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DAY 1

Keynote Forum

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March 26-28, 2018 | Vienna, Austria

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William J Rowe, Int J Anesth Pain Med 2018, Volume 4
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NEIL ARMSTRONG SYNDROME AND THERMOGENESIS

William J Rowe

University of Toledo College of Medicine and Life Sciences, USA

Neil Armstrong syndrome applies both to earth with common magnesium (Mg) deficits and with Mg deficits invariably occurring in space (S); this can trigger acute temporary heart failure i.e., (catecholamine (C) cardiomyopathy). Whereas the normal CO_2 levels on earth are 0.03% in S, during the Euromir 94 missions, levels, over 10 times higher (0.5-0.7% CO_2). It has been postulated that there is, with S flight, an intracellular shift of calcium (Ca) conducive to vasospasm and damage to mitochondria. Mg is a Ca blocker and strong antioxidant and is required for thermoregulation with loss of Mg in sweat and renal Mg loss and dehydration; this will increase potential for heart failure and hypertension. C levels in S are twice supine levels on earth. Armstrong, during his last 20 lunar minutes, notified Houston twice during a 4 minute interval that he was short of breath along with heart rates up to 160; tachycardia will intensify oxidative stress in S from Mg ion deficits, high C, high free fatty acids and vicious cycles. This syndrome: severe dyspnea, severe thirst, severe tachycardia corrected by fluid replenishment, applies to earth as well; it would be more likely to occur in post-menopausal women with 90% of cases of C cardiomyopathy reported in this group, marathoners particularly at the finish line and those in the tropics, particularly with water shortages. It is likely to be corrected, relatively quickly either by intravenous fluids or a subcutaneous Mg injection.

Biography

William J. Rowe M.D. FBIS (Fellow British Interplanetary Society), FACN (Fellow American College of Nutrition), is a board certified specialist in Internal Medicine. He received his M.D. at the University of Cincinnati and was in private practice in Toledo, Ohio for 34 years. During that time he supervised over 5000 symptom - limited maximum hospital-based treadmill stress tests. He is a former Assistant Clinical Professor of Medicine at the University of Ohio, School of Medicine at Toledo. He studied 3 world class extraordinary endurance athletes and published their exercise---related magnesium deficiencies. This triggered a 20 year pursuit of the cardiovascular complications of Space flight. He has published in LANCET that extraordinary, unremitting endurance exercise can injure a perfectly normal heart. Of only 4 space syndromes, he has published 2: "The Apollo 15 Space Syndrome" and "Neil Armstrong Syndrome." He published Neil Armstrong's probable lunar acute heart failure. He has been listed in the Marquis Whos Who of the World from 2002-2009,2013, 2014, 2015, 2016, 2017

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Michael S Bronze, Int J Anesth Pain Med 2018, Volume 4
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IMPACT OF HEPATITIS C VIRUS: UPDATE ON PATHOGENESIS OF COMPLICATIONS AND TREATMENT STRATEGIES

