
2003 Health Sciences SIPs

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Abstract

Transfer RNA nucleotidyltransferase is an enzyme that is necessary for attaching a specific CCA nucleotide sequence to the 3' end of tRNA. What makes this enzyme unique is that it accomplishes this task without the aid of a template. Similar enzymes are found in many organisms including humans. The specific mechanism of this enzyme, however, is not clear.

The project was concerned with performing specific mutations on the amino acid sequences of the fungal enzyme (from *C. albicans*). These mutations were targeted to residues thought to be involved with active site catalysis. The mutated enzymes were then expressed in *E. Coli*. The effects that these mutations had on enzyme activity were determined through activity assays.

The majority of the mutations performed ablated enzymatic activity, demonstrating their importance to the CCA tRNA nucleotidyltransferase enzyme. One mutant retained activity, and was characterized. These mutations furthered understanding of the residues important for active site activity in *C. Albicans* CCA nucleotidyltransferase.

TITLE: The effect of furosemide-induced hypohydration on the athletic performance of standardbred horses

AUTHOR: Emery Engers

SUPERVISOR: Harold C. Schott, II, MSUCVM, East Lansing, MI

Abstract

Furosemide is a potent diuretic commonly administered to racehorses in an attempt to prevent exercise-induced pulmonary hemorrhage (EIPH). However, recent studies suggest that furosemide administration may have performance-enhancing effects aside from its effects on EIPH. This study examined the effect of furosemide-induced hypohydration on the athletic performance of four Standardbred horses. Each horse received one of three treatments: 1) no furosemide (control); 2) IV injection of 1 mg/kg furosemide 4h pre-exercise (mild hypohydration); 3) IV injection of 1 mg/kg furosemide 4h pre-exercise followed by a second IV injection of 1 mg/kg furosemide 2h pre-exercise (moderate hypohydration). Exercise was performed on a treadmill at a constant speed of 13 m/s until the onset of fatigue. Furosemide-induced mild and moderate hypohydration produced significantly different body weight reductions of $2.78\% \pm 0.12$ and $3.39\% \pm 0.40$, respectively. We observed an 8.4% and 7.8% decrease in run time with mild and moderate hypohydration, respectively, however these differences were not statistically significant. Analysis of physiological factors in response to **exercise** and during recovery did not suggest that furosemide administration contributed to the onset of fatigue. We concluded that the levels of hypohydration investigated in this study had no deleterious effects on athletic performance. Furthermore, our findings, combined with previous research, allow for the possibility that furosemide administration prior to racing may enhance performance through its body weight reducing effects.

TITLE: The effects of calmodulin site II and IV mutations on the activity of inducible nitric oxide synthase.

AUTHOR: Irena Gribovskaja

SUPERVISOR: Regina Stevens-Truss, Kalamazoo College, Kalamazoo, MI

Abstract

Nitric oxide is a free radical, whose roles in the human body include such important functions as neurotransmission, blood pressure control, and immune system response. However, if overproduced, nitric oxide can be detrimental, especially when it combines with other reactive species, chemically changing bio macromolecules. Due to the oxidative stress that it causes, nitric oxide has been implicated in serious diseases, such as neurodegenerative disorders and autoimmune disorders. Nitric oxide synthase exists in three distinct isoforms. All three are activated by calmodulin, which is the focus of this study. As it turns out, calmodulin binds to two NOS isoforms only at high micromolar concentrations of intracellular calcium (for which it has four binding sites), and it seems to bind the third-inducible NOS (or iNOS)—even if intracellular calcium is low. This fact can be used to further investigate how calmodulin interacts with NOS and how the regulation of this isoform takes place. Dr. Stevens-Truss has done previous work on iNOS and calmodulin interaction. It turned out that inhibition of calcium-binding sites of calmodulin had a differential effect on the iNOS activity depending on where the impaired site was located. This project focused on the effect that deactivated calcium-binding sites II and IV of two calmodulin mutants had on iNOS activity. Successful expression, purification, and testing yielded the following results: inactive site II of calmodulin decreased iNOS activity to 39% of the maximum value, whereas inactive site IV allowed iNOS to retain 76% maximal activity.

