WOMEN'S HEART HEALTH

Articles Contributed By:
Gina Price Lundberg, MD
Carolina Gongora, MD
Nanette K. Wenger, MD
David Markham, MD
Jonathan Kim, MD
Ijeoma Isiadinso, MD

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Atlanta Medicine Editorial Board

Michael C. Hilton, MD, is in the private practice of general and forensic psychiatry in Atlanta, where he treats a wide range of adult psychiatric conditions. He is the 2012-2013 chairman of the Medical Association of Atlanta.

Nikhil Shah, MD, is the Chief of the Minimally Accessible Robotic Surgery at Piedmont Health Care. He serves as the President and Founder of the Men's Health and Wellness Center of Atlanta.

Barry Silverman, MD, has practiced cardiology in Sandy Springs for 36 years and is on staff with Northside Cardiology.

Lance Stein, MD, practices transplant hepatology at the Piedmont Transplant Institute. He serves on national committees for the American Association for the Study of Liver Diseases, American College of Gastroenterology and the American Society of Transplantation.

W. Hayes Wilson, MD, is a physician with Piedmont Rheumatology Consultants, PC. He has served as Chair of the Medical & Scientific Committee of the Arthritis Foundation and Chair of the Division of Rheumatology at Piedmont Hospital.

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CONTRIBUTING WRITERS

GUEST EDITOR

Gina Price Lundberg, MD, FACC, Dr. Lundberg is an Assistant Professor of Medicine at Emory University and Clinical Director of the Emory Women’s Heart Center. She is a Preventive Cardiologist with offices in East Cobb and Hiawassee. She started the first women's heart program in the state of Georgia in 1998. She is a National American Heart Association Spokesperson and is passionate about reducing cardiovascular disease in women.

Carolina Gongora, MD, Dr. Gongora is a Board certified cardiologist at the Emory Heart and Vascular Center and Assistant Professor of Medicine (Cardiology) at Emory University School of Medicine. Dr. Gongora went to medical school in Bogota, Colombia, where she is from originally. She moved to Atlanta in 2005. Before starting her training in Internal Medicine and Cardiology at Emory University, Dr. Gongora did a post doctoral research fellowship in hypertension and renal disease. She is board certified in Cardiology, Internal Medicine and Echocardiography.

Ijeoma Isiadinso, MD, MPH, FACC, Dr. Isiadinso is an Assistant Professor of Medicine at Emory University School of Medicine. She obtained a dual degree in medicine and public health at Drexel University School of Medicine. She completed her Internal Medicine residency and Cardiology fellowship at Temple University Hospital and served as Chief Cardiology Fellow. Her clinical and research interests include health care disparities, cardiovascular disease in rheumatic conditions, preventive health, lipid disorders and women and heart disease.

Jonathan Kim, MD, Dr. Kim is a sports cardiologist and Assistant Professor in the Division of Cardiology at Emory University. Dr Kim, a Fulbright scholar, received his B.S. in Biology at Emory University before attending Vanderbilt University School of Medicine. He completed his residency in Internal Medicine and Pediatrics at Massachusetts General Hospital and cardiology fellowship at Emory University. Dr Kim holds an adjunct assistant professorship in the School of Applied Physiology at Georgia Tech. Dr Kim conducts his sports cardiology clinic at Emory Saint Joseph's Hospital.

David Markham, MD, Dr. Markham is Associate Professor of Medicine and Medical Director of the Heart Failure, Assist Device and Transplant Program at Emory Saint Joseph's Hospital. He is a member of the Division of Cardiology at Emory University School of Medicine. He is interested in various aspects of peripartum cardiomyopathy, assist device physiology, and transplantation.

Nanette K. Wenger, MD, MACC, MACP, FAHA, Dr Wenger is Professor of Medicine in the Division of Cardiology at the Emory University School of Medicine. Coronary heart disease in women is one of Dr Wenger’s major clinical and research interests. She chaired the U.S. National Heart, Lung, and Blood Institute Conference on Cardiovascular Health and Disease in Women. Dr Wenger received the Physician of the Year Award of the American Heart Association (AHA). Dr Wenger received the Gold Heart Award, the highest award of the AHA. The American Society of Preventive Cardiology honored Dr Wenger by naming an annual Nanette K. Wenger Distinguished Lecture focusing on cardiovascular prevention in women.
I am honored to serve as the guest editor of this special edition focused on cardiovascular disease (CVD) in women. When I first started my practice in cardiology in the Atlanta area in 1994, there was no Go Red for Women campaign and little awareness of heart disease in women.

In fact, there was the prevailing attitude that heart disease was predominantly a man’s illness. In my early years, I would hear stories of female patients with chest discomfort that was very suggestive of coronary ischemia, but they had not been referred for any cardiac evaluation. Many of them had been told their chest discomfort was gastrointestinal, others musculoskeletal and others were even told it was just stress. These stories continued until I felt compelled to focus my practice on heart disease in women.

In 1998, I started the first women’s heart center in the state of Georgia. Since these early days, there have been great strides in awareness of heart disease in women and much success resulting in improved outcomes for our female patients.

Heart disease and stroke remain the No. 1 cause of death for women in the United States. While there has been a reduction in deaths for women with CVD overall, women under age 50 and non-white women have seen very little change in death rates from CVD.

According to 2010 data, women in Georgia have 119 coronary heart disease deaths and 46 stroke deaths per 100,000 women. This same study showed that, in women over 65 in Georgia, 68 percent have hypertension and 21 percent have diabetes. Alarmingly, the highest incidence of obesity is among women in the 45 to 64 years age group, at 30 percent. As all physicians care for women, regardless of specialty, the core of patient-centered care is to focus on the unique differences required for cardiovascular care of women and men.

It has been more than 10 years since the American Heart Association (AHA) started the Go Red for Women campaign to increase awareness of heart disease in women. Evidence synthesis documents, such as the American College of Cardiology/AHA guidelines for the prevention of heart disease in women, first published in 2004 and later updated in 2007 and 2011, serve as the ultimate resource guides for cardiovascular care of female patients.

More recently, in 2014, the first AHA/American Stroke Association guidelines for the prevention of stroke in women were published. These guidelines focus on unique risk factors and differences between women and men. Pregnancy-related risks such as preeclampsia, hypertension and gestational diabetes are important in both sets of guidelines as indicators of women with long-term increased risk for CVD. Migraine headaches with aura, which are more common in women, are included as risk markers in the stroke prevention guidelines. Diabetes and atrial fibrillation are also more common in women and are significant risk factors for both stroke and heart disease. Primary care physicians, including obstetricians and gynecologists, should be aware of these guidelines and rely on them to care for women in their practices.

While strides have been reported in terms of improved diagnosis, treatment and outcomes for women, not all racial and ethnic subsets of the population have equally benefited. The greatest improvements in cardiovascular care have been reported for white women. However, African-American and Hispanic women have notable treatment inequities and reported poorer outcomes; results particularly relevant to our diverse patient populations in Georgia.

It is vital that more research be done not only on unique female differences but also as this evidence applies to
racial and ethnically diverse women to determine their best diagnostic tests and treatments for improved clinical outcomes. We cannot continue to apply outcomes in studies of predominantly white male populations to guide our treatment of women.

This year, the AHA announced a $15-million grant for research specific to women with heart disease. In addition, the AHA and many other organizations are focused on reducing disparities in healthcare, especially for CVD in women.

I am very excited about this special edition focused on CVD in women. We have tried to highlight some topics addressing heart disease in women that you should find particularly relevant to your practice. Most of the articles give a patient case presentation to make the information more clinically relevant.

All of our authors are clinical cardiologists and support the Emory Women’s Heart Center. Dr. David Markham has vast experience with peripartum cardiomyopathy, a very serious complication of pregnancy, not only in the United States but also in Haiti. He shares long-term outcomes of women with peripartum cardiomyopathy as well as information for possible future pregnancies.