Michael S Bronze

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Hepatitis C (HCV) is a global infection due to *Hepacivirus*, a member of the Flaviviridae family. Parenteral routes including blood transfusion, injecting drug and exposure to medical procedures usually transmit infection; however, the virus can be transmitted maternally and in some patients, no known risk factor is identifiable. Over 170 million persons worldwide are infected and chronic infection leads to cirrhosis, hepatocellular carcinoma and increased all-cause mortality. The majority of infected patients maintain a chronic infection leading to several hepatic and non-hepatic complications. Linked to progressive infection is the presence of significant fibrosis within the liver and several risk factors predict which patients are likely to develop complications such as cirrhosis, hepatocellular carcinoma (HCC), and increased all-cause mortality. HCC is the fifth most common cancer in males, seventh in females and is a major cause of cancer related death. Eighty-five percent of cases occur in the developing world and HCV is a leading predisposition. The pathogenesis of HCV related HCC is complex and unlike hepatitis B virus, HCV does not integrate into the host genome. However, HCV does dysregulate cellular proliferation and differentiation pathways, creates chronic inflammation and inhibits tumor suppressor gene activity. Our laboratory has focused on two aspects of HCC carcinogenesis, namely cancer like stem cells and chronic inflammation. Hepatoma cells expressing a HCV subgenomic replicon express several cancers like stem cell markers, especially doublecortin-like kinase (DCLK1), a microtubule kinase that is a putative marker for intestinal and pancreatic cancers. Expression of DCLK-1 is linked to HCV replication and tumorigenesis in xenograft models, and DCLK-1 is identifiable in tissue and plasma derived from patients with HCV associated cirrhosis and HCC. SiRNA knockdown of DCLK-1 inhibits tumor growth in animal models suggesting that DCKL-1 might be a therapeutic marker. Additionally, total RNA analysis of FCA4 cells, which also express a HCV subgenomic replicon, reveals upregulation of DCLK-1 and a number of pro-inflammatory markers including S100A9 and SMARCA. These cells generate tumors in xenograft models that express DCLK-1, AFP and S100A9 and siRNA knockdown of DCLK-1 abrogates tumorigenesis and S100A9 expression. Over the last several years, there has been significant progress in the treatment of HCV infection. New, pan-genotypic direct antiviral agents (DAA) have vastly improved our treatment strategies not only achieving cure in a large percentage of patients, but also showing promise in reducing the complications of HCV infection.

Biography

Michael S. Bronze, M.D. was appointed Professor and Chairman, Department of Medicine, University of Oklahoma Health Sciences Center effective July 1, 2000. He was named the Stewart G. Wolf Professor in Internal Medicine in 2004 and David Ross Boyd Professor in 2011. He is board certified in Internal Medicine and Infectious Diseases. He completed his medical school training at the University of Tennessee, Memphis in 1982. His internship and residency were completed at the University of Tennessee, Memphis and served and additional year as Chief Medical Resident.

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PERSONALIZED AND TRANSLATIONAL MEDICINE AS A MODEL OF THE HEALTHCARE SERVICES AND ARMAMENTARIUM TO GET THE MODEL ARMED: MYTH OR THE REALITY?

Sergey Suchkov

I M Sechenov First Moscow State Medical University and Moscow Engineering Physical Insti-tute (MEPhI), Russia

A new systems approach to diseased states and wellness result in a new branch in the healthcare services, namely, personalized medicine (PM). To achieve the implementa-tion of PM concept into the daily practice including clinical cardiology, it is necessary to create a fundamentally new strategy based upon the subclinical recognition of bioindicators (biopredictors and biomarkers) of hidden abnormalities long before the disease clinically manifests itself. Each decision-maker values the impact of their decision to use PM on their own budget and well-being, which may not necessarily be optimal for society as a whole. It would be extremely useful to integrate data harvesting from different databanks for applications such as prediction and personalization of further treatment to thus provide more tailored measures for the patients and persons-at-risk resulting in improved outcomes whilst securing the healthy state and wellness, reduced adverse events, and more cost effective use of health care resources. One of the most advanced areas in cardiology is atherosclerosis, cardiovascular and coronary disorders as well as in myocarditis. A lack of medical guidelines has been identified by the majority of responders as the predominant barrier for adoption, indicating a need for the development of best practices and guidelines to support the implementation of PM into the daily practice of cardiologists! Implementation of PM requires a lot before the current model "physician-patient" could be gradually displaced by a new model "medical advisor-healthy person-at-risk". This is the reason for developing global sci-entific, clinical, social, and educational pro-jects in the area of PM to elicit the content of the new branch.

