

Drug Information News

Volume 1, Issue 2

Second Quarter - 2009

Drug Information Resident

Texas Southern University's Drug Information Center is proud to welcome Dr. Portia Davis as the new Drug Information Resident for the 2009-2010 year. Dr. Davis is a member of the Rho Chi Pharmacy Honor Society and president of the Gamma Delta Chapter at Texas Southern University. She is affiliated with multiple professional organizations such as the American Society of Health System Pharmacists, American Pharmacists Association and has held leadership positions in the Alpha Sigma Chapter of Lambda Kappa Sigma International Professional Pharmacy Fraternity. With earning her doctor of pharmacy degree from Texas Southern University and her continuing service to the community, Dr. Davis looks forward to dedicating herself to the profession of pharmacy through the drug information center and being accessible to provide drug information services to local health care professionals. We are excited to have Dr. Davis on our team as we continue to advance in providing current, unbiased, evidence based drug information to the Houston community and look forward to another productive year.



Southern University. She is affiliated with multiple professional organizations such as the American Society of Health System Pharmacists, American Pharmacists Association and has held leadership

The PPI/Plavix® Interaction

By: Adlia M. Ebeid PharmD, Drug Information Resident

In the last issue of the Drug Information Newsletter, an article regarding the effect of proton pump inhibitors (PPIs) on clopidogrel caught the attention of many of our readers suggesting that PPIs decrease the effect of this antiplatelet therapy. Since then, other research and publications have surfaced to confirm the effect and mechanism of this interaction. In March of 2009, a clinical trial aimed at comparing the risk of adverse outcomes in patients taking clopidogrel with a PPI to those without a PPI following acute coronary syndrome (ACS) was published. The results suggested that there was an increased risk of death or re-hospitalization in patients taking clopidogrel and a PPI in comparison to those not taking a PPI, 29.8% vs. 20.8%, respectively with a 95% confidence interval and an adjusted odds ratio of 1.25 (1.11-1.41). The study also revealed a statistically significant increased re-hospitalization for ACS in patients taking the PPI compared to those not taking the PPI ($p < 0.001$), therefore concluding that concomitant therapy with PPIs and clopidogrel result in greater adverse outcomes.¹ The question still remains of the mechanism responsible for this reaction. As suggested in the April issue of Pharmacology weekly, PPIs, more specifically, omeprazole is known to be a competitive inhibitor of specific liver enzymes necessary for clopidogrel's oxidation to its active metabolite and thereby impedes the antiplatelet effects of clopidogrel. This reasonable discovery may truly explain the mechanism for the interaction between omeprazole and clopidogrel but is not inclusive of all PPIs. Further studies need to be conducted to determine the effects of multiple PPIs on clopidogrel and on patients not undergoing antiplatelet therapy to rule out the possibility of PPI induced cardiovascular problems. With the accessibility of over the counter omeprazole and health care provider's attempt to prevent gastric bleeding, information such as this needs serious consideration and patients need to be evaluated on an individual basis.

INSIDE THIS ISSUE:

- 1 New Drug Information Resident
- 2 The PPI/Plavix® Interaction
- 3 Acetavance™: Acetaminophen Injections
- 4 Kawasaki Syndrome
- 5 Racially Influenced Response to Hepatitis C Treatment
- 6 Desvenlafaxine Use In Menopausal Vasomotor Symptoms
- 7 Rivaroxaban to Replace Warfarin for VTE
- 8 New Drug Uses Milk of Gene Spliced Goats
- 9 Homocysteine: A predictor of Cardiovascular Mortality in Elderly Patients

1. Ho PM, Maddox TM, Wang L, *et al.* Risk of adverse outcomes associated with concomitant use of clopidogrel and proton pump inhibitors following acute coronary syndrome. JAMA. 2009;301(9):937-44.
2. Bain AM, Busti AJ, Lehew DS, *et al.* What is the mechanism by which the proton pump inhibitor, omeprazole reduces the antiplatelet effects of clopidogrel thereby decreasing its cardioprotective effects? PW Drug Interact News.2009;1(14):1-5.