Dr. Jonathan Kim shares information on sports medicine and women. Whether it is a high school physical examination for athletic participation or evaluation of a female professional athlete, certain manifestations of the athlete’s heart are not seen in non-athletes. He gives insight into when athletes should be referred to a sports medicine professional for further cardiovascular evaluation.

Dr. Ijeoma Isiadinso explains how rheumatoid arthritis and systemic lupus erythematosus are new risk factors for CVD in women. Dr. Carolina Gongora, who has a special interest in heart disease in Latina women, addresses the issue of disparities in healthcare in women of different races and ethnicities. Dr. Nanette Wenger reviews noninvasive testing for women suspected of ischemic heart disease and the term “false-positive” in women. Finally, I outline stroke prevention in women and the importance of the new guidelines.

The Emory Women’s Heart Center is dedicated to improving CVD care for women in the Atlanta area and throughout the southeastern part of the U.S. Our physicians give special attention to the unique risk factors for CVD in women, and our team works throughout the metro Atlanta area to raise awareness of CVD in women, not only throughout the community but among physicians as well.

We have screening programs at six Emory locations as well as physicians who specialize in heart disease in women. Our community outreach program includes special awareness events as well as community screening and educational events. In October 2015, we will host our third annual Reward Your Heart program, where the public is invited for an evening of fun and heart health education.

This year we focus on the benefits of changing healthcare and reducing disparities in CVD in racially and ethnically diverse women. Next summer will be the 10th year of our continuing medical education conference focused on CVD in women. We hope those of you who care for women will consider attending our event. I hope that you find this special edition informative and useful in caring for your female patients.

References
About 600,000 people die of heart disease in the United States every year, corresponding to 1 in 4 deaths. Cardiovascular disease (CVD) is the No. 1 cause of death in both women and men and is highest in the South and lowest in the West. Unfortunately, half of Americans have at least one of the recognized risk factors for CVD, including dyslipidemia, hypertension or smoking. Despite this being the case across ethnicities and genders, there are differences among different groups regarding prevalence, treatment and outcomes.

According to the National Health Interview Survey in 2012, more men than women have been diagnosed with coronary artery disease (CAD) or hypertension (HTN). Asians adults were less likely to have been diagnosed with CAD than whites. Asian adults and whites were less likely to be diagnosed with HTN than black adults. Poverty level is inversely associated to any type of heart disease, HTN or stroke.¹

**Ethnic Disparities**

In 2002, the Institute of Medicine (IOM) reported remarkable disparities in healthcare quality in racial and ethnic minorities. These observations helped encourage the development of new strategies to improve accessibility and quality of healthcare for these minorities. A decade later, quality of care has improved for most Americans, however significant disparities persist.

By 2013, similar proportion of whites, African Americans, Hispanics and American Indians had heart disease, around 10 percent. However, in terms of hypertension, there are
significant differences. In whites, Hispanics and American Indians, the prevalence of hypertension and stroke is similar, around 20-25 percent and 2 percent, respectively. But in African Americans, the prevalence of hypertension and stroke is significantly higher, 32 percent and 3.6 percent, respectively. Of these hypertensive patients, only around 50 percent were controlled, 75 percent treated and 15 percent undiagnosed.[1] In Hispanics, hypertension prevalence is similar to whites, but only one third is controlled compared to 50 percent in whites.2

Regarding risk factors for HD, obesity rates are highest in Mexican American males and black women. Hypercholesterolemia is higher in white and Mexican American men and white women. Hospitalization for congestive heart failure and stroke is higher in women and highest in the southeastern part of the country. Life expectancy is higher for whites than blacks by approximately 5 percent.

Among modifiable risk factors, while smoking is higher in white women, other factors such as obesity and physical inactivity are much more common among African American and Hispanic women. It seems that Puerto Rican women have the highest rates of hypertension, obesity, smoking and dyslipidemia compared to the rest of Central and South America.3

Racial minorities have been observed to receive less timely evidenced-based interventions (angioplasty, PCI and CABG) and to have worse outcomes after these interventions.4

Another important difference worth mentioning among racial and ethnic groups is healthcare coverage. As expected, patients without adequate health insurance are more likely to experience poor clinical outcomes and have higher mortality. Minorities make a significant proportion of the low income and uninsured population and also rely more on acute hospital care than consistent preventive care with a primary care provider.5

**Gender-Specific Disparities**

**Presentation and Diagnosis of Ischemic Heart Disease in Women**

Women present more frequently than men with chest pain without having obstructive CAD. In the setting of MI, women less often report chest pain and diaphoresis and more often complain of back or jaw pain, palpitations, lightheadedness or loss of appetite. This atypical presentation in women has been linked to the delay in diagnosis and delivery of life-saving treatment strategies, with poorer outcomes.

Before 75 years of age, a higher proportion of a CVD caused by coronary artery disease occur in men than women, and a higher proportion of strokes happen in women than in men.[6, 7]

When evaluating a woman for IHD, the determination of a woman’s risk status will guide the selection of appropriate diagnostic tests. In general, premenopausal women 50 or younger, with no CHD equivalent conditions such as diabetes or peripheral artery disease, are considered to be at low risk. Women in their 50s are classified as low or intermediate risk based on level of functional capacity, with lower functional capacity conferring higher risk. Women in their 60s are considered intermediate risk, and women 70 or older are considered high risk. The presence of comorbidities and multiple other risk factors may adjust the assessment of risk up to one category.8

**Specific Risk Factors Related to Women**

Despite the decline in ischemic heart disease in both men and women, more women still die from CVD than men. Some data indicates the prevalence of CVD in women between 35 and 54 years old is increasing.

The traditional Framingham Risk Score is now known to underestimate women’s CV risk. It classifies 90 percent of women as low risk. The impact of some traditional risk factors differs between men and women. Hypertension is rising similarly in men and in women. However, premenopausal women are at higher risk of end-organ damage than men, and after menopause the prevalence of HTN is higher in women.9

Women are at higher risk of left ventricular hypertrophy and symptomatic heart failure with preserved ejection fraction. Women who smoke and those with metabolic syndrome have 25 percent more risk of CV events than men.10 The impact of developing diabetes in middle age is higher in women than men.11 Another significant difference is the lack of aspirin benefit is preventing ACS in women before 65 years old compared to same age men.12 And fewer women than men report performing the recommended 150 minutes of exercise each week.

Besides the traditional risk factors, there are risk factors that are unique to women, like pregnancy-related complications,
depression, anxiety, hormonal factors and autoimmune diseases that are more common in women than men.

Women with PCOS have a higher prevalence of metabolic syndrome, diabetes, obesity and HTN. Women with PCOS have elevated coronary calcium score compared to matched controls.13

Pregnancy is considered a stress test. When a woman fails this stress test, complications like preeclampsia, eclampsia, gestational diabetes (GD) and preterm delivery occur. These complications are associated with an increased risk of CVD. Preeclampsia triples the risk of CV events and quadruples the risk of future HTN.14 GD increases the risk of developing diabetes mellitus (DM) later in life.15 In fact, the 2011 ACC guidelines included complications during pregnancy as risk factor for CVD.

Systemic rheumatologic diseases, systemic lupus erythematosus (SLE) and rheumatoid arthritis are more common in women and are associated with a 50 percent higher risk of CAD than non-affected women.(16, 17)

Incidence of IHD increases after menopause, likely due to the drop in estrogen and increase in testosterone. Within a year of menopause, cholesterol levels increase. The beneficial effects of hormone replacement therapy are controversial, and currently hormone replacement therapy is not recommended for CVD prevention.18 Chronic use of oral contraceptives (OCPs) in women who smoke increase by seven fold the risk of CV or thrombotic events and stroke. In women with history of HTN, progestin-only OCPs are recommended over combined OCPs.

Depression, mainly in younger women, and migraine, both more common in women than men, have been associated with increased risk of IHD and stroke. Moderate to severe depression doubles the risk of heart attack in the next 2 years and increases the risk of death. For this reason the American Heart Association (AHA) recommends women be screened and treated for depression. Migraines with aura are associated with ischemic stroke, CV events and death due to ischemic CVD, effects that are potentiated significantly by smoking and oral contraceptive use. Migraine without aura was not associated with increased risk of any CVD event.