Biography

Sergey Suchkov graduated from Astrakhan State Medical University and was awarded with MD and maintained his PhD and Doctor's degree. He was working for Helmholtz Eye Research Institute and Moscow Region-al Clinical Research Institute. He was a Secretary-in-Chief of the Editorial Board, *Biomedical Science,* an international journal published jointly by the USSR Academy of Sciences and the Royal Society of Chemistry, UK. Currently, he is a Director of Center for Personalized Medicine, Sechenov University; Chair of the Department for Translational Medicine, Moscow Engineering Physics University and Secretary General of United Cultural Convention, Cambridge, UK. He is a Member of the New York Academy of Sciences; American Chemical Society; American Heart Association; AMEE, Dundee, UK; EPMA, Brussels, EU; PMC, Washington, DC, USA and ISPM, Tokyo, Japan.

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Areerat Suputtitada, Int J Anesth Pain Med 2018, Volume 4
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NOVEL OF EXTRACORPOREAL SHOCKWAVE THERAPY AND HIGH-POWER LASER THERAPY IN MUSCULOSKELETAL PAIN CONDITIONS

Areerat Suputtitada

Chulalongkorn University & King Chulalongkorn Memorial Hospital, Thailand

Rehabilitation management of musculoskeletal pain conditions are challenges. Most patients developed chronic pain conditions since inadequate management during acute pain phase. Currently, extracorporeal shock wave therapy (ESWT) and Class IV lasers or high-power laser therapy are novel therapy for these conditions. Interestingly that both therapies with different actions and mechanisms have same benefits on musculoskeletal pain conditions and considered as regenerative medicine therapies. The evidences of safety, efficacy and good patient compliance made both therapies to be increasing popular in the worldwide. ESWT has become one of the best investigated treatment modalities for various conditions of the musculoskeletal system such as myofascial pain syndrome, tendinopathies and osteoarthritis, etc. An optimum treatment protocol for ESWT appears to be three treatment sessions at one-week intervals, with 2000 impulses per session and the highest energy flux density that can be applied. The proposed mechanisms for the benefit of ESWT on musculoskeletal tissue include direct effects on tissue calcification, alteration of cell activity through cavitation, acoustic micro streaming, hyper vascularity and blood flow increment, alteration of cell membrane permeability and effects on nociceptors through hyper stimulation, blocking the gate control mechanism. Class IV lasers or high-power laser therapy offers better therapeutic outcome compared to Class III lasers as follows: (1) larger dosages of therapeutic energy. (2) deeper penetration into the body. (3) larger treatment surface area. This is important when treating large regions, such as the lumbar spine, quadriceps or hips. (4) greater power density. (5) continuous power supply. (6) superior fiber optic cables: Fiber optic cables transmit laser energy from the laser to the treatment probe (wand) at the end of the cable. The beneficial effects of ESWT and high-power laser therapy on musculoskeletal tissues are anti-Inflammation, analgesic, accelerated tissue repair and cell growth, improve vascular activity, release trigger points and desensitization, reduce fibrous tissue formation. In conclusion, ESWT has been proven for more than 20 years as effective and safe noninvasive treatment option for tendon and other pathologies of the musculoskeletal system in a multitude of high-quality RCTs. High power laser therapy is by far the most exciting new clinical treatment to advance physical medicine in the 21st century anti-inflammatory and analgesic effects. It offers better therapeutic outcome compared to Class III lasers which has been used for a long period of time with little impressive outcome. High power laser therapy is newer therapy with increasing evidences.

Biography

Areerat Suputtitada MD is a Professor of Rehabilitation Medicine from Chulalongkorn University and King Chulalongkorn Memorial Hospital, Bangkok, Thailand. She is the Director of Excellent Center for Gait and Motion at King Chualongkorn Memorial Hospital and Chairperson of Neurorehabilitation Research Unit of Chulalongkorn University. She has been involved in education, residency training, research, and clinical treatment related to rehabilitation medicine for more than 20 years. She was invited as international speaker more than 80 times around the world. She received 18 national and international awards, and published more than 60 national and international articles in several areas of Rehabilitation Medicine including Neurological Rehabilitation, Spasticity and Dystonia, Pain, Gait and Motion, and Sport and Exercise Medicine. She has been elected and appointed to important positions in the ISPRM such as the Chairperson of ISPRM Women and Health Task Force and ISPRM International Exchange Committee.