TITLE: Gene expression profiles in prostate cancer cells
AUTHOR: Sheetal Kerkar
SUPERVISOR: Michael Cher, MD & Sree Chinni, PhD, Wayne State University, Detroit, MI

Abstract

The metastasis of prostate cancer, particularly to the bone, can cause significant morbidity. This study was designed to determine expression profiles for seven genes that could potentially impact prostate cancer metastasis. These profiles monitored gene expression in three prostate cancer cell lines, LNCaP, PC3 and DU145, as well as normal cell lines. All three cancer lines colonize human bone implants; PC3 was removed from a metastatic bone lesion, LNCaP from lymph node metastases, and DU145 from brain metastases.

Prostate cancer cells were obtained and RNA was extracted. The RNA was then used to make cDNA, which was amplified using designed primers to check for protein expression using RT-PCR. Real-Time PCR will be used to verify these results.

The most significant result was the gene expression profile of ADAM11, a matrix metalloproteinase (MMP). MMPs play roles in both normal bone remodeling and invasion and metastasis of prostate cancer. ADAM11 was greatly expressed in the LNCaP cell line and had almost no expression in the other five lines. This could provide further insight into the metastases of prostate cancer to lymph node and potentially bone. In previous studies by Dr. Michael Cher and colleagues, several MMPs were strongly expressed in PC3 tumor cells, and upon inhibition by batimastat (a broad-spectrum MMP inhibitor), proliferating tumor cells were reduced and degradation of marrow trabeculae within bone was prevented. ADAM11 could provide useful information into the mechanism behind prostate cancer metastasis and can help elucidate the effects of MMPs on cancer growth.

TITLE: $\text{INF-}\gamma$ increases the uptake of IgA transcytosis in HT-29 cells

AUTHOR: Emily Hamamdjian

SUPERVISOR: Larry Diebel & David Liberati, Wayne State University Detroit, MI

ABSTRACT

Immunoglobulin A (IgA) is **the major** defense **mechanism** in mucosal (epithelial) tissue (Loman *et. al.* 1997). Dimeric IgA (dIgA) is transported from the basal (basolateral) to the apical side of the cell via transcytosis. This process involves the noncovalent binding of dIgA to the polyimmunoglobulin receptor (pIgR). Once this occurs, the bound complex is transported from the basal to the apical side of the cell. After the transport of dIgA is complete, IgA is released from the pIgR. It is released in the form of secret&y IgA and contains a portion of the pIgR. This piece of pIgR attached to the released IgA is now called the secretory component (SC) (Tamer *et. al.* 1995). The secretory component is what fights against the invading antigen. However, when an injury occurs to the epithelial tissue, the level of IgA has been found to be much less than its normal level. Previous studies that were conducted using other cell types, such as **transfected** kidney and lung cells, have shown that the presence of cytokines **increased** the rate of IgA transcytosis, however, the study of intestinal cells (HT-29 cells) has yet to be conducted. For this reason, **human** colon carcinoma epithelial cells (HT-29 cells) are of interest in this study. These cells **were** obtained from the American Type Culture Collection (ATCC, Rockville, MA). The cytokine γ -interferon ($\text{INF-}\gamma$) was used in order to determine if its presence would increase IgA transcytosis as it had in previous studies involving other cell types. By adding the cytokine gamma interferon to the basal side of human colon carcinoma epithelial cells, the level of IgA is shown to increase, therefore, decreasing a cell's susceptibility to infection.

Abstract

Gliomas constitute more than 80% of the neoplasms of the adult central nervous system (Chakravarti, *et al.* 2001). In spite of advances in cancer research over the past twenty years, the diagnosis of glioma carries with it limited treatment options and poor prognosis (Mahler, *et al.* 2001). Emerging therapies, such as gene therapy and immunotherapy, seek to take advantage of our expanding molecular and genetic understanding which has accompanied the sequencing of the human genome. In house computer-generated serial analysis of gene expression (SAGE) data indicate several glioma-associated proteins have immunotherapeutic potential (Sloan, *et al.* in preparation). This study sought to verify the presence of 14 of these potential antigens in glioblastoma multiforme and oligodendroglioma tumors using gene-specific primers (GSPs) and quantitative reverse-transcription PCR (RT-PCR).

Data collected during PCR was validated using native polyacrylamide gel electrophoresis (PAGE). Although quantitative PCR results indicated elevated expression levels of all fourteen selected genes across both tumor types, conclusions could not be reached. Ectopic products were observed upon PAGE analysis of RT-PCR products, either drowning out any signal from the expected products or accounting for the entire observed signal collected during the amplification process, indicating experimental conditions of the quantitative PCR reactions must be further optimized. Results from the PAGE study clearly indicated the use of a high-resolution separation method to accurately analyze and verify quantitative PCR products is a necessity.