Racial and ethnic disparities continue to persist in healthcare and treatment, and the increasing prevalence of CV risk factors makes these disparities more difficult to overcome.

Statistical Data

Cardiovascular disease mortality trends in the U.S. showed a decline exclusively in men until 2000. However, since 2000 we have seen a 40 percent decline in CVD-related mortality in women. Despite this decline, women still have a high prevalence of CVD, and studies suggest that women have worse outcomes after MI and a higher incidence of heart failure compared to men.

Traditionally, research studies have excluded women, and in clinical trials women are underrepresented. This situation is changing, and recent evidence shows that there are differences in the presentation, pathophysiology, diagnosis and treatment of CAD for women versus men. Despite sharing many of the traditional CHD risk factors, women have unique risk factors and mechanisms of the disease compared to men.

Some studies have shown that close to half of women with abnormal noninvasive tests do not have flow-limiting coronary stenosis at angiography. However, these women still have a 9 percent occurrence of death or myocardial infarction and have worse prognosis than men. Women with stable ischemic heart disease, despite having less severe obstructive coronary artery disease compared to men have twice the mortality and morbidity.19

Women with angina undergo exercise stress testing less frequently than men and are less likely to be referred to angiography and have coronary revascularization. Also, aspirin, ACE inhibitors, statin and heparin are used significantly less in women than in men.20 In addition, six months after a myocardial infarction, women are less likely to achieve target blood pressure, LDL and hemoglobin A1c.

Despite the decline in women’s heart disease since 2000, the burden of disease and risk factor prevalence remain high and the evidence still suggests that women with myocardial infarction have a worse outcome and higher incidence of congestive heart failure after MI compared to men. Marked reductions in cardiovascular mortality in women are the result of an increase in professional awareness, a greater focus on women’s cardiovascular risk and application of evidence-based treatments for established coronary heart disease.

Racial and ethnic disparities continue to persist in healthcare and treatment, and the increasing prevalence of CV risk factors makes these disparities more difficult to overcome. Treatment options, outcomes and healthcare coverage are still unequal in racial/ethnic minorities compared to whites. Efforts to apply evidence-based care and improve quality should continue in order to reduce the gap between women and men and among racial/ethnic groups.
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In 2014, a Consensus Statement from the American Heart Association focused on the role of noninvasive testing for women with suspected ischemic heart disease, providing the clinician with gender-specific evidence-based guidance for the use of diagnostic procedures.

A number of important features are emphasized, the first being that ischemic heart disease in women may result from both obstructive atherosclerotic plaque in the coronary arteries and nonobstructive coronary artery disease and coronary microvascular disease. Symptomatic women with nonobstructive coronary disease and ischemia at noninvasive testing were identified as being at increased risk for a coronary event.

The more diverse symptom presentation for women than for men with ischemic heart disease was emphasized, highlighting the frequent non-pain symptoms such as excessive dyspnea and fatigue. Women’s ischemic symptoms were cited as more often related to emotional or mental stress and less frequently precipitated by physical activity than ischemic symptoms in men.

Determination of a woman’s risk status should guide the discussion, and shared decision should be made between the woman and her healthcare provider as to the need for and appropriate selection of diagnostic testing. Low-risk women generally require no further testing and should be assessed for a non-stable ischemic heart disease causation of their symptoms. Premenopausal non-diabetic women are generally at low risk, but limited functional ability confers higher risk.

Markers of high-risk status for women include peripheral arterial disease, a greater than 10-year duration of poorly controlled diabetes mellitus, chronic obstructive lung disease, transient ischemic attack or cerebrovascular accident, chronic kidney disease, inability to perform activities of daily living, <5 metabolic equivalents (METs) estimated Duke Activity Status exercise capacity. The recommended initial diagnostic test for the intermediate-risk woman functionally capable of exercising and with an interpretable resting ECG is an exercise electrocardiogram. When an abnormal resting ECG or inability to exercise adequately are present in women at intermediate to high risk, they become candidates for stress imaging (myocardial perfusion imaging, echocardiography, cardiac magnetic resonance imaging or coronary computed tomographic angiography).

Test selection should preferentially involve limiting exposure of women in this cohort to ionizing radiation. Emphasis on exercise test interpretation included both abnormalities on the electrocardiogram and non-ECG variables such as exercise capacity, chronotropic response, heart rate recovery response and blood pressure response to exercise. Post-stress test risk stratification is based on the extent and severity of inducible ischemia. The document displays the characteristics of high-risk markers on stress echocardiography, stress myocardial perfusion imaging, stress CMR and coronary CTA. Newer data are cited that support cardiac magnetic resonance imaging and coronary CT angiography as accurate for the detection of obstructive CAD and coronary heart disease risk in symptomatic women, with coronary CTA providing information on both obstructive and nonobstructive CAD burden. High-risk test results should invoke consideration of symptom-guided coronary angiography.

The term “false-positive non-invasive test” should be discarded from our vocabulary. An abnormal noninvasive test, despite its lack of association with obstructive CAD, indicates myocardial ischemia, which is etiologic for morbidity and mortality in women. Guideline-based lifestyle and pharmacologic measures are indicated for these women, with an inadequate response in high-risk women warranting invasive evaluation for myocardial revascularization.

References
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Mrs. N.A. is a 60-year-old asymptomatic woman who presents to your office for input regarding her cardiovascular risk. She has a history of hypertension (HTN) and rheumatoid arthritis (RA). She leads a healthy lifestyle, exercising 30 minutes daily, does not smoke and has a body mass index (BMI) of 24. She does not really monitor her blood pressure, but has been told that “it is fine.” There is no family history of cardiovascular disease.

She attended a luncheon with friends, one of whom mentioned that she was recently diagnosed with heart disease. Like your patient, her friend had never had any symptoms of heart disease prior to her diagnosis. It was this discussion that prompted Mrs. N.A. to seek your expert opinion, and you can probably expect more patients with stories like this as awareness grows regarding this disease.

Cardiovascular disease (CVD) is the No. 1 killer among men and women, and for those diagnosed with rheumatoid arthritis (RA) and systemic lupus erythematosus (SLE), they are at increased risk.

While heart disease was considered a “man’s disease” for many years, both the medical community and general public have become more aware that women are not exempt from this condition. However, many people (including clinicians and laypersons) are not necessarily aware that each year heart disease kills more women than men.
In 2011, 398,035 deaths among women were due to CVD. As a result of these statistics and research demonstrating worse outcomes among women with heart disease, a significant effort has been undertaken to increase awareness of heart disease in women, encourage screening of women at risk for CVD and identify nontraditional risk factors for heart disease in women. Both SLE and RA occur with a greater prevalence in women, making it all the more important to screen women for these autoimmune, inflammatory conditions.

Many of the risk factors for CVD are the same for both women and men (Table 1). However there are nontraditional risk factors that increase the risk for CVD in women. Awareness of these unique risk factors is important when performing a comprehensive CV risk assessment to ensure appropriate screening and treatment for CVD. That becomes increasingly important when the patient has RA or SLE.

**Cardiovascular Disease in RA and SLE**

Cardiovascular disease is the leading cause of morbidity and mortality among patients with SLE. While the most often recognized cardiovascular complication is pericardial effusion, other complications, including pericarditis, myocarditis, coronary vasculitis, coronary artery disease and valvular disease, can also occur. Patients with SLE have a four- to 10-fold greater risk of atherosclerotic CVD and a 50-fold increase in myocardial infarction (MI) compared with the general population. There is an increased risk of coronary artery disease (CAD) among patients with RA. In one study, individuals with RA were more than three times likely to have had a prior MI than those without RA.