Acetavance™: Acetaminophen Injections

By: Leroysha Reese, Doctor of Pharmacy

With the Food and Drug Administration's (FDA) approval of acetaminophen in 1951, over a half of a century ago, pharmaceutical companies are continuing to come up with innovations in drug products that distinguish them from their competitors. Cadence™ Pharmaceuticals has recently acquired the rights of Acetavance™, an intravenous formulation of acetaminophen for treatment of acute pain and fever, from Bristol-Myers Squibb. Marketed as Perfalgan® throughout Europe and other parts of the world since 2002, acetaminophen injections are the leading injectable analgesic based on dollars and units sold in Europe with an estimated total of nearly 80 million sold in 2007. In comparison to other injectable analgesics, Acetavance™ is said to be equally efficacious with a safety profile comparable to the oral acetaminophen formulation. The results of two phase III clinical trials were recently announced to help support the potential of this innovative discovery.

In two clinical trials one used to assess pain relief and the other fever reduction, 330 patients and 60 subjects, respectively were randomized to receive acetaminophen or placebo. The results showed a positive response to pain relief and overall increased satisfaction in patients taking the acetaminophen injections following abdominal gynecological surgery but a statistically insignificant pain reduction compared to placebo a clinically significant reduction in fever compared to that of placebo in the second trial. The FDA has agreed to not require additional clinical trials prior to the submission of the new drug application (NDA) under the notion that acetaminophen is a well known drug. Researchers argue that the formulation itself needs further evaluation and more clinical trials are necessary but as of May 14, 2009, the NDA has been submitted to the FDA.

1. Ogbru O. Acetaminophen; MedicineNet. <http://www.medicinenet.com/acetaminophen/article.htm>. Accessed on February 27, 2009.
2. Cadence Pharmaceuticals. Cadence Pharmaceuticals Announces FDA Concurrence With Clinical Development Plan for Acetavance™. http://files.shareholder.com/downloads/CADX/567723575x0x216939/c7e111a7-dc0f-442e-8e6c-4afb6ee74a33/CADX_News_2008_7_30_General_Releases.pdf. Accessed on February 27, 2009.
3. Reuters. Cadence Pharmaceuticals Announces Topline Results of Two Phase III Clinical Trials. <http://www.reuters.com/article/pressRelease/idUS118019+11-Jan-2008+PRN20080111>. Accessed on February 27, 2009.

Mucocutaneous Lymph Node Kawasaki Syndrome

By: Jacqueline Banboye, Doctor of Pharmacy

On January 2, 2009, film actor John Travolta tragically lost his teenage son to complications of a disease known as Kawasaki syndrome. Kawasaki syndrome is a disease of the immune system which affects various organs of the body but particularly the heart. The disease can be fatal if not well managed and mostly occurs in children less than five years of age and in males twice as much as in females. Dr. Tomisaku Kawasaki was the first person to describe this disease also known as mucocutaneous lymph node syndrome (MLNS) in Japan in the late 1960's. Since then the disease has been on the rise in the United States with nearly 3,000 new cases reported each year. The etiology for this disease remains undetermined and is neither hereditary nor communicable, however there is some suggestion that the disease could be caused by a virus. The major symptoms of Kawasaki syndrome include, persistent high fever, rash on chest and genital area, red lips, and strawberry colored tongue. In addition patients may also suffer from joint pain, pneumonia, diarrhea and cracked lips. Since Kawasaki syndrome occurs mostly in children, the disease is usually first diagnosed by a pediatrician. There is no confirmatory laboratory test for this disease but it is diagnosed by ruling out other diseases that may have similar symptoms. The patient must however also have a high grade fever lasting five days or more and not responding to antibiotics. Aspirin is the drug of choice due to its antipyretic and anti-inflammatory effects. Immune globulins are also used to prevent complications that may arise in the coronary arteries. Corrective surgery may sometimes be necessary in advance cases. About one to two percent of patients suffering from Kawasaki Syndrome die from complications of blood clots or heart attacks. Kawasaki syndrome is not a very common disease but can be fatal. It is thus important that parents follow the recommended treatment and take appropriate precautions with their children.