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ACUPUNCTURE ANALGESIA, ADVANTAGES AND LIMITATIONS

Xinyan Gao

Academy of Chinese Medical Sciences, China

Pain relief is a puzzle. Though no possible single theory can clarify the mechanism for acupuncture analgesia, acupuncture analgesia is the most acceptant treatment field clinically and basically. In recent years, we have studied the effect of acupuncture on inhibition of C-fiber reflex or RIII reflex as a quantitative sensory test for acute pain or chronic pain to investigate the mechanism of acupuncture analgesia. Based on this methodology, we investigated homotopic and heterotopic acupuncture mediated by gate of spinal level and diffuse noxious inhibitory controls (DNIC) of supraspinal level. Additionally, we studied influential factors as caffeine and adenosine system and mechanism of glia-mast cell crosstalk on acupuncture analgesia. Our research demonstrated acupuncture is characterized by irreplaceable advantages but with limitations on pain management.

Biography

Prof. Gao Xinyan has completed her PhD from China Academy of Chinese Medical Sciences (CACMS), and postdoctoral studies from Baptist University of Hongkong 2009 and Medical University of Graz 2011. She is the director of Department of Physiology, Institute of Acupuncture. She has published more than 30 papers in reputed journals and has been serving as an editorial board for several peer reviewed journals. Her research has been supported by National Natural Scientific Foundation of China for 4 times.

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LIPOSOMAL BUPIVACAINE: A NOVEL, LONG ACTING LOCAL ANESTHETIC

Christopher F Tirotta

Nicklaus Children's Hospital, USA

Post-operative pain control continues to be a problem in surgical patients. A novel formulation of an ultra-long acting local anesthetic is now available in the US: Exparel or liposomal bupivacaine. Liposomal bupivacaine is made up of microscopic polyhedral particles. The liposomes encapsulate the drug, bupivacaine hydrochloride, without altering molecular structure. This provides the reliable low dose release of the bupivacaine over time, providing long-lasting, post-surgical pain relief over the course of 2-3 days. This eliminates the need for titration of a single dose or the need for external devices or pumps to prolong analgesia. Plasma bupivacaine levels may persist for 96 hours after injection. Peak plasma concentrations are lower in magnitude and occur later in time than after a similar injection with bupivacaine HCl. Plasma bupivacaine concentrations are not correlated with local efficacy. Safety profile was evaluated in 10 clinical trials in patients undergoing a variety of surgical procedures. Most common adverse events were nausea, constipation and vomiting. Exparel demonstrated a favorable cardiac profile. There was no cardiac toxicity and no QTc prolongation, even a supra-therapeutic dose. Rate of absorption is dependent on total dose administered, route of administration and vascularity of the surgical site. Efficacy has been established. Multiple trials demonstrated a significant reduction in pain intensity scores and a reduction in overall opioid consumption as compared to placebo. Liposomal bupivacaine is a safe and effective novel drug to treat post-surgical pain.

Recent Publications

1. Bramlett K, Onel E, Viscusi E R, Jones K (2012) A randomized, double-blind, dose-ranging study comparing wound infiltration of DepoFoam bupivacaine, an extended-release liposomal bupivacaine, to bupivacaine HCl for postsurgical analgesia in total knee arthroplasty. Knee. 19(5):530-536.
2. Bergese S D, Onel E, Morren M, Morganroth J (2012) Bupivacaine extended-release liposome injection exhibits a favorable cardiac safety profile. Reg Anesth Pain Med. 37(2):145-151.
3. Naseem A, Harada T, Wang D, et al. (2012) Bupivacaine extended release liposome injection does not prolong QTc interval in a thorough QT/QTc study in healthy volunteers. J Clin Pharmacol. 52(9):1441-1447.
4. Gorfine S R, Onel E, Patou G, Krivokapic Z V (2011) Bupivacaine extended-release liposome injection for prolonged postsurgical analgesia in patients undergoing hemorrhoidectomy: a multicenter, randomized, double-blind, placebo-controlled trial. Dis Colon Rectum. 54(12):1552-1559.
5. Golf M, Daniels S E, Onel E (2011) A phase 3, randomized, placebo-controlled trial of DepoFoam®bupivacaine (extended-release bupivacaine local analgesic) in bunionectomy. Adv Ther. 28(9):776-788.