Several studies have also shown a higher risk of CV mortality among patients with RA and SLE compared with the general population. There is a 50 percent increased risk of CV mortality among patients with RA compared with non-RA patients. Although this is largely driven by deaths due to ischemic heart disease, heart failure is a significant contributor. Patients with RA have a two-fold risk of developing heart failure (HF) compared with non-RA counterparts.

It may surprise many to read that the etiology of heart failure in this population is not due to ischemic heart disease, but instead a result of diastolic dysfunction. Although the mechanism is not fully understood, the chronic systemic inflammation responsible for the immune response in RA appears to play a role. Elevated inflammatory markers, including C-reactive protein, interleukin-6 and tumor necrosis factor alpha are associated with an increased risk of diastolic dysfunction and development of HF in the general population. These levels are increased in patients with rheumatoid arthritis. In RA patients, elevated IL-6 levels conferred increased risk of diastolic dysfunction and were associated with premature coronary atherosclerosis even after adjustment for CV risk factors.

**Traditional and Nontraditional Risk Factors**

Several studies have demonstrated a higher prevalence of certain cardiac risk factors in SLE and RA. Hypertension is not only common in patients with RA but often undertreated. Some studies report a prevalence as high as 75 percent. Patients with SLE are also more likely to be hypertensive compared with those without SLE.

Smoking is a well-known modifiable risk factor for CVD. Patients with RA are more likely to have a history of tobacco use, which is a risk factor for RA, compared with non-RA patients.

A unique relationship exists between obesity, RA and CVD. As we know, obesity is a risk factor for CVD in the population...
general population, and the same is true for patients with RA. However, low body mass index in RA is associated with an increased CV risk compared with non-RA patients. The hypothesis is that the lower BMI in these patients may represent rheumatoid cachexia due to a higher degree of inflammation. The release of proinflammatory cytokines can cause endothelial dysfunction and accelerate atherosclerosis.

Lipids play a paradoxical role with respect to CV risk in patients with RA. During periods of high-grade inflammation or untreated RA, the total cholesterol, high-density lipoprotein cholesterol (HDL) and low-density lipoprotein cholesterol (LDL-C) levels are suppressed. This unfavorable lipid profile is associated with an increased CV risk.

Metabolic syndrome and dyslipidemia are seen more frequently in patients with SLE compared with the general population. Several studies have reported a higher prevalence of nontraditional risk factors in patients with SLE. Proinflammatory HDL (piHDL), also known as dysfunctional HDL, cannot perform the normal protective functions of HDL to inhibit the atherosclerotic process. Patients with SLE have been found to have a greater prevalence of piHDL compared with other groups.

**Accelerated Atherosclerosis in Systemic Autoimmune Conditions**

Despite controlling for the increased prevalence of specific traditional CVD risk factors in this population, there remains an increased risk of CAD in patients with SLE and RA. Therefore, we must conclude that other factors are contributing to the increased risk.

The presence of subclinical atherosclerosis has been well documented in patients with SLE and RA. Endothelial dysfunction is a surrogate marker for subclinical atherosclerosis. In both RA and SLE, endothelial dysfunction, measured by impaired flow mediated dilation (FMD), has been observed. FMD has been inversely associated with cardiovascular risk. Coronary artery calcification (CAC) is more common in patients with SLE compared with those who do not have the disease. In RA, the severity of CAC is also increased compared with those without RA.

Premature atherosclerosis is well recognized in SLE. Among SLE patients younger than 35, the most common initial clinical presentation of CAD is acute myocardial infarction. The same holds true for patients with RA. Not only are they less likely to present with angina, but they often do not have typical ischemic findings on electrocardiogram at presentation.

This is especially concerning as it highlights the importance of having a high index of clinical suspicion when patients with RA and SLE present with atypical symptoms of angina. It also supports the need for aggressive screening for CVD in asymptomatic patients and among those with known risk factors.

**Drugs Used in the Treatment of RA and SLE**

Some of the therapies used in the treat of autoimmune rheumatic diseases can also increase the risk of heart disease. Glucocorticoids have been associated with a higher risk of CV events in population-based studies of patients with RA. They can also promote CAD although the duration and cumulative dose play a role.

Nonsteroidal anti-inflammatory drugs (NSAIDs), which are used to control inflammation and pain, can cause new-onset HTN, worsen blood pressure in those with a history of HTN and increase the risk of heart failure. As was recently announced by the U.S. Food and Drug Administration, NSAIDs can increase the risk of MI or stroke in patients with or without heart disease.

**Cardiovascular Risk Estimation**

Cardiovascular risk assessment tools, including the Framingham Risk Score (FRS), Reynolds Risk Score (RRS) and the 2013 American College of Cardiology/American Heart Association (ACC/AHA) cardiovascular risk calculator, have been used to provide an estimate of an individual's risk of a cardiovascular event. Neither the FRS nor ACC/AHA risk calculator accounts for the presence of a systemic inflammatory condition in its risk calculation.

In a 2012 study published by Crowson et al, the observed risk for CVD was two-fold higher than predicted in women using the FRS. The RRS also underestimated risk in women despite the use of C-reactive protein levels. This difference in the expected and observed CV event rates may be due to an underestimation of the effect of traditional and nontraditional CV risk factors in patients with inflammatory rheumatic conditions.

Recognizing this clinical gap, in 2011 the American Heart Association published an update of the guidelines for the prevention of heart disease in women. Included in this document was the recommendation that women with systemic autoimmune diseases, but without clinically evident CVD, be considered at risk for CVD and undergo appropriate screening.

RA and SLE confer an increased CV risk that must be recognized by clinicians as we strive to provide the best care for our patients. This increased risk is due to a combination of factors, including greater prevalence of traditional and nontraditional cardiac risk factors, premature atherosclerosis, systemic inflammation and a higher burden of subclinical atherosclerosis. CV morbidity and mortality is increased and should prompt referral to a cardiologist for appropriate screening, CV risk factor modification and treatment when indicated.

Current guidelines for CV risk assessment underestimate the risk for CVD in patients with RA and SLE and may result in missed opportunities for aggressive prevention strategies.
References:

if we rely on these tools alone. Further research is necessary to develop an accurate CV risk assessment tool in this population. In the interim, we need to aggressively screen and treat cardiovascular risk factors when they are identified in order to reduce the risk of CVD. Consideration should be given to screening patients without clinically evident CVD using noninvasive methods for additional cardiovascular risk stratification.

Due to the multisystem involvement of RA and SLE, these patients are often cared for by multiple providers (including primary care physicians, cardiologists, rheumatologists, nephrologists, endocrinologists, etc). It is imperative that we assume an interdisciplinary approach in the management of these patients in an effort to treat the “whole patient.” Collaboration between physicians is a much-needed initial step in achieving this goal.

Recovery Begins At Bluff Plantation

A RiverMend Health Recovery Program

Spanning 178 beautiful acres in Augusta, Georgia, Bluff Plantation is the most comprehensive residential treatment program on the East Coast for alcohol and drug dependency, dual disorders and pain medication addiction.

Led by William S. Jacobs, M.D., a renowned triple board certified physician in Anesthesiology, Pain Medicine and Addiction Medicine, the team at Bluff Plantation utilizes a proven, chronic disease management model to deliver superior outcomes and accelerate recovery.
A 29-year-old woman presents two weeks after delivery of her second child complaining of lower extremity edema and dyspnea on exertion. She had mild dyspnea at the end of her first pregnancy two years ago, but she has had an uneventful second pregnancy. She has no other medical problems. The patient has a faint third heart sound (S3) on cardiac exam, basilar rales on lung exam, and 2+ peripheral edema. An echocardiogram shows an Ejection Fraction (EF) of 35 percent. The patient is admitted for diuresis in the setting of peripartum cardiomyopathy (PPCM). A few months pass, and her EF is now over 55 percent and normalized. She is asymptomatic. The patient asks about possibly becoming pregnant again. In this brief review, I will discuss a few of the questions surrounding this case.

What is PPCM?