1. US news.com. <http://usnews.healthline.com/galecontent/kawasaki-syndrome/3>. Accessed on January 11, 2009.
2. Wikipedia Online. http://en.wikipedia.org/wiki/Kawasaki_disease. Accessed on January 12, 2009.
3. Encyclopedia of children's health: Infancy through Adolescence, <http://www.healthofchildren.com/I-K/Kawasaki-Syndrome.html>. Accessed on January 11, 2009.

Racially influenced response to Hepatitis C treatment

By: Lillian Mendoza, Doctor of Pharmacy Candidate

Latinos are the fastest growing race in the United States and it is estimated that they will represent 15% of the U.S. population by 2010. Studies have shown that 2.1% of all Latinos are infected by the hepatitis C virus (HCV) compared to only 1.5% of non-Latino whites. The mortality rate among Latinos with HCV is twice the rate of non-Latino whites. In an effort to assess the effect of race on certain HCV medications and target the underrepresented Latino population, a comparative prospective study was performed to determine the effect of peginterferon alfa-2a and ribavirin in HCV genotype 1 infected individuals. The study consisted of 269 Latino and 399 non-Latino whites from 52 centers in the United State and Puerto Rico. The patients included in the Latino population were between the ages of 18 and 65, had no prior history of treatment for HCV infections, had Spanish speaking parents and grandparents from Latino descent. The treatment group was given peginterferon alfa-2a 180 mcg/weekly and ribavirin depending on their weight.^{1,2} Researchers assessed their virologic and biochemical responses at weeks 4, 12, 24, 48, 60, and 72 along with the assessment of compliance at each clinic visit. Any laboratory data, vital signs, dose adjustment, and clinical adverse events were monitored throughout the study and adjustments were made as needed. Histological assessments were done at the time of screening or within 18 months before the study began and during the final week. Relapses were assessed between week 48 and 72. The results of the study showed that Latino patients infected with chronic HCV genotype 1 have a lower rate of response to standard therapy with peginterferon alfa-2a and ribavirin than non-Latino whites. Also, found was that the sustained virologic response rate was significantly lower in the Latino group than in the non-Latino group ($P < 0.001$). In a post hoc analysis it was shown that the rates of sustained virologic response were similar regardless of the country of origin of Latinos. Adverse effects occurred in 98% of the patients with the most common being depression, suicidal ideation, and fatigue which lead to 9% of the Latinos and 14% of the non-Latinos dropping out of the study. This study demonstrated that there should be more race focused clinical trials due to varied treatment responses in certain disease states among various patient populations.

1. Lexicomp Online. <http://online.lexi.com/crlsql/servlet/crlonline>. Accessed March 11, 2009.
2. Rodriguez-Torres M, Lennox J, Sheikh M, Rossaro L, et al. Peginterferon Alfa-2s and Ribavirin in latino and Non-Latino Whites with Hepatitis C. *NEJM*. Jan 2009;360:257-267. <http://content.nejm.org/cgi/content/short/360/3/257>. Accessed March 7, 2009.
3. Strader D, Wright T, Thomas D, Seef L. Diagnosis, Management, and Treatment of Hepatitis C. *Hepatology* 2004 Apr;39(4):1147-71.

