behavior in Adults with Autism**

*E Fonkem, BS and W Price, M.D.*

**\*\* Poster will be presented at 1:00 p.m. \*\***

**Abstract**

Memantine, a NMDA, type glutamate receptor antagonist that was administered to three adult patients with a history of autism to treat their physical aggression, self injurious behavior and property destruction. The patients were started on 5mg/d of memantine and the dose was gradually titrated upwards by 5mg/ week to a maximum dose of 20 mg/ day. The patients' behaviors showed a significant improvement as the amount of physical aggressive, self injurious behaviors and property destruction greatly reduced. Given the existing models of pathophysiology of autism, several mechanisms could explain why these patients responded to memantine. Lam and colleagues (2006) suggested that autism is caused by the over stimulation of glutamate system. By treating these patients with memantine, a glutamate receptor antagonist, we were decreasing the level of glutamate in CNS. Certainly more research is needed to help clarify the role glutamate/ glutamate antagonism may play in the development and treatment of autism.

**39) The human cytomegalovirus UL34 gene.**

BJ Biegalko, R Rana, Z Liu and E Lester

**Abstract**

Despite its large genome, human cytomegalovirus has a surprisingly small number of genes that are essential for replication in cell culture. The majority of the essential viral genes have identified roles in viral replication. However, the contributions of one of the essential genes, the UL34 gene, to viral replication are as yet, relatively poorly understood. The UL34 gene encodes two highly related proteins; the UL34 proteins localize to the nucleus, bind a specific DNA element, and repress expression of the US3 immune evasion gene. In addition to binding to a sequence within the US3 gene, UL34 proteins bind to numerous additional elements within the human cytomegalovirus genome, including several sites in the region of *ori-lyt*. During infection, UL34 proteins colocalize initially with the major immediate early protein, IE2; and as infection progresses, UL34 proteins colocalize with UL44 in viral DNA replication centers. Although UL34 is not one of the proteins essential for viral DNA replication in transient replication assays, the binding of UL34 proteins to *ori-lyt* coupled with the localization of the protein to replication centers suggests that UL34 influences viral DNA replication during infection.

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**40) Stage- and tissue-specific alternative splicing of *Manduca sexta* allatotropin mRNA and evidence for the presence of predicted allatotropin-like peptides in cells of the larval terminal abdominal ganglion**

FM Horodyski<sup>1</sup>, K-Y Lee<sup>1,2</sup>, S Neupert<sup>3</sup>, R Predel<sup>3</sup>, and NA Davis<sup>1</sup>

<sup>1</sup> Department of Biomedical Sciences, Ohio University, Athens, OH USA, <sup>2</sup> Department of Agricultural Biology, Kyungpook National University, Daegu, Korea, <sup>3</sup> Saxon Academy of Sciences, Jena, Germany

**Abstract**

*Manduca sexta* allatotropin (Manse-AT) is a multifunctional neuropeptide that is expressed as at least three alternatively spliced mRNAs in a stage- and tissue-specific manner. Two of these mRNAs are predicted to encode three additional allatotropin-like (ATL) peptides which possess biological activities that overlap with those of Manse-AT. However, evidence for the production of the ATL peptides has thus far been lacking.

We generated polyclonal antisera to Manse-ATL-II and report the staining of specific cells with this antiserum in larval *M. sexta*. The most intense staining was observed in two cells in the terminal abdominal ganglion (TAG) whose axons project posteriorly and exit the CNS. Two cells in the brain and one cell in the subesophageal ganglion showed weak Manse-ATL-II-like immunoreactivity. Staining was completely blocked by preabsorption of the antiserum with synthetic Manse-ATL-II, but was unaffected by preabsorption with Manse-AT, Manse-ATL-I, or -III. Our previous demonstration of Manse-AT RNA-3 (which encodes Manse-ATL-II) in the larval TAG is consistent with these immunohistochemical staining results.

Analysis of the peptide content of the Manse-ATL-II immunoreactive cells in the larval TAG revealed the presence of peptides whose masses are consistent with those of Manse-AT, Manse-ATL-I, and Manse-ATL-II. These peptides are the predicted products of Manse-AT RNA-3. These data demonstrate that Manse-ATL-II-like immunoreactivity is present in a subset of cells that contain Manse-

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AT immunoreactivity suggesting that alternative splicing of Manse-AT mRNAs occurs in a cell-specific manner.

This work was supported by the NSF.