PPCM is an important and often under-recognized cardiac disease of pregnancy. It is rare in the United States and has varied incidence around the world. When the disease occurs, it affects the mother, the children and the local community, especially in poor parts of the world. PPCM has been defined as a heart failure syndrome occurring in the last month of pregnancy or within five months of delivery, but some cases may manifest outside this time frame.¹

In the United States, PPCM has a reported incidence of approximately 1 in 3000 births.² Studies from Deschapelles, Haiti, report one of the highest incidence rates in the world at approximately 1 in 300 births.³⁻⁴ Worldwide, the estimated number of women with PPCM could be as high as 72,500 cases a year if 145,000,000 babies are born each year and if there is an approximate incidence of 1 in 2,000 in childbearing women.

A variety of risk factors have been identified for PPCM (See Table 1), including history of hypertension, multigravid state, prolonged tocolysis, obesity, smoking and low socioeconomic status.⁵⁻⁹ Regarding race/ethnicity, the incidence of PPCM seems to be highest in women with an African or African-American background.¹⁰ Genetic factors likely play a role in PPCM, but specific links are not yet understood.

The etiology of PPCM remains unknown, but several hypotheses are being scrutinized. Inflammation has long been considered a possible etiology of PPCM, but data have not
supported this hypothesis. The viral hypothesis of PPCM has been considered. Viral genomic material has been discovered in cardiac biopsy specimens from PPCM patients, but the incidence is not different than controls. Immune activation may also be important in PPCM. For instance, various autoantibodies are found in some PPCM patients. The presence of fetal cells in the mother’s heart (microchimerism) also suggests a role for immune activation.

Micronutrient deficiency has also been proposed as a hypothesis because of the significant association of low socioeconomic status with PPCM. Hormonal imbalances are also a possible etiology in PPCM. Data in this area come from studies of the prolactin pathway. As such, bromocriptine, an inhibitor of prolactin, has been proposed as a treatment for PPCM, but the use of bromocriptine has not been widely accepted due to safety concerns and limited data. Another recently proposed mechanism involves abnormal angiogenesis. The variety of hypotheses regarding PPCM and supporting clinical data may suggest multiple pathways for development of the disease.

**How Do We Diagnose and Treat PPCM?**

Distinguishing PPCM is often difficult because of the high prevalence of edema and dyspnea during normal pregnancy. Practitioners must have a high degree of suspicion and be prepared to perform screening echocardiography. PPCM often goes undiagnosed or misdiagnosed. The typical symptoms of heart failure (HF) are often present in PPCM patients: edema, orthopnea, paroxysmal nocturnal dyspnea, dyspnea of exertion, exercise intolerance, cough and chest pain.

On the physical exam, patients may have the usual array of HF signs: elevated jugular venous pulsations, pulmonary rales, displaced apical pulse or S3 on cardiac exam, ascites or peripheral edema. Echocardiography is the cornerstone of PPCM diagnosis, particularly to assess left ventricular EF (typically < 45%

**Table 2: Risk Factors For Peripartum Cardiomyopathy**

<table>
<thead>
<tr>
<th>Probable Risk</th>
<th>Possible Risk</th>
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<tbody>
<tr>
<td>Multigravidity</td>
<td>Smoking</td>
</tr>
<tr>
<td>Extremes of age</td>
<td>Hypertension</td>
</tr>
<tr>
<td>Prolonged tocolysis</td>
<td>Pregnancy-related hypertensive diseases</td>
</tr>
<tr>
<td>African or African-American origin</td>
<td>Malnutrition</td>
</tr>
<tr>
<td></td>
<td>Cocaine</td>
</tr>
<tr>
<td></td>
<td>Low socioeconomic status</td>
</tr>
<tr>
<td></td>
<td>Multiparity</td>
</tr>
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| Emerging Risk                        | Genetics                                                                     |
|                                      | Obesity                                                                      |
percent). Cardiac magnetic resonance imaging (MRI) can also be useful in the evaluation of PPCM patients.

All guideline-based recommendations for HF of other etiologies apply to the management of PPCM. Patients with HF due to PPCM are often initially treated with intravenous diuretics and vasodilatory agents. Inotropes may be necessary in some patients. Following stabilization, beta-blockers, angiotensin-converting enzyme (ACE) inhibitors, diuretics and digoxin make up the standard regimen for PPCM patients. Also, other vasodilatory agents may be added to the chronic HF regimen in some persistently symptomatic patients such as isosorbide and hydralazine.

It is important to note that patients diagnosed during the antepartum period often require early delivery. Beta-blockers are often titrated upward to obtain target doses recommended from clinical trials. ACE inhibitors and angiotensin II receptor blockers (ARBs) are not recommended for pregnant women because of the risk of fetal renal abnormalities. Aldosterone receptor antagonists should be avoided in the antepartum period. Diuretics should be used, in all instances, at the lowest possible dose to maintain a euvoletic state.

High incidence rates of left ventricular (LV) thrombi have been reported in PPCM patients, and stroke rates seem to be increased. This risk is likely complicated by the hypercoagulable state of pregnancy. Patients with severely reduced ejection fraction (EF<35 percent) should be considered for anticoagulation. During pregnancy, unfractionated heparin (UFH) or low molecular weight heparin may be used since they do not cross the placenta. After delivery, heparin or warfarin may be used since they are not secreted in the breast milk.

Duration of therapy for PPCM patients is controversial, and there is currently no consensus. If a patient's left ventricular (LV) function normalizes, some practitioners recommend continuing guideline-based HF therapy for at least one year. One study has demonstrated, however, that some patients may have deterioration months or even years after diagnosis if medications are stopped. Similar results have been noted in the Haitian PPCM population (personal communication from Albert Schweitzer Hospital, Haiti). If the LV function remains depressed, drug therapy should be continued indefinitely.

It is important to note that short- and long-term outcomes in patients with PPCM are better than other types of non-ischemic cardiomyopathies. PPCM patients have a high rate of LV recovery. Overall, the risk of death is low, but some patients do progress to refractory HF and need cardiac mechanical support or cardiac transplantation.

What About Subsequent Pregnancy After PPCM?

Studies of subsequent pregnancy after PPCM consistently show higher risk in unrecovered (abnormal LVEF) vs. recovered (normal LVEF) patients. The risk of decreased LV function during a subsequent pregnancy for a recovered patient is 20-30 percent. The risk of decreased LV function during a subsequent pregnancy for an unrecovered patient is 50 percent. The risk of death with subsequent pregnancy in recovered vs. unrecovered patients is approximately 0-5 percent vs. 15-20 percent.

Some studies suggest that a stress echocardiography test (dobutamine or exercise) may be helpful in risk stratification. Patients who have a normal stress echocardiography result seem to have a favorable prognosis, while an abnormal result may suggest a higher risk with subsequent pregnancy. For PPCM patients who elect to have subsequent pregnancies, our practice has been to perform frequent echocardiography – as often as every 4-6 weeks – during pregnancy and after delivery.

Back to the Patient

In the case presented at the beginning of this article, the decision to become pregnant again is complicated and is not without some risk. It is perhaps favorable that this patient had complete recovery of LV function and is asymptomatic, but if she becomes pregnant again she will require close monitoring and follow up.

Much has been learned about PPCM from the cohort of patients in Deschapelles, Haiti, at the Albert Schweitzer Hospital. Our team in Atlanta at Emory Saint Joseph's Hospital is involved in providing long-term care to the women in Haiti with PPCM, who are often poor and in need of help supporting their families. Ongoing studies in Haiti and elsewhere will lead to further insights into this interesting and important disease and continue to promote the health of mothers around the world. More information about PPCM can be found at www.healingforamothersheart.com.
The vision of WellStar Health System is to deliver world-class healthcare through our hospitals, physicians and services. Our not-for-profit health system includes WellStar Kennestone Regional Medical Center (anchored by WellStar Kennestone Hospital) and WellStar Cobb, Douglas, Paulding and Windy Hill hospitals, WellStar Medical Group, Urgent Care Centers; Health Parks; Pediatric Center; Health Place; Homecare; Hospice; Atherton Place; Paulding Nursing and Rehabilitation Center; and the WellStar Foundation.