TITLE: Effect of nitric oxide on lysyl oxidase mRNA expression in rat SMCs *in vitro*
AUTHOR: Shaun Ittiara
SUPERVISOR: Charles Shanley, William Beaumont Hospital, Royal Oak, MI

Abstract

Lysyl oxidase is an enzyme produced by vascular smooth muscle cells that regulates collagen and elastin accumulation in a number of tissues. It is postulated that there is an inverse relationship between lysyl oxidase and cell proliferation. It is possible that the phenotype switch between activated fibroblast/SMC secreting matrix and actually proliferating and migrating cells may involve nitric oxide. If this is the case, nitric oxide may be effective in treating endothelial dysfunctions, such as atherosclerosis and arterial restenosis. This study attempts to decipher the effect of nitric oxide on lysyl oxidase mRNA expression. Rat smooth muscle cell cultures were serum-starved for 24 hours prior to treatment with different substances that donated or inhibited nitric oxide. TGF- β 1, a cytokine found to upregulate lysyl oxidase in preliminary studies, served as a positive control. Results were analyzed using a novel and exciting technique which allows for the simultaneous analysis of multiple samples by quantitative RT-PCR. Our data suggest that there is no significant correlation between nitric oxide concentration and lysyl oxidase mRNA expression in rat smooth muscle cells *in vitro*. Nevertheless, in comparison to results from similar studies, this data lends credence to the efficacy of the novel RT-PCR technique.

Abstract

Cathepsin B (cat B) has been implicated in the degradation of the extracellular matrix. Collagen I is the major component of the bone matrix, including the bone matrix. The bone matrix is a component of the extracellular matrix. It has been shown that cathepsin B degrades collagen I. There are also enzymes that degrade the matrix (MMPs and serine proteases) and they are all members of the proteolytic cascade that plays a role in tumor invasion. The goal of this project was to show the contribution of Cathepsin B to tumor invasion. The effects of three different prostate cancer cell lines (DU145, PC3, and LNCap) on degradation of collagen I were studied. Cancer cells were grown on plastic and three different types of collagen: bovine collagen I, mouse collagen I (+/+), and mutated mouse collagen I (r/r). Expression, secretion and activity of cathepsin B in prostate cancer cells were determined by the means of western blots and fluorescent activity assays were performed to interpret their results. Our data showed that both cathepsin B expression and levels of activity increase in this process, which resulted when DU145 cells are grown on bovine or mouse collagen I as compared to plastic. Cathepsin B is capable of degrading degradation of both wildtype collagen I (coll +/+), as well as the its mutated form (coll r/r), which is resistant to collagenases (MMPs). This implies that cathepsin B, contributes to tumor progression and metastasis.

TITLE: Ultrasonic vocalizations in rats compared to physiological means (heart rate and blood pressure)

ABSTRACT: ^{Author: Tim Frater}
SUPERVISOR: Steven Kuhlman, Pharmacia & Upjohn, Kalamazoo, MI

In the field of laboratory research, animals are often used for testing drugs before they become available to the human market. With the well being of these animals in mind many processes are done to insure the animal has maximized care. Accordingly, the field of Ultrasonic Vocalization (USV) monitoring has grown in an effort to measure stress in a rat model without having to use an intrusive method of measuring stress. 24kHz frequency USVs have been long accepted as a measure of stress in rats; due to their association with negative drugs or environments. However, no data exists that correlates these vocalizations with a coincident physiological indication of stress, such as a sympathetic change. In an effort to increase care standards, this project attempted to correlate two measures of stress to 24 kHz vocalizations in a rat model, increased heart rate and blood pressure. Vocalizations were observed using a bat-ultrasonic detector, blood pressure and heart rate were monitored with use of an implanted telemetry system. A positive correlation could lead to increased animal care, but we observed no significant correlation relating the stress models to 24 kHz USV production.