Desvenlafaxine Use In Menopausal Vasomotor Symptoms

By: Portia N. Davis, Doctor of Pharmacy

Menopause is defined as the cessation of menstruation for twelve months, and usually occurs naturally in women around the age of 50.¹ Menopause may also begin directly following an oophorectomy, or radiation therapy. Symptoms of menopause include irregular periods, mood swings, vaginal dryness, urinary incontinence, insomnia, depression, dry skin, loss of libido, alopecia, osteoporosis, and vasomotor symptoms of hot flashes and night sweats. Vasomotor symptoms (VMS) may begin prior to the onset of menopause and continue for years. These symptoms vary in intensity, and are one of the primary reasons that women seek medical care. The National Menopause Society released a position statement in 2004 which supports that hormonal therapy remains the most effective treatment for VMS.² Currently, only hormonal preparations carry FDA approval for this indication, however all patients are not candidates for hormonal regimens. Women with contraindications to hormonal therapy include those with undiagnosed abnormal vaginal bleeding, a history of breast cancer or any estrogen/progesterone dependent tumor, venous or arterial thromboembolic disorders (including DVT, PE, MI, or stroke), or hepatic diseases. Non-hormonal agents currently being utilized in the treatment of menopausal VMS include selective serotonin reuptake inhibitors (SSRIs), selective norepinephrine reuptake inhibitors (SNRIs), alpha-2 agonists, and gabapentin. Desvenlafaxine (Pristiq®), FDA approved February 29, 2008, is the newest commercially available SNRI. Although indicated for the treatment of major depressive disorder, studies have shown that this agent, as well as other SNRIs has proven useful in the treatment of menopause related VMS symptoms. To determine the efficacy and safety of desvenlafaxine in this condition, Wyeth Research Laboratories conducted a double-blind, placebo-

controlled, randomized study that followed 567 postmenopausal women experiencing 50 or more hot flashes (HFs) per week. Subjects were recruited and participated in the study for 26 weeks in 32 US sites which included private and institutional practices and research centers. Women were included in the study if they were diagnosed as postmenopausal, healthy, had a BMI ≤ 40 kg/m², and experienced at least 7 or more moderate to severe hot flashes (HF) per day for 7 consecutive days. Women were excluded if they had a history of cancer, certain psychiatric disorders, seizures, cardiovascular disease, glaucoma, or if they had received any hormone-containing drug within 6 months of the study. The subjects were randomly assigned to receive placebo, 100mg, or 150mg of desvenlafaxine once daily for 26 weeks. The primary endpoint of the study was drug efficacy which was measured by several variables including number and severity of HFs, and nighttime awakenings. The secondary endpoints were safety and tolerability, which were measured by the number of adverse events experienced during and after treatment. The study results indicated that most women in the desvenlafaxine treatment groups achieved between a 50% to 75% decrease in the number of HFs, and the majority of women in these groups also reported improvement in the severity of HFs as well. The treatment groups reported significantly more adverse effects than the placebo group, however only 7 subjects from the treatment group reported serious adverse events. The author of the study concluded that desvenlafaxine at 100mg and 150mg doses is a generally safe, well-tolerated treatment for moderate to severe vasomotor symptoms associated with menopause.³ As the number of women entering menopause continues to grow, the demand for hormone-free menopausal treatment will continue to increase as well. Desvenlafaxine may serve as a treatment option for women who suffer from moderate to severe vasomotor symptoms that may not be able, or may not be willing to take traditional hormonal therapy.

1. American Menopause Association website. Available at: <http://www.americanmenopause.org/>. Accessed on March 9, 2009.
2. Santoro NF, et al. Treatment of Menopause-associated Vasomotor Symptoms: Position Statement of the North American Menopause Society. *Menopause*. 2004; 11(1):11-33.
3. Pristiq [package insert] Philadelphia, PA: Wyeth Pharmaceuticals, Inc.; 2009. January.
4. Archer DR, et al. Desvenlafaxine for the treatment of vasomotor symptoms associated with menopause: a double-blind, randomized, placebo-controlled trial of efficacy and safety. *Am J Obstet Gynecol*. 2009; 200:238.e1-238e.10.