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For more information, please visit wellstar.org/mayo. For physician referral, please call 770-956-STAR (7827).

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We believe in life well-lived.

References
Case #1: A 55-year-old female triathlete self-refers herself to your clinic complaining of exertional dyspnea on exertion. She has been a high-level recreational endurance athlete for the last 25 years, competing in 25 marathons and 8 Ironman triathlons. At baseline, she runs 40 miles per week when not training for competition. She states that for the last six to nine months, she feels excessively fatigued and more short of breath during her long runs. You are the third cardiologist she has seen. She brings previous records demonstrating a “normal” 2-D trans-thoracic echocardiogram and standard Bruce protocol exercise treadmill test. The stress test was stopped because she achieved maximum heart rate; she was asymptomatic at the time. She was told nothing was wrong with her because “you run marathons and run 50 miles per week”.

Case #2: An 18-year-old female soccer player is referred to your clinic for an “abnormal ECG” obtained during a pre-season sports physical. It shows an incomplete right bundle branch block and voltage criteria for left ventricular hypertrophy. She has no symptoms and a normal physical exam. The referring physician believes the athlete needs an echocardiogram.

These hypothetical cases are, in fact, descriptions of common referrals and self-referred patients seen in general cardiology clinics across the country. They are examples of why sports cardiology is becoming an integral and essential component of preventive cardiology. Without sports cardiology expertise and significant exposure to athletic patients, one may agree that the patient described in Case #1 is truly “fine.”

How could someone this fit have significant exertional dyspnea and fatigue? Didn’t she have a normal echo and stress test? For Case #2, it is not surprising there was concern about the presence of high voltage on the ECG. Who wants to miss a case of hypertrophic cardiomyopathy?

The story of Hank Gathers resonates with all physicians who care for athletes. Perhaps Case #2 requires more testing, and Case #1 is an example of wasted resources and too much testing. The answer is actually the exact opposite.

To start, however, it is important to first look at the tremendous rise in sports participation in the United States. Since the 1990s, the number of women and men who participate in recreational running events in the U.S. has skyrocketed, and now women sign up for long-distance road races more than men. In 2012 almost 9 million road race finishers in the U.S. were women. These striking trends indicate that female participation in these endurance exercise events will continue to rise over the coming years.
With liver disease affecting one in 10 Americans and the rate of chronic hepatitis cases on the rise, careful diagnosis, screening and treatment by highly trained physicians is critical. At Atlanta Gastroenterology Associates' The Liver Center, our expert hepatologists provide the level of care patients suffering from these chronic diseases need, including comprehensive monitoring and treatment plans using the most current therapies available and direct access to liver transplant programs. Treatment for Hep C is now also available.

When you refer patients to The Liver Center, you can be confident they will receive the specialized care they need. In turn, you will receive the information you need to monitor their progress.

Our hepatologists are now seeing patients in four metro Atlanta locations — including a newly renovated office at Emory Midtown and three satellite offices — making access to expert care easier than ever.
Specific to running, there are several controversial issues regarding the effects of endurance exercise on the heart. The core of these issues centers on the hypothesis of a “dose-response” and exercise.

this is extremely rare in occurrence and limited to a very small, at-risk portion of the ultra-endurance athletic population.

Exactly who is at risk is unknown and an important area of current research. The association between ultra-endurance exercise and accelerated coronary atherosclerosis remains inconclusive and based on weak and poorly controlled observational data. There is simply more we need to understand before any conclusions can be made. Moreover, there are studies that have demonstrated improved mortality in ultra-endurance athletes, the safety of marathon running and the beneficial effects on cardiovascular health from marathon training. Current advice for those concerned would be to consult a sports cardiologist before embarking on an ultra-endurance training regimen.

A second and more publicized controversy poses the question, should all competitive athletes be screened with a 12-lead ECG prior to sports participation? At the forefront of this controversy are highly visible, albeit rare, tragedies of sudden cardiac death on the playing field and data from Italy demonstrating a 90 percent reduction in athlete sudden cardiac death events through the use of a nationally mandated ECG screening program. Indeed, because of these data, Europe mandates the use of a pre-participation ECG, while the U.S. (American Heart Association) does not.

Although it seems logical to implement this same requirement in the U.S., there are many valid issues with this proposed mandate. For one, there remains no definitive evidence that the addition of a pre-participation ECG reduces mortality compared to the current practice of only a pre-participation history and physical. However, recent data have also demonstrated higher-risk of sudden cardiac death in some U.S. collegiate athlete groups.

At this point, this controversy remains far from resolved. For now, I believe there is a role for more in-depth pre-participation screening (utilizing ECG and/or echocardiography) in certain athlete groups if the infrastructure is in place to support this practice and the physicians, both internists and cardiologists, have the experience and expertise to adequately interpret the data obtained. Further, I believe ongoing research efforts designed to improve the interpretation of the athlete ECG are paramount and will continue to improve the specificity and false positive rates of the screening athlete ECG.

It is critical for all cardiologists and internists to educate our patients about the benefits of exercise, to not discourage strenuous exercise in those healthy enough and invested to do so, and to be aware of these current controversies within sports cardiology. For the sports cardiologist, we must be aware of the current limitations within sports cardiology research and recognize there is still much to understand. Because of this, we must be cautious of science that may garner headlines and critically analyze all new sports-specific research.

Going back to the initial cases: Case #1 illustrates the important point that symptoms experienced by even the most fit ultra-endurance athlete should not be ignored and that appropriate testing is critical to the evaluation and work-up of the endurance athlete. Although this triathlete had previous “normal” testing, the Bruce protocol is not adequate for an elite endurance athlete. Moreover, the functional capacity of this athlete was not assessed properly.

The more appropriate test of choice would have been a cardiopulmonary exercise test, using some sort of ramp exercise protocol in attempts to replicate the training conditions experienced by the athlete. From an echocardiographic standpoint, the use of speckle-tracking techniques may detect early forms of cardiomyopathy not readily evident using standard 2-D echocardiography. Thus, the work-up in Case #1 remains incomplete and inadequate.

Case #2 illustrates the importance of being familiar with normal athletic “training-related” ECG patterns. Voltage
consistent with left ventricular hypertrophy, but without additional abnormal ECG findings (ex. left axis deviation, q-waves, ST-segment abnormalities, etc.), is completely normal in a young, competitive athlete. This young athlete did not require a cardiology referral and certainly does not require further testing.

This is an exciting time in the field of sports cardiology. The American College of Cardiology has endorsed exercise and sports cardiology as an important and growing field in cardiology. The sports cardiologist has an important role in the individualized medical care of all athletic patients. Research possibilities in sports cardiology are also endless in today’s climate, and it is essential we include female athletes in the design of new studies. As current research efforts provide evidence-based insight into the current controversies present in sports cardiology, it is paramount for the sports cardiologist to responsibly disseminate this knowledge to the general public.

References
Stroke is the leading cause of disability in the U.S. as well as the leading preventable cause of disability. Over 6.5 million people are living after stroke with the majority of survivors, 3.8 million, being women.

Nearly half of stroke survivors have persistent residual deficits six months after their initial stroke, increasing the number of disabled women to 200,000 more than men. Because women are more likely to be living alone and widowed before a stroke, women are more often institutionalized after a stroke. Unfortunately, women tend to have worse recovery after a stroke as compared to men.

The American Heart Association (AHA) / American Stroke Association (ASA) published the first ever Stroke Prevention Guidelines for Women in 2014. Similar guidelines for the prevention of heart disease in women were published 10 years earlier. Guidelines specific to women are important since they address unique differences in women, such as genetics, hormonal and reproductive factors, immunity and coagulation factors. It is critically important to identify women at higher risk for stroke so proper preventive measures can be implemented.

Case #1: A 65-year-old female with well-controlled hypertension has paroxysmal atrial fibrillation on a 24-hour Holter that was ordered for palpitations. What should be done to reduce her risk of stroke?