Biography

Christopher F Tirotta has been an active Member of Miami Children's Hospital medical staff since 1991, practicing with the Department of Anesthesiology; he has served as the Director of Cardiac Anesthesia since 2002. He has served as Chief of the Department of Anesthesia since July 2017. He also has a clinical appointment with the Department of Anesthesiology at The University of Miami School of Medicine. He received his BA from Cornell University (USA) in 1982 and his MD from New York University School of Medicine (USA) in 1986. He also received an MBA degree from Columbia University in 1999. He completed his internship in Internal Medicine at State University of New York, Stony Brook in 1987. He completed his residency training in Anesthesiology at the University of Miami/Jackson Memorial Hospital in 1990; he sub-specialized in pediatric and cardiovascular anesthesia, including heart transplantation.

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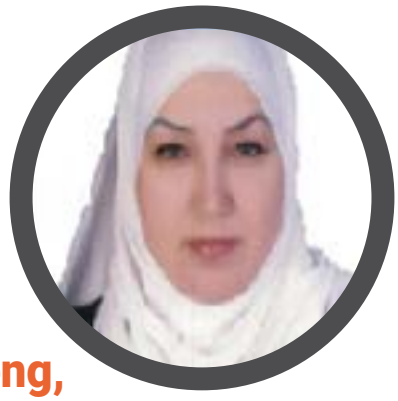

EPIGENETIC RE-PROGRAMMING OF PLASMA MICROVESICLES IN SEPSIS

Duaa Dakhlallah, Jon Wisler, Tierra Ware, Erin Leatherman, Yijie Wang, Amy Gross, Joyce Obeng, Ahmad Dakhlallah, Timothy D Eubank and Clay B Marsh

West Virginia University, USA

Background: Sepsis microvascular dysfunction embraces different cellular components including endothelial cells, in which it increases its permeability and activation to shed extra microparticles (MPs) to transport a unique cellular signaling to the recipient cells. In this study, we observed that microparticles can retain different epigenetic components as miRNA, mRNA of DNMTs and HDACs from parent cells that can transfer to naïve target cells. Importantly, in sepsis, MPs production is increased. Increased expression of DNMTs results in promoter hypermethylation which can suppress transcription of not only a single gene but networks of genes with systemic effects. Sepsis is an inflammatory insult which can result in vascular dysfunction leading to systemic shock and eventual death.

Aim: The aim of this study is to distinguish the role of sepsis microparticles in systemic immunosuppression process and the impact of these particles upon cellular targets and survival mechanisms to allow better diagnostic tools and potential novel therapeutic approach during infection and trauma.

Methodology: Endothelial cells (HUVEC) and naïve monocytes treated with MPs from patients with sepsis demonstrated dramatically reduced of anti-inflammatory genes, TGF-β, TNF-α expression and some of autophagy molecules (ATG5, ATG7 and LC3) due to hypermethylation of their promoter. These data demonstrate that mRNAs of epigenetic regulators including DNMTs are highly expressed in plasma MVs in patients with sepsis and can be transferred to naïve cells through MVs and cause pro-inflammatory cytokine gene silencing and autophagy repression in monocytes. Further, MVs per mL plasma on day 1 alone significantly correlated with death by day 5 (r=0.7125 and p=0.0042). Using immunostaining techniques and flow cytometer, we found the major source of plasma MVs in the critically-ill, non-septic control patients shifted from monocytes (Mo) to endothelial cells (EC) in the SS patients (Control: Mo 63.6% and EC 7.4% and SS: Mo 12% and EC 58.7% qualitatively). Focusing our study on SS patients who lived and SS patients who died by day 5, our data shows that while total DNMT mRNA copy numbers per plasma MV are significantly higher over days 1 and day 3 in those SS patients who lived, the ratios of DNMT1 (maintenance DNA methylation) and the combination DNMT3A and DNMT3B (de novo DNA methylation) are reversed on days 1 and 3 (SS Lived: DNMT3A/3B-to-DNMT1: day 1=0.68 and day 3=0.87; SS Died: DNMT3A/3B-to-DNMT1: day 1=2.49 and day 3=2.94). Finally, MV DNMT3A/3B mRNA from day 1 samples positively correlates with reduced survival (r=6261 and p=0.0165). Targeting of circulating MVs with commercially available inhibitors of DNMTs may be a therapeutic strategy in specific patients with deregulated epigenetic mechanisms to limit both early and chronic consequences.