Abstract

The integral role of proteins is increasingly apparent in the coordinated events of the fission and fusion of the mitochondrial inner and outer membranes. The voltage dependent anion channel (VDAC) and adenine nucleotide translocase (ANT) serve as a junctional complex between both mitochondrial membranes and is implicated in the division process. Cyclophilin D (CypD), a peptidyl-prolyl *ci-trans* isomerase, binds to the ANT on the inner mitochondrial membrane and may serve a critical role in regulating division. To further understand the function of CypD, cyclophilin 1 (Cyp1) a CypD homologue, was examined using *C. elegans* as the experimental system. Cyp1 antisense and sense DNA constructs were injected into two *C. elegans* strains resulting in Cyp1 knockout and Cyp1 overexpression genotypes. It appears that mitochondrial Cyp 1, and therefore CypD, plays an important role in the fission and fusion of the mitochondrial inner and outer membranes. Expression of the Cyp1 antisense construct indicates a blocked fission mechanism, demonstrating that the mitochondria are not dividing properly. In contrast, the overexpression of Cyp1 appears to enhance division. These data suggest that CypD serves a critical regulatory function in terms of mitochondrial division.

TITLE: **Rap1** stimulates VEGF and IL-8 secretion in oral squamous cell carcinoma
AUTHOR: Suprotim Samaddar
SUPERVISOR: D'Silva Nisha, University of Michigan, Ann Arbor, MI

Abstract

Background: Rap1 is a small GTP-binding protein that has been reported to upregulate vascular endothelial growth factor (VEGF) and Interleukin 8 (IL-8) transcription in prostate carcinoma cells. VEGF and IL-8 induce angiogenesis, which has a significant role in tumor growth and metastasis. *Objective:* The aim of this study was to determine whether Rap1 induced VEGF and IL-8 secretion in human oral squamous cell carcinoma cell lines. The hypothesis is that active Rap1 leads to the secretion of VEGF and IL-8 in the cancer cells, which provides a mechanism for regulation of tumor growth and metastasis. *Methods:* Cell lysates and conditioned media were harvested from ten human oral squamous cell carcinoma cell lines at ~ 60-70% confluence. The cell lines were evaluated for active Rap1 levels via immunoprecipitation of Rap1-GTP, and for total Rap1 by immunoblot analysis. The conditioned media was used to measure VEGF and IL-8 secretion by using an enzyme-linked immunosorbent assay (ELISA). Two cell lines were transfected with Rap-GAP, which inactivates endogenous Rap1. Conditioned media and cell lysates were harvested from the transiently transfected cell lines. *Results:* The level of active Rap1 expression in the cancer cells correlated with VEGF and IL-8 secretion. Cell line UMSCC74-A had the highest amount of active Rap1 and VEGF and IL-8 secretion. Transfection with RapGAP in UMSCC-1 IA and UMSCC-74A, led to lower levels of VEGF and IL-8 secretion. Over expression of Rap1 in UMSCC-11 A resulted in increased

TITLE: Suppression of **murine** TRP mediated inward currents using RNA interference

AUTHOR: Kristin Swor

SUPERVISOR: Rodrigo Andrade, Wayne State University, Detroit, MI

Abstract

Transient Receptor Potential **channels (TRP^c)** are voltage-dependent non-selective cation channels that are localized to a variety of excitable and non-excitable **metazoan** cells. **TRP** channels are evolutionary conserved across many species lines, **indicating** their significance and probable physiological necessity, although their function is still unclear. In this study, we investigated the current induced in HEK 293 cells **transfected** with murine **TRPC5 (mTRP5)** and the **5-HT_{2A}** receptor. We then attempted to eliminate this current using RNA interference in order to attribute it to the activation of **TRPCS** via **5-HT_{2A}** stimulation. The gene suppression technique **RNAi** was chosen to evaluate its efficacy for future TRP studies.

The study was performed using the patch-clamp technique of electrophysiology. Cells were stimulated with S-hydroxytryptamine (S-HT), known commonly as **serotonin**, and the peak currents of control and **RNAi-expressing** cells were assessed. We found that **RNAi** significantly reduced **mTRP5-mediated** inward currents, indicating **RNAi** as a plausible technique for the study of voltage-gated ion channels. In the future, **RNAi** may be **utilized** in brain slices to identify *in situ* currents, lending to a systematic identification of protein channel induced ion currents.