Case #2: A 30-year-old female with a history of preeclampsia with her first pregnancy is now 12 weeks pregnant with normal blood pressure at this time. What should be done to reduce her risk of preeclampsia and risk of stroke?

Risk Factors for Stroke

The Prevention of Stroke Guidelines for Women focuses on risk factors unique to women. The risk factors common to both men and women are addressed in the Guidelines for the Primary Prevention of Stroke published December 2014. Stroke risk factors that are specific to younger women are oral contraceptive use, pregnancy, preeclampsia and gestational diabetes. Older women are affected by changes in hormonal status and in postmenopausal hormone use. Stroke risk factors that are more commonly seen in women are migraine headaches with aura, atrial fibrillation (AF), diabetes mellitus (DM) and hypertension (HTN). The risk factors for stroke that are common in both sexes are previous cardiovascular disease (CVD), smoking, metabolic syndrome (MetS), age, physical inactivity, poor diet and obesity.

Hypertension is the most common modifiable risk factor for stroke in both men and women. Seventy-seven percent of people who have a first stroke have blood pressure 140/90 mmHg or greater. The Women’s Health Initiative (WHI) shows that older women with high normal blood pressure (prehypertension) had a 93 percent increased risk of stroke compared to normotensive women. A recent meta-analysis of large randomized controlled studies showed treatment of HTN in women age 55 years or older has a 38 percent lower risk of fatal and nonfatal strokes.

Hypertension in pregnancy increases the risk for preeclampsia, eclampsia and stroke during pregnancy. Fortunately, stroke is uncommon during pregnancy. There are 34 strokes per 100,000 deliveries. Risk for stroke is higher in pregnant women than in age-matched non-pregnant women, with the highest risk of stroke in the third trimester and postpartum. An increased risk of hypertension and stroke occurs in women with a history of preeclampsia for up to 30 years after delivery.

Therefore, it is essential that these women be followed long term for hypertension and other modifiable cardiovascular risks. Long-term health risks also include renal disease, DM and CVD. Women with previous preeclampsia or hypertension should be considered for 81 mg of aspirin after 12 weeks of gestation to reduce preeclampsia risk. Calcium supplementation of one gram per day should be considered in women with low calcium intake of less than 600 mg daily to prevent preeclampsia.

Migraine headache with aura has a prevalence of 4.4 percent and has a 2.5 percent increase in ischemic stroke risk. This risk is higher in women who also take oral contraceptives. Increased frequency of a migraine headache...
with aura is associated with an increased risk of stroke. Women under age 55 years with migraine headache with aura have an increased risk of both ischemic stroke (IS) and intracerebral hemorrhage (ICH). Migraine and stroke has been associated for more than 40 years, but the pathobiology of this association has only recently been studied. The various mechanisms include vasospasm, endothelial injury, platelet aggregation and prothrombotic states, cortical spreading depression, carotid dissection, genetic variants and traditional vascular risk factors.

Obesity is strongly related to stroke risk. Both Body Mass Index (BMI) and waist circumference increase risk for stroke. By 2030, it is estimated that 86 percent of Americans will be overweight or obese (BMI ≥ 25 kg/m2). Abdominal obesity is common in postmenopausal women and associated with insulin resistance. Further, women with MetS are much more likely to have stroke.14

MetS affects one-third of the American population. MetS is three of the following constellation of risk factors: abdominal obesity, dyslipidemia (elevated triglycerides and/or low levels of high density lipoprotein cholesterol), HTN and insulin resistance/impaired fasting glucose. Lifestyle changes such as a heart-healthy diet with caloric restriction and regular physical activity are essential for managing the risk factors associated with MetS.

Oral contraceptives (OC) are associated with strokes, with the incidence 1.4-2.0 times higher in OC users compared to non-OC users.15 The risk of stroke associated with OC use is lower than the risk associated with pregnancy. However, stroke risk increases with age, smoking, obesity, HTN, diabetes and other prothrombotic factors. Future research will determine the safety of low-dose OC, transdermal and vaginal rings in women who may be at risk for stroke based on age, lifestyle habits, ethnicity and race.

Strokes from AF cause the most severe disability compared to other causes of strokes. Women with AF have been found to have a higher risk of stroke compared to men with AF.17, 18 In 1998, it was reported that stroke rates in patients with CVD were approximately 25 percent higher in women with AF but only 10 percent higher in men compared to those without CVD.

Novel anticoagulants (NOAC) were approved for stroke prevention in non-valvular AF starting in November 2010. A meta-analysis evaluated gender differences in residual risk of strokes and major bleeding in patients treated with warfarin or a novel anticoagulant. Compared to men, women with AF taking warfarin had a significantly greater residual risk of stroke and systemic embolism.
compared with men. However the gender difference was not seen in patients receiving novel anticoagulant agents. The disadvantage of women with AF compared to men disappeared with the use of novel anticoagulants.

Recent guidelines reflect the higher risk of stroke burden in women and older patients with AF by recommending assessment of a patient’s risk of stroke by using the CHA2DS2-VASC. Female gender was considered an independent risk factor for stroke in atrial fibrillation. The presence of atherosclerosis in those younger than 65 was added as a risk factor. The new guidelines recommend that for patients with non-valvular AF with prior stroke, transient ischemic attack, or a CHA2DS2-VASC score of 2 or greater, oral anticoagulants should be considered. Suggested oral anticoagulants are warfarin (INR 2.0 to 3.0); dabigatran; rivaroxaban; or apixaban. In addition, if the patient is unable to maintain a therapeutic INR level with warfarin, a direct thrombin or factor Xa inhibitor (dabigatran, rivaroxaban, or apixaban) is recommended.

Now back to those two case studies. Case #1 should be started on anticoagulation with either warfarin or a NOAC because her CHA2DS2-VASC score is 3 (hypertension, age over 65 and female sex). She should be considered for beta-blocker therapy for rate control. Underlying causes of paroxysmal atrial fibrillation should be evaluated, such as thyroid disorder, sleep apnea, ischemia, valvular heart disease and elevated blood pressure.

Case #2 should be started on calcium supplementation of 1 gram per day and 81 mg of aspirin daily to reduce her risk of preeclampsia. She should be monitored closely throughout her pregnancy for hypertension and signs of preeclampsia.

No matter the age or level of health, stroke in women remains a serious cause of preventable deaths, disability and cost. While there is good news for mortality reduction in the U.S. from CVD and stroke, intentional efforts are needed to reduce stroke in women. Women need education on gender-specific risk and attention from primary care providers, especially obstetricians/gynecologists, to improve awareness and reduce morbidity and mortality. All physicians and providers who care for women should follow the new 2014 Prevention of Stroke in Women guidelines.

References
For patients with severe aortic stenosis who were once considered to be high risk or inoperable candidates for heart valve replacement, a minimally invasive procedure offers another option. Transcatheter aortic valve replacement (TAVR) makes the repair without removing the old valve. Instead, a replacement valve is wedged into the damaged aortic valve’s place, essentially creating a valve-within-a-valve.

Similar to placing a stent in an artery, TAVR delivers a collapsible replacement valve to the damaged valve site through a catheter, entering either through the femoral artery or through a small incision in the chest to access a large artery or the tip of the left ventricle. When the new valve is expanded, the old valve leaflets are moved out of the way and the new valve begins regulating blood flow.

Amar Patel, MD, an interventional cardiologist and Co-Medical Director for Structural Heart and Valve Therapies at WellStar Health System, says the procedure offers a reparative solution to people for whom an open heart procedure is too risky. “For patients who are older and more frail, or for those with other comorbidities such as prior chest wall surgery, poor lung function and cardiomyopathy, the risk for complication is quite high,” he says. “TAVR employs technology that helps reduce the potential for complication and improves survival rates for these people.”

Additionally, TAVR results in improved outcomes and short length of stay in the hospital for patients.