Rivaroxaban to Replace Warfarin for VTE

By: Joseph Ukonu, Doctor of Pharmacy Candidate

Venous thromboembolism (VTE) is a potentially fatal disorder and a significant national health problem in our society. Although it can strike young, otherwise healthy adults, it most frequently occurs in patients who sustain multiple traumas, undergo major surgery, are immobile for a lengthy period of time, or have a hypercoagulable disorder. The true incidence of VTE in the general population is unknown since in over 50% of the patients the disease remains silent. An estimated 2 million people in the United States develop VTE each year; of which 600,000 are hospitalized and 60,000 die.¹

Blood coagulation is initiated when "Tissue Factor", (a protein-phospholipid complex normally present on vascular cells and activated monocytes), are exposed to factor VII in the presence of calcium. The activated tissue factor-VII complex activates factors IX and X. Factor IXa enhances the production of Xa, especially in the presence of the co-enzyme VIIIa. Factor Xa converts prothrombin to thrombin (factor IIa). Thrombin cleaves fibrinogen yielding monomers of fibrin which then polymerizes to form the fibrin clot.³

Rivaroxaban (Xarelto®) is an oxalolidinone derivative that exerts its action by binding to the active site of factor Xa which acts at the convergence point of the extrinsic and intrinsic coagulation pathways and catalyzes the conversion of prothrombin to thrombin thereby inhibiting factor Xa. The L-shape structure of rivaroxaban allows it to be highly selective for factor Xa. This high selectivity allows the drug to inhibit free factor Xa, prothrombinase activity and clot-associated factor Xa, giving it the ability to prevent clots from forming and possibly break down of pre-existing clots.⁴ Rivaroxaban is well absorbed orally, with an appropriate bioavailability of 80%. The pharmacokinetic and pharmacodynamic characteristics of rivaroxaban are moderately altered by food, resulting in delayed absorption and increased peak concentration, but are unaffected by changes in gastric pH. Rivaroxaban is highly protein bound and it is unknown if its metabolism mimics that of other Xa inhibitors through the liver. It is eliminated through both renal (66%) and biliary (28%) pathways, with 36% of the drug unchanged.⁴ The effect of rivaroxaban was tested in a double-blind study where 4541 patients were randomized to receive either 10mg of oral rivaroxaban once daily beginning after surgery, or 40mg of enoxaprin subcutaneously once daily beginning the evening before surgery plus a placebo tablet or injection, respectively. A

New Drug Uses Milk of Gene Spliced Goats

By: Chidima Azuike, Doctor of Pharmacy

Antithrombin, a natural anticoagulant that regulates thrombin, holds an important role in the formation of blood clots. Antithrombin deficiency is a rare hereditary deficiency that is usually diagnosed after a patient has suffered from recurrent thromboembolic events. Patients with hereditary antithrombin deficiency are prone to developing blood clots. It is said that about 1 in 5,000 people are at risk of developing blood clots in their veins because they do not produce enough protein. This condition can not only be very painful, but also extremely dangerous if the clot were to break loose. It can also pose a threat to pregnant women because blood clots in the placenta can lead to miscarriage or stillbirth. The hereditary deficient population, as previously stated, is about 1 in 5,000 and until now has been dependent upon plasma-derived antithrombin products for use during high-risk procedures. As what could be considered the first of its kind, ATryn[®] has moved even closer to becoming government approved. ATryn[®] is the only recombinant antithrombin product that is geared towards treating people with hereditary antithrombin deficiency that are at risk of developing serious or even potentially life-threatening venous thromboembolic events. This recombinant form of antithrombin will be an alternative to treatment with plasma-derived product for deficient patients. ATryn[®] was developed by the biotechnology company GTC Biotherapy who develops human therapeutic proteins in the milk of transgenic animals. With this they are able to express human therapeutic proteins in their milk. These recombinant proteins can then be purified from the milk for therapeutic use. In GTC's case they produce transgenic goats. They use goats because their mammary gland efficiently expresses high levels of different types of proteins during milk production. For patient with the hereditary disorder, the conventional treatment standard will still apply. The use of ATryn[®] is reserved only for patients who are undergoing surgery or having a baby. It is basically used only in times when there is a high risk of dangerous clots forming. The drug is administered by infusion and patients receiving the medication will do so for a limited time before and after their procedures. Pregnant patients and those undergoing surgery with a serious blood disorder have responded well to treatment with a man-made anti-clotting protein. If approved by the FDA, a major step will have been made in the shift from