TITLE: Dental implant osseointegration: a study of various factors involved in implant success.
AUTHOR: Matthew Anderson
SUPERVISOR: Randall Goode, DDS, New Baltimore, MI

Abstract

Full and partial edentualism are serious problems in the United States and all over the world. With the advancements in the technology of dental implants and the increased benefit to patients more people are opting for this procedure. The success rate of implants is over 90% but there are still instances where the implants fail to integrate with the surrounding bone. Understanding what factors play a role in increasing the likelihood of successful integration is important for almost anyone in the dental field because of the increasing number of patients with implants. The major factors involved in whether an implant will integrate are the implants surface characteristics, the biomechanical function of the implant, procedural trauma to the surrounding tissue: and the response of the bone proximal to the implant. With increased awareness of the facets involved in successful dental implants patients undergoing the procedure will be able to increase their chances of success and better understand the complex interactions taking place between implant and bone.

TITLE: The diagnosis and treatment options of injuries to the anterior cruciate ligament of the knee.

AUTHOR: Robert Carson

SUPERVISOR: Gary Doss, Orthopedic Associates of Port Huron, Port Huron, MI

Abstract:

The human body relies upon its musculoskeletal system to allow for normal daily function. One very important component of the musculoskeletal system is the knee joint. The knee joint contains many important features, but none are more important in maintaining stability and function than the anterior cruciate ligament (ACL). The ACL connects the femur to the tibia and is susceptible to injury during many athletic and work activities. Injuries to the ACL can be caused in a number of ways and are found in women in significantly larger numbers than in men. Anatomical, hormonal, and environmental characteristics of females and their athletic activities have been studied to try and shed light on the high rate of ACL tears.

Physicians use a variety of tests to accurately diagnose injuries to the ACL. Depending on the severity of the injury and other factors that would put a patient at high risk, the ACL tear can be treated conservatively or with surgical procedures. Surgical procedures are similar for the reconstruction of the ACL, the only difference being which type of graft is used to replace the damaged ACL. Research on ACL reconstruction has focused on which types of graft materials provide the most success in providing stability and returning patients back to athletic activities. Further research will allow for more breakthroughs in the field of ACL injury treatment.

ABSTRACT

Rheumatoid **arthritis** is an **autoimmune** disease that causes **inflammation** in the lining **of joints** causing warmth, **swelling**, and pain in the joint. It **affects almost 1 percent** of the **United States population**, and affects people world wide, It's cause is still being intensely researched and possibilities are focused on a genetic, viral, or bacterial basis. The symptoms of **rheumatoid** arthritis arc centered around the inflamed joints, but this **inflammatory disease** can **also** manifest itself through loss of appetite, weight loss, anemia, or visibly through protruding rheumatoid nodules. Symptoms may appear progressive, or they may be mild with periods of increased **inflammation** and pain, **called flares**

Treatments need to be assessed by investigating the indications, **efficacy**, costs, and side **effects**. Rheumatologists and primary care physicians need to **be** aware of the symptoms, **causes**, and treatments **when** making the **clinical** diagnosis. Physical **findings** based on joint examinations, radiographic **findings** based on x-rays, and laboratory findings based on laboratory tests, **will** allow the health care provider to fully diagnose the disease as rheumatoid arthritis

A **management** plan to control the progress of the disease is crucial to **effectively** maintain the patient's well being. After the diagnosis has **been** made, an initial treatment plan **will** be implemented to address the patient's perspective, and to weigh the options of treatment, and review the prognosis. Next, a treatment regimen will be formed to comply with the patient's pathogenic needs and the patient's preferences. **Finally**, a close monitor of the patient's disease is necessary to control the disease, and to implement **different** methods of treatment if necessary.

TITLE: Root canal therapy and related to it endodontic procedures
AUTHOR: Kamila Demkiewicz
SUPERVISOR: Malgorzata Wlodarczyk, DDS, Warren, MI

ABSTRACT

Once upon a time, if you had a tooth with a diseased nerve, you'd probably lose that tooth. Today, with a special dental procedure called a root canal therapy you may save that tooth.

Inside each tooth is the pulp, which provides nutrients and nerves to the tooth. It runs like a thread down through the root. When the pulp is diseased or injured, the pulp tissue dies. If it is not removed, the tooth gets infected and one may lose it. After the dentist removes the pulp, the root canal is cleaned and sealed off for protection. Then the dentist places a crown over the tooth to help make it stronger.

Most of the time, a root canal is a relatively simple procedure with little or no discomfort involving one to three visits. Best of all, it can save a tooth and a smile!