Results: We found that MPs from patients with septic shock and septic had significantly increased mRNA for DNMTs compared to MPs from patients with critical illness without sepsis and from normal healthy adults over the course of 5 days. Remarkably, we noticed that DNMT1 and -3a mRNA has the highest gene expression in sepsis MPs compared to other DNMTs. Additionally, naïve monocytes treated with MPs from patients with sepsis demonstrated increased expression of DNMTs. At the same time decreased expression at 24 hours.

Biography

My research focuses on the genetic mechanisms and regulatory pathways involved in pulmonary disease. In my graduate study I had focused on the role of microRNAs and epigenetic regulators in disease pathology. Specifically, we had identified alterations in gene regulation that correlates with clinical severity of disease in IPF. This has allowed us to target potential therapies, some of which have shown significant promise in our small animal models. While my current focus is on patients with IPF, these pathways allow diverse application too many fields of study. We have developed several collaborations with clinicians and researchers a like examining epigenetic regulation in diseases such as breast cancer, sepsis and acute respiratory distress syndrome. The central theme of my research is to identify epigenetic mechanisms by which prolonged macrophage survival can amplify the immune response and contribute to cancer, metastasis, Autophagy, chronic lung inflammation in idiopathic pulmonary fibrosis (IPF) and other inflammatory lung diseases.

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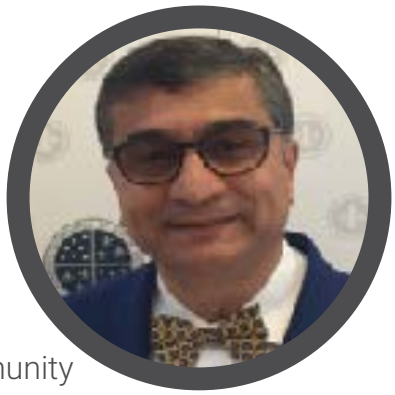

ANTIBIOTIC RESISTANCE: A THREAT TO MODERN MEDICINE

Reza Nassiri

Departments of Pharmacology and Toxicology, and, Family and Community Medicine, Michigan State University, East Lansing, Michigan, USA.

Global consumption of antibiotics has increased nearly 40% in the last decade. The incredible rapid antibiotic resistance which is taking place worldwide is not only a serious threat to the practice of modern medicine, but also a threat to global public health. This issue of bacterial resistance is so alarming that it caught the attention of G-20 Summit in both China (2016) and Germany (2017), let alone the U.N. Assembly in 2016 had called for a special meeting of "superbugs" which focused on the escalating drug resistance with respect to the sexually transmitted disease gonorrhea and carbapenem resistant Enterobacteriaceae. While the causes of antibiotic resistance are complex, certainly human behavior play a significant role in the spread of antibiotic resistant genes. In addition to the human behavior, the drivers of resistance include agriculture sector, animal husbandry, household and industry – these factors contribute significantly to the spread of the resistant genes within the ecosystem. Such resistant mechanisms are continuously emerging globally, which threatens our ability to treat common infections, resulting in increased death, disability and costs. Since the development and clinical use of penicillin, nearly 1000 resistant-related beta-lactamases that inactivate various types of antibiotics have been identified. There is also a global concern about the emergence of antibiotic resistant carried by the healthy individuals, the commensal bacteria. The CDC and WHO surveillance data shows that the resistance in E. coli is generally and consistently the highest for antibacterial agents in both human and veterinary medicine. Within communities, resistant bacteria circulate from person to person or from animals and environment to person, or vice versa. With 1 billion people travelling each year, bacteria is becoming more mobile. The bacterial resistance can kill 700,000 worldwide each year and it's been estimated to kill 10 million by 2050. The WHO estimates 78 million people a year get gonorrhea, an STD that can infect the genitals, rectum and throat - there is a widespread resistance to the first-line medicine ciprofloxacin as well as increasing resistance to azithromycin. The emergence of resistance to last-resort treatments known as extended-spectrum cephalosporins (ESCs) is now eminent.