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**41) New Hope on the Horizon for Osteopathic Graduate Medical Education: What Our Students are Telling Us.**

SB Zimmerman, MPA  
Director of Alumni Affairs  
Ohio University College of Osteopathic Medicine

**Abstract**

Over the past several years, the Ohio University College of Osteopathic Medicine, along with other osteopathic colleges, has seen an alarming decline in the number of graduating osteopathic medical students opting to continue their training in osteopathic GME (Graduate Medical Education) programs. Rather, osteopathic graduates are increasingly choosing allopathic training programs. In response, a study was devised to survey the opinions of osteopathic medical school graduates and identify the most significant factors influencing GME program selection. According to results from the survey, completed by all 104 graduates from the Ohio University College of Osteopathic Medicine (OU-COM) class of 2004, program quality is the most important factor in selecting a graduate medical education program. Geographic location, family considerations, hospital climate including faculty/DME (director of medical education) interest, and availability of specialty or sub-specialty complete the list of the top five influencing factors. Identifying these factors will help educators and administrators to develop new efforts and reinforce current reforms in osteopathic GME programming.

This study, approved by the Ohio University Institutional Research Board, and utilized a survey-directed cross-sectional design. Data was collected at one point in time pertaining to several variables. The survey was mailed to all 104, 2004 OU-COM fourth year medical students in conjunction with the annual survey currently utilized by the college to collect updated post-graduate medical education and practice data on its graduates. Students indicated their top five reasons from a list of thirteen factors for choosing an internship or residency program.

A self-addressed stamped envelope was included in the mailing to increase the likelihood of an expedient response. Additional surveys were re-sent to all targeted participants that had not responded six weeks after the initial mailing. The day prior to graduation, class members that had not responded were provided with the survey instrument once again, ensuring 100 % participation from the entire OU-COM class of 2004.

**42) Effectiveness of the pilot Chagas disease Control and Surveillance Project in Loja Province, Ecuador.**

**MJ Grijalva**<sup>1, 2</sup>, AG Villacis<sup>1</sup>, EG Baus C.<sup>1</sup>, MS Lascano<sup>2</sup>, SO Mayorga<sup>1</sup>, P Castellanos C.<sup>1</sup> CA Yumiseva<sup>1</sup>, IM. Freire<sup>1</sup>, S Dávila<sup>3</sup>, JM Nicola<sup>4</sup>, LA Terán<sup>1</sup>

<sup>1</sup> Centro de Investigación en Enfermedades Infecciosas, Escuela de Biología, Pontificia Universidad Católica del Ecuador, Quito, Ecuador. <sup>2</sup> Tropical Disease Institute, Biomedical Sciences Department, College of Osteopathic Medicine, Ohio University, Athens, OH. <sup>3</sup> PLAN Internacional, Quito, Ecuador. <sup>4</sup> Programa Nacional de Chagas, SNEM, Ministerio de Salud Pública del Ecuador.

**Abstract**

Chagas disease is endemic in Loja Province. Work conducted in 2002-2003 led to the formulation of a control strategy that was implemented in 10 communities in 2005 and 2006. Maps were constructed of every community using GPS units. The entomological teams conducted searches for one man hour inside and around every house. Pyrethrin (0.1%) was used as a dislodging agent. Houses found to be infested with Triatomines were sprayed with 25 mg/m<sup>2</sup> with a pyrethroid insecticide (Deltamethrin). Educational talks were conducted in every household. Evaluation visits were conducted at 1, 6 and 10 months post intervention. The results show a drastic decrease on the house infestation rates, density and crowding post intervention. Reinfestations were found mainly in the peridomicile. Sylvatic populations of *Rhodnius ecuadoriensis* were found in two communities associated with the squirrel *Sciurus stramineus*. A community based passive surveillance system was created for detection of reinfestations.

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43) Life Cycle, feeding and defecations patterns of *Rhodnius ecuadoriensis* Lent & León, 1958 (Hemiptera: Reduviidae: Triatominae) under Laboratory conditions

A Villacis¹, LA Terán¹, **MJ Grijalva**^{1,2}

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² Tropical Disease Institute, Biomedical Sciences Department, College of Osteopathic Medicine, Ohio University.

Abstract

Chagas Disease (CD) is one of the most serious health problems in Latin America and Ecuador. *Rhodnius ecuadoriensis* is the second most important vector of CD in the country. Its presence has been registered in Manabí, Guayas, Pichincha, El Oro and Loja provinces of Ecuador. Populations of *R. ecuadoriensis* are associated with the palm tree *Phytelephas aequatorialis* and with human dwellings. The objective of this study is to determine and compare the life cycle, feeding and defecation habits of populations of *R. ecuadoriensis* gathered from Manabí and Loja provinces.

The life cycle was determined using a cohort of 57 individuals from Manabí province. The average length from egg to adult was 193.55 days. Only 26 of the 57 individuals completed their life cycles. During insect's development it was observed that at least one meal was needed to transform from one stage to the next.