TITLE: Cerebral palsy and gait: a focused look at spasticity and management with **Botulinum toxin type A**

AUTHOR: Kimberly **Hartman**

SUPERVISOR: Sharon **Geimer**, MD, Riverbend Healthcare, Shelby Township, **MI**

Abstract

The hopes and expectations of parents may be disrupted by their child's **abnormal** motor development. Particularly in the area of walking, disabilities can lead to physical as well as psychosocial detriments. A common diagnosis in disabled children is cerebral palsy. Cerebral palsy (CP) is a collection of motor disorders involving a static injury to the premature brain. One of the most prevalent neuromotor disorders among children, CP affects 1.5 to 2.5 per 1000 live births, with medical technology actually increasing the rate of cerebral palsy in the United States. Although relatively common in society, little is known of the risks of these disorders and thus, prevention is currently impossible. Without a viable means of preventing CP, emphasis on treatment and management is of utmost import. Treatment of gait abnormalities is the main focus of many therapeutic strategies, as a restoration to normalcy can improve the child's physical capabilities as well as psychological interactions. Dysfunction in walking is frequently the result of spasticity (high muscle tone) in cerebral palsy. Recent research focuses on reducing spasticity by use of motor point blocks. Botulinum toxin type A (BTX-A) is the latest motor block to be examined and has been shown to drastically improve spasticity and **gait** in children with CP. Although BTX-A is only approved in some realms, it is the hope of physiatrists that increasingly widespread use will reduce, if not fully negate, the effects of the neuromotor disorders ~~that~~ are cerebral palsy.

TITLE: A relationship-centered health reform to the traditional U.S. medical system
AUTHOR: Jonathan Hughes
SUPERVISOR: Dr. Cabras, Lakeview Medical Center, Paw Paw, MI

Abstract

The actual interaction between the physician and the patient has always been the fundamental component of any health care system. Traditionally, paternalistic disease-based care guided treatments in the United States with wide success and approval. However, with present poor access and perceived poor quality of care, the current U.S. health system is no longer adequate. Relationship-centered health is a new perspective in medicine applicable to primary and specialty care. This approach aims beyond physical pathology, and focuses upon developing the necessary health care bonds that benefit the holistic human experience. Implementation of a relationship-centered perspective would be relatively simple and would not demand drastic changes in policy. However, changing to such an approach would drastically improve physician, patient, and community aspects. Educating future physicians in a relationship-centered model is necessary in order to effectively care for the diverse population and complex health problems of the United States.

Hypertension in a dental school patient population
AUTHOR: Sara Kellogg
SUPERVISOR: John Gobetti, DDS, University of Michigan, Ann Arbor, MI

Abstract:

A retrospective study of patient records was examined to investigate the incidence of hypertensive patients seen at a U.S. dental school. This research was conducted in hopes of creating a national awareness of the current problems in diagnosing and treating hypertensive patients in the dental community so that appropriate changes can be made.

Nine-hundred and seventy-six records of patients who were seen between January 1, 1999 and January 1, 2000 were reviewed. Five-hundred records that met specific criteria; health history, medications used, recorded blood pressure, etc. were selected for the study. Factors examined include the following: demographic data history of hypertension, JNC blood pressure classification, control of hypertension, medication used, tobacco/alcohol use, etc.

The data demonstrated that 32% of the patients seen were hypertensive, 48.1% of whom were unaware of their high blood pressure prior to their visit to their dental providers. Eight point eight percent of the hypertensive patients had such elevated blood pressures that they had to be sent for medical consent before they were able to be treated. Fifty-three percent of the hypertensive patients were female. The average blood pressure of the hypertensive patients was found to be, systolic 145.6, diastolic 87.9, JNC stage II classification. Fifty-eight percent of hypertensive patients used tobacco products regularly and 36.9% used alcohol weekly. Of the diagnosed patients, 41.9% were taking anti-hypertension medication for their condition, 13% were taking two or more. Hypertension is a serious problem affecting nearly one third of the dental school population. It is crucial that dental providers take blood pressure readings for screening, monitoring of hypertensive patients, and appropriate dental care.