“Because it is minimally invasive, TAVR oftentimes requires a much lighter anesthesia load than traditional surgery,” Dr. Patel says. “Ultimately, this means that the patient is typically wide awake and eating later that day and able to go home just a couple of days afterward.”

**Volume + Experience = Successful Outcomes**

WellStar began offering TAVR at its Kennestone facility in 2012. Since then, more than 165 procedures have been completed, making WellStar Kennestone Hospital one of the busiest centers in the nation. “In terms of the Transcatheter Valve Therapy (TVT) registry, we are in the top quartile for volume of procedures performed,” Dr. Patel says. “And our outcomes are certainly among the best in the nation.”

He adds that the longevity of the procedure is, as yet, unknown, but he expects TAVR to be a proven long-term success. “Clinical trials have only been going on for about 10 years, but we know the procedure works for at least that long,” he says. “The replacement valve we’re using has fared very well compared to surgical valves. I believe TAVR will deliver long-lasting results.”

**Continued Advancements**

As advances in technology and techniques occur, TAVR may eventually be a good approach not only for high-risk patients, but also for those who have a medium or even a low level of risk. “In the three years since we began performing TAVR, new technology has been introduced that has improved the procedure and reduced the risk for potential complications,” Dr. Patel says. “Today, we have options like self-expanding valves that can be repositioned for optimal deployment and the Edwards SAPIEN 3 heart valve, which has a new sealing skirt that fits inside the old heart valve and provides a tight seal. Both of these valves reduce the risk of paravalvular leaks.

“As a result of device and process improvements, we’ve seen a reduction in stroke rates as well as the rate of permanent pacemaker implantation,” he adds. “Over time, if TAVR can be proven to be just as good or better than a surgical approach, it may eventually replace surgery as the best option for heart valve replacement in any type of patient.”
The field of neuroscience is ever changing and expanding, with physicians and researchers working separately and together, using cutting-edge technologies and techniques to advance the understanding of the brain and nervous system.

Minimally Invasive Technologies Improve Cerebrovascular Treatments

Continuous advances in technology are making it possible to treat cerebrovascular disease, strokes and aneurysms with greater precision and effectiveness, according to Rishi Gupta, MD, director of the Neurocritical Care Unit and Telestroke Network at WellStar Health System. One such treatment is a catheter-based approach for patients suffering from strokes.

“In the past, a patient suffering from one of these conditions would receive thrombolytic therapy to break up or dissolve blood clots. Today, we have catheters that we can use to remove clots and treat brain blood vessel disorders,” he says.

Dr. Gupta says that new technologies have especially improved surgeon’s capabilities to remove blood clots.

“There has been a rapid evolution of technologies to allow physicians to safely and effectively remove blood clots from the brain. Less than five years ago, we were able to open arteries by removing clots about 50 percent of the time; now, we are able to open arteries about 95 percent of the time. That improvement is attributable to technology,” he says. “The previous Merci device that is similar to a corkscrew has been replaced with retrievable stent-like devices – the Trevo device and the Solitaire device – that we can deploy to collapse and remove blood clots.”

A new and exciting technology for the removal of brain hemorrhages is the Apollo aspiration catheter.

“In the past, we had to open the patient’s skull to remove a hemorrhage. Now, we can use the Apollo device to pass a catheter through a tiny hole drilled in the skull, reach the clot and initiate aspiration to remove the bleed,” he says. “This technology allows us to access brain hemorrhages that previously could not be operated upon, and with only minimal disruption to the normal brain tissue.”

According to Dr. Gupta, new and advanced treatments and techniques are quickly changing the way stroke patients receive care.

“Stroke patients have more options today,” he says. “Now, by using approaches that are less invasive and with new technologies, we have been able to extend the window of time for treating these people. That allows us to do a lot more for them.”

Targeted Therapies for Brain Tumors

“The scope of neuro-oncology includes primary and metastatic cancers that affect the brain and the spine. The neuro-oncologist’s ‘bread and butter’ is metastatic disease – brain and spine metastases are 10 times more common than tumors that originate in the brain and spine,” says Erin Dunbar, MD, director for neuro-oncology and one of the founding physicians of the Piedmont Brain Tumor Center. “Fortunately, there are some extraordinarily promising tumor-directed therapies – chemotherapies, radiations, surgeries and devices like tumor-treating shields – that we are using today to improve both longevity and quality of life for patients with both primary and metastatic tumors of the brain and spine.”
For example, in light of former President Jimmy Carter’s recent diagnosis of melanoma that has metastasized to other parts of his body including his brain, Dr. Dunbar says that a targeted medicine approach, immunotherapy, is making huge strides in treatment.

“Immunotherapy is exciting and showing promise in treating melanoma and lung cancer, including their brain metastases,” she says. “Additionally, it is being used to treat primary brain tumors like glioblastoma.”

Dr. Dunbar says that there is currently an explosion of new medicines being applied to tumor-directed therapy, both in terms of delivery mechanisms and the benefits to and tolerability for the patient.

“There are some amazing new medicines being applied to tumor-directed therapy, including vaccines that can harness [the] immune system and get it to fight the tumor. Traditional chemotherapy is only one tiny fraction of how we fight tumors with medicines now,” she says. “These vaccines and other immune system fighters and new chemotherapies are often outpatient therapies that patients can live with.”

One modality is a non-invasive device that the patient wears on his or her head. “[It’s] a biologic energy field that is designed by a certified physician to deliver a low-dose treatment right to their brain tumor,” Dr. Dunbar says. “The device is portable and empowers patients by giving them control of their therapy.”

Traditional treatments for brain tumors continue to improve as well, according to Dr. Dunbar.

“The technical components of radiation and surgery are becoming so precise that patients are receiving more effective therapy with fewer side effects than ever before,” she says. “The improvements are completely changing the way people get their care.”

Dr. Dunbar adds that the paradigm in oncology has evolved to a point where patients are benefiting from clinical trials and emerging technologies and therapies, at diagnosis and throughout their lifetimes. Patient-centered, multidisciplinary care teams are also essential to improvements in quality of life and longevity. And there have been advances in palliative care.

“Now we have board-certified palliative oncologists as well as providers in both palliative care and oncology specialties who are dedicated to aggressively preventing and managing complex symptoms,” she says.

**Telemedicine Offers Hospitals 24/7 Access to Stroke Care**

When it comes to stroke care, time is of the essence. Yet more and more hospitals are themselves without neurologists on staff, leaving them with a critical need for assistance in diagnosing and treating stroke patients.
Matthews Gwynn, MD, and his partners at Atlanta Neurology, Drs. Keith Sanders, Jim Kiley and Lisa Johnston, saw that they could provide this much-needed service to hospitals in real-time via the Internet. Six years ago, they founded AcuteCare Telemedicine (ACT), which offers cost-effective solutions that deliver complete on-call coverage, improve patient outcomes, adhere to HIPAA/HITECH requirements and establish a sustainable financial model for patient care.

“With the advent of high-speed Internet service, we saw the feasibility of treating emergency neurology patients through telemedicine in real time,” says Dr. Gwynn. “We started out providing the service to one hospital and are now serving 25 hospitals in five states, and the demand is still high and growing.”

Dr. Gwynn explains that ACT’s physicians are available to consult with hospital personnel and see the patient who presents with stroke symptoms within just minutes of notification.

“We’re able to actually see the patient via a webcam with a high-definition camera on a wide flat screen. The camera can pan, tilt and zoom all around the room so that we are able to view the patient, turn and talk with his or her family members, view lab results and scans ... exactly as if we were in the room,” he says. “Then we can determine if the patient is having a stroke or experiencing something else and make recommendations for how to treat them. Our note goes into the patient’s chart immediately.”

Through ACT, hospitals are able to access a network of experienced, board-certified clinicians who are able to communicate clearly with patients, doctors, nurses and pharmacists, at a fraction of the cost they would incur for having neurologists on staff. But more important, they are able to provide immediate diagnosis and treatment for patients who may be experiencing stroke.
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