total of 3153 of the patients were included in the superiority analysis and 4433 were included in the safety analysis. The primary efficacy outcome occurred in 18 of the 1595 patients (1.1%) in the rivaroxaban group and 58 of the 1558 patients (3.7%) in the enoxaparin group (absolute risk reduction, 2.6%; 95% confidence interval, 1.5 to 3.7; $p < 0.001$). Major thromboembolism occurred in 4 of 1686 patients (0.2%) in the rivaroxaban group and in 33 of 1678 patients (2.0%) in the enoxaparin group. Major bleeding occurred in 6 of the 2209 patients (0.3%) in the rivaroxaban group and in 2 of the 2224 patients (0.1%) in the enoxaparin group ($p = 0.18$). The investigators concluded that a once-daily 10mg oral dose of rivaroxaban was significantly more effective for extended thrombophylaxis than a once-daily 40mg subcutaneous dose of enoxaparin in patients undergoing hip surgery.² A separate study measuring rivaroxaban's ability to treat preexisting clots and act as a long-term anticoagulant looked at the treatment of proximal DVT's. Subjects were given oral rivaroxaban in doses of 10, 20, and 30 mg twice daily, 40mg once daily or enoxaparin 1mg/kg subcutaneously twice daily followed by a vitamin K antagonist for 12 weeks. The investigators concluded after their findings, that the range of doses of rivaroxaban was as safe and effective at treating proximal DVT was enoxaparin.⁴ Rivaroxaban is currently in Phase III clinical trials and does not have any approved indications at this time. FDA approval for the drug was sought in the third quarter of 2008 by Bayer Healthcare and decision can be expected by late 2009.⁴

There is indeed a need for a new anticoagulant that is just as effective as warfarin, but without such a rigorous monitoring schedule. Once daily dosing of rivaroxaban has been shown to produce 24 hours of inhibition of factor Xa and thrombin generation, allowing for a convenient once-daily dosing regimen with minimal monitoring.⁴ Trials to date have not shown an increased risk of major or minor bleeding compared with conventional therapies.

1. Borris, CL. New compounds in the management of venous thromboembolism after orthopedic surgery: focus on rivaroxaban. *Vasc Health Risk Manage.* 2008; 4(4):855-862.
2. Eriksson, B, Borris, L, Friedman, R et al. Rivaroxaban versus Enoxaparin for Thromboprophylaxis after Hip Arthroplasty. *The NEJM.* June 2008. 358(26) pp2765-2775.
3. Assessing Coagulation: The Coagulation System. www.anaesthetist.com/icu/organs/blood/coag.htm. (Assessed on 2/27/09)
4. Rivaroxaban (Bay59-7939), Xarelto[®]. A possible replacement for warfarin (Coumadin, Jantoven). Warfarin Institute of America. www.warfarinfo.com/rivaroxaban.htm. (Assessed on 2/27/2009)

medications made from chemicals to those made from living organisms.

1. ATryn® - RECOMBINANT HUMAN ANTITHROMBIN. GTC Biotherapeutics Web Site.2008. Available at: <http://www.gtc-bio.com/products/atryn.html>. Accessed on January 9, 2009.
2. FDA Advisory Committee Recommends GTC Biotherapeutics' ATryn* (antithrombin [Recombinant]) If approved, ATryn will be first recombinant human antithrombin available in the U.S. GTC Biotherapeutics Web Site.2008. Available at: <http://www.gtc-bio.com/pressreleases/pr010909.html>. Accessed on January 9, 2009.
3. The Associated Press. New Drug Uses Milk from Gene Spliced Goats. CBS News Web Site. 2008. Available at: <http://www.cbsnews.com/stories/2009/01/07/health/main4704807.shtml>. Accessed on January 7, 2009.