TITLE: Total knee arthroplasty: an investigation of the causes, the surgery, the alternatives and the patient results of the procedure

AUTHOR: Shawn Kidd

SUPERVISOR: Thomas Ryan, MD, Kalamazoo Orthopaedic Clinic, Kalamazoo, MI

Abstract

The population in American society is growing older by the day. Not only are people living longer, but they are also becoming more and more active. This active lifestyle that many elderly people lead has lead to a dramatic increase in the number of osteoarthritis cases nation wide. Osteoarthritis of the knee is one of the most prevalent and damaging skeletal disorders that can occur. This degenerative disorder of the knee causes intense pain, loss of stability, decreased strength, loss of range of motion, and overall discomfort for the patient. This disease occurs as the result of a traumatic injury, a genetic disease, or, in most cases, from simple wear and tear of the knee joint due to simple everyday activities. Until about 25 years ago, the only option that patients had to combat this disease was to take various kinds of drugs or injections and go through intense physical therapy sessions. However, a procedure known as Total Knee Arthroplasty has been developed and has become one of the most widely used procedures for relieve the pain and discomfort that a patient feels due to osteoarthritis. The success rates and patient satisfaction for this procedure are extremely high making it a highly desirable operation, not only for the elderly population, but also for the middle aged population as well. Although there are a small number of drawbacks and risks to this procedure, the positive aspects of TKA far outweigh the negative. This paper will discuss the reasons why TKA is chosen by patients with knee pain, what it is that causes their pain, and how TKA improves the quality of life of those who undergo the procedure. In addition, the surgery itself will be described as well as a list of alternatives to the procedure, both surgical and non-surgical.

TITLE: Brain cancer-the **ultimate** clinical challenge: an **outline** of the biology, treatment and research of glioblastoma **multiforme**

AUTHOR: Karen Sherman

SUPERVISOR: Anthony **Asher**, Carolina neurosurgery & Spine Associates, Charlotte, NC

Abstract

Glioblastoma **multiforme** (GBM) is the most common type of malignant brain tumor in adults. This lesion is typically associated with poor survival despite aggressive conventional therapies. Symptom evolution in patients diagnosed with GBM **is** generally related to tumor location: and rapid deterioration of neurologic function is common. These tumors are composed of necrotic, cystic, and hemorrhagic elements and can possess significant morphological heterogeneity. Aggressive multimodality treatment, which is most appropriate for younger patients with good functional status, typically includes craniotomy for tumor resection, external beam radiation therapy, chemotherapy, and other adjuvant therapies. Because of the aggressive nature of glioblastoma **multiforme**, **most** patients suffer tumor recurrence within a year of diagnosis, and most die within two years. None of the available treatment options are curative measures, but rather palliative procedures that ideally offer increased survival and an improved quality of life. Intense research efforts regarding this tumor are ongoing. The most promising research has concentrated on the molecular biology of tumor growth and extension within the central nervous system.

TITLE: Associations of periodontal disease and edentulism with glycemic control status in US adults with diabetes

AUTHOR: Thomas Simon

SUPERVISOR: George Taylor, DDS, University of Michigan, Ann Arbor, MI

Abstract

Objective: To investigate the effects of periodontal disease and edentulism on glycemic control in people with diabetes. *Methods:* Data from the National Health and Nutrition Examination Survey III was analyzed using bivariate and logistic regression analysis with the SUDAAN 8.01 statistical analysis program. Variables involved included diabetes status, oral health status, glycemic control, age, income, education, smoking status, tobacco usage: alcohol, heavy alcohol use, exercise, osteoporosis, diabetic therapies, and race/ethnicity. *Results:* Analysis showed no significant differences in the associations of edentulism and periodontal disease on glycemic control. *Conclusion:* The data showed a similar relationship between edentulism and diabetes, and between periodontal disease and diabetes. The results indicated that those with periodontal disease and those with edentulism both showed higher prevalences of poor glycemic control when compared to those with no periodontal disease.

TITLE: Exploring the link between periodontal disease and coronary heart disease: a review of the literature

AUTHOR: Dan Wagner

SUPERVISOR: Sven Erickson, DDS, St. Joseph, MI
Abstract

Periodontal disease, experienced by approximately 75 percent of adults in the United States, is a chronic bacterial infection that affects gums and bones supporting the teeth, as a result of toxins produced from oral bacteria. It is thought that this bacterium enters the blood stream and attaches to plaques in the coronary arteries and contributes to clot formation; &indicative sign of coronary heart disease. Several studies have examined whether an association between periodontal disease and coronary heart disease exists. The majority of studies have shown a positive association between the two diseases, however due to several concerns about the strength of associations, inconsistent study findings, and differences in measurements of periodontal disease and coronary heart disease, more studies still need to be performed examining this issue before drawing a final conclusion.