Biography

Nassir, R. (Keynote Address). Antibiotic Resistance: A Global Crisis. 2017 OMED International Seminar, October 7, 2017. Philadelphia, Pennsylvania, USA. Departments of Pharmacology and Toxicology, and, Family and Community Medicine, Michigan State University, East Lansing, Michigan, USA.

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PHYSIOTHERAPY RELIEVES PAIN AN EVIDENCE-BASED PRACTICE

Natarajan Venkatesh

Sri Ramachandra University, India

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or injury, or described in terms of such damage or injury. Physical rehabilitation emphasizes the use of modalities such as heat, cold, and electricity to relieve pain. Heat, one of the oldest modalities to relieve pain, can also decrease muscle spasm and improve function superficial heat can be provided by means of hot packs, hot water bottles, hot moist compresses, electrical heating pads, or chemical or gel packs. Deep heating (diathermy) is achieved by converting another form of energy to heat. In shortwave diathermy, high-frequency electrical currents are converted to heat, while microwave diathermy uses electromagnetic radiation as the source. Electricity has been a pain treatment modality since ancient times. The most common mechanism for applying therapeutic electricity is Transcutaneous Electrical Nerve Stimulation (TENS), Interferential therapy (IFT). Electro galvanic stimulation (EGS), electrical muscle stimulation (EMS) and neuroaugmentative stimulation are other rehabilitative methods that employ electrical current. TENS involves the delivery of electrical energy across the surface of the skin to stimulate the peripheral nervous system is based on the gate control theory of pain modulation. TENS is most effective in neuropathic pain such as complex regional pain syndromes (reflex sympathetic dystrophy and causalgia), phantom pain, and post herpetic neuralgia. Empirical and experiential evidence indicates that TENS, in selected patients, can provide an alternative to medications and improve the individual's function. However, several trials and systematic reviews indicate that a large, perhaps major, component of pain relief after TENS is due to a placebo effect.. Ultrasound, first introduced for medical use in the United States in the late 1940s, uses high-frequency acoustic vibration that is converted into heat. Deep-heating modalities increase temperature to depths of 3–5 cm. Ultrasound is the preferred treatment in most painful disorders, especially those arising from soft tissues and ligaments, as it has greater penetration and also nonthermal effects, such as increasing extensibility of tissues.

Conclusion: Ultrasound has greater penetration effect hence used widely for pain relief for soft tissue and ligament injuries and TENS for neurological conditions.

Biography

I am Natarajan Venkatesh (N. VENKATESH) working as Professor in Faculty of Physiotherapy, in Sri Ramachandra University, Chennai – 600 116, India. I have been in clinical and teaching Physiotherapy for the past 25 years. I am PhD scholar. I am working on Influence of Yoga on Autonomic Nervous System. Honor of Awards received: Distinguish Service Award by the Indian Association of Physiotherapists on 23.01.05. ----"Best Teacher Award" (Chosen by Vice Chancellor, The Tamil Nadu Dr. MGR Medical University on 05.09.2011) --- Fellowship Award – 51st by The Indian Association of Physiotherapists 2013 (FIAP).

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