Homocysteine: A predictor of Cardiovascular Mortality in Elderly Patients

By: *Sneha Valimattathil, Doctor of Pharmacy Candidate*

Cardiovascular disease (CVD) is the leading cause of morbidity and mortality in elderly in the United States.

Among the new biomarkers in predicting and preventing these events, homocysteine (Hcy) - a sulfur containing amino acid produced by the conversion of methionine in the presence of folic acid and vitamin B12 and an important substrate in protein synthesis and metabolism, is associated with increased risk of cardiovascular disease in the elderly.¹ The discovery of this new biomarker in predicting cardiovascular events may improve quality of life in elderly. There are several hypothesis proposed to explain how elevated Hcy levels lead to cardiovascular events. One hypothesis is that it can destroy the endothelial cells of blood vessels leading to plaque formation and also impair nitric oxide activity. It is also hypothesized that Hcy can promote vascular smooth muscle cell hypertrophy.² Both these processes leads to occlusion of blood vessels resulting in ischemia. Studies have reported that an increase in Hcy levels promotes atherosclerosis, endothelial dysfunction, oxidative stress, coagulation and platelet dysfunction only in the absence of folic acid or cyanocobalamin.³

Therefore whether the elevated Hcy level is an indicator of cardiovascular event remains unclear. A population-based prospective cohort study conducted by Dangour et al examined the association of plasma levels of folate, vitamin B-12 and homocysteine, and all-cause and CVD mortality in patients 75 years old and older in the United Kingdom. The study included 853 men and women and during the median follow up period of 7.6 years, 429 individuals died of with the leading cause being CVD 185

(43%). Individuals with plasma Hcy levels in the top third compared with the bottom third had a two-fold higher risk of all-cause mortality ($P<0.001$) and CVD mortality ($P<0.001$) after adjustment for age, sex and other covariates, but with no association of plasma folate or vitamin B-12 levels.⁴ The Leiden 85-plus Study, an observational prospective cohort study, conducted by Ruijter et al investigated the performance of classic risk factors using the Framingham scale, and of some new biomarkers, in predicting cardiovascular mortality in very old people with no history of CVD. The study sample consisted of participants aged 85 years and older (215 women and 87 men) with no history of CVD. During a follow-up period of 5 years, 108 of the 302 participants died of which 32% (35/108) were from cardiovascular causes. The authors concluded that there was no difference in cardiovascular mortality between the risk categories and, only homocysteine resulted in a statistically significant differences between the risk categories ($P=0.002$) such that the high risk category had a 3.4-fold increased risk of cardiovascular mortality compared with the low risk category. The study concluded that in the elderly with no history of CVD, concentrations of homocysteine alone can accurately identify those at high risk of cardiovascular mortality whereas classic risk factors included in the Framingham risk score do not.¹ In conclusion, homocysteine levels can be used in predicting cardiovascular mortality in the elderly. In future, the practice of medicine may target therapy in reducing homocysteine level to lower the risk of having any cardiovascular event and, thereby decrease the economic costs associated with it.

1. Ruijter W, Westendorp RG, Assendelft WJ et al. Use of Framingham risk score and new biomarkers to predict cardiovascular mortality in older people: population based observational cohort study. *BMJ* 2009;338:a3083.
2. Fanapour PC, Yug B, Kochar MS. Hyperhomocysteinemia: an additional cardiovascular risk factor. *WMJ*. 1999;98(8):51-4.
3. Carlsson CM. Homocysteine Lowering with Folic Acid Vitamin B Supplements: Effects on Cardiovascular Disease in Older Adults. *Drugs Aging*. 2006;23(6):491-502.
4. Dangour AD, Breeze E, Clarke R, Shetty PS et al. Plasma Homocysteine, but Not Folate or Vitamin B-12, Predicts Mortality in Older People in the United Kingdom. *J. Nutr*. 2008;138:1121-28

Drug Information Center
2450 Holcombe Blvd
Houston, Texas 77021
Phone: (713) 313 – 1242
Fax: (713) 313 – 1209
E-Mail: tsudic@tsu.edu
www.tsu.edu/cophs/dic