Forty individuals were studied in each stage to determine the insect's feeding habits and growth. The

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results indicate that the rate of growth decreases with age. Regarding the dynamic of insect's defecation, 100% of NI in both provinces did not defecate during feeding, However, defecation occurred right after feeding in the later stages; This suggests that the insect's vector potential increases with insect's development until become adults.

The data gathered in this study about lifecycle and potential vectors of Chagas disease give us a base to implement plague control programs that will help to reduce the risk of Chagas Disease in Ecuador.

44) Mammalian reservoir hosts of Chagas disease from three endemic provinces of Ecuador

CM Pinto¹, S Ocaña-Mayorga¹, MJ Grijalva²

¹Infectious Disease Research Center, School of Biology, Catholic University of Ecuador, ²Tropical Disease Institute, Biomedical Science Department, College of Osteopathic Medicine, Ohio University.

Abstract

Chagas disease is one of the most important parasitic diseases in Latin America. Its complexity is the result of complex ecologic interactions between the parasite *Trypanosoma cruzi*, causal agent of the disease, the insect vector and the mammal reservoir hosts. To understand the epidemiology of this disease is important to determine the role of each actor in the transmission cycle. The main goal of this study was to determine the species that are acting as the main reservoirs of *T. cruzi* in communities of three endemic provinces for Chagas disease in Ecuador (Manabí, Guayas and Loja) and to determinate their infection rate with *T. cruzi*. Sherman and Tomahawk traps were used to capture the mammals. All the individuals were sacrificed with CO₂. A sample of blood was examined to detect the presence of *T. cruzi*-like organism by direct microscopy of thin and thick blood smears and hemaculture. Then PCR analysis with the primers S35/S36 were conducted to determinate the species of Trypanosomatidae (*T. cruzi* or *T. rangeli*). A total of 192 mammals were captured from nine species. Four species were considered as the main reservoir host of *T. cruzi* in Ecuador (*Didelphis marsupialis*, *Rattus rattus*, *Mus musculus* and *Philander opossum*). In Loja province the main reservoir host for *T. cruzi* is *R. rattus* while in Manabí all the species were considered as important for *T. cruzi* transmission. Manabí province presented high infection rates in all the four species, suggesting complex ecologic interactions between the reservoirs, whereas Guayas province presented the lowest infection rate, founding just one individual of *D. marsupialis* infected (3,84%). All these data suggest that *T. cruzi* prevalence in mammal reservoirs is influenced by the ecology of these species in these different environments.

45) Molecular Analysis of Trypanosomes isolated from mammals in three provinces of Ecuador

S Ocaña-Mayorga, P Pennington, **MJ Grijalva**

Infectious Disease Research Laboratory, Catholic University of Ecuador, Center of Health Studies and Centers for Disease Control-Central America Program, Universidad del Valle, Guatemala. Tropical Disease Institute, Biomedical Science Department, College of Osteopathic Medicine, Ohio University.

Abstract

Chagas disease is a health problem in Ecuador and is caused by the parasite *Trypanosoma cruzi*. Genetic diversity of the parasite is presumed to be partly responsible for the broad epidemiological characteristics and clinical manifestation observed. This study analyzed isolates of Trypanosomes obtained from reservoirs from three endemic provinces of Ecuador (Manabí, Guayas, Loja). Determination of species were carried out by PCR of the kDNA to detect the presence of *T. cruzi* and/or *T. rangeli* (Vallejo *et al.*, 1999) and primers specific to detect *T. lewisi* in rat samples (Desquesnes *et al.*, 2002). *T. cruzi* lineages were determined by the amplification of the non-transcribed spacer of mini-exon (NTS-ME) (Fernandes *et al.*, 2001) and genetic variability were determined by the analysis of polymorphic microsatellites. The results of these analysis showed a 4,2% of infection with *T. cruzi*. *Rattus rattus* presented higher infection rate (9,37%) than *Didelphis marsupialis*, the ancestral reservoir of *T. cruzi*, and also showed a high rate of mix infections with *T. cruzi* and *T. lewisi*. Additionally, this study presented the first report of the species *Oryzomys xantheolus* infected with *T. rangeli*. In relation with the distribution of *T. cruzi* lineage, all the marsupials and 27,27 % of the rodents presented mix infection with TCI and TCII which suggest active role of these species in the linkage between the sylvatic and domestic transmission cycle in endemic areas of Ecuador. The TCI appears to be the predominant lineage circulating in Ecuador (90%). Microsatellite analysis suggested genetic differences according the habitat and the species of reservoir. These genetic changes could be influenced by the specific environmental and ecological factors. All these results remark the importance of considering synanthropic mammals and distribution of *T. cruzi* lineages in the overall scenario of *T. cruzi* to propose specific actions to the Chagas disease control Programme.