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INSIDE

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A Diet by Any Other Name Is Still a Diet ...

ABSTRACT & COMMENTARY

Malcolm Robinson MD, FACP, FACG, AGAF

Emeritus Clinical Professor of Medicine, University of Oklahoma College of Medicine, Oklahoma City

Dr. Robinson reports no financial relationship to this field of study.

Synopsis: *Regardless of proportions of fat, protein, and carbohydrate, all diets with lowered caloric intake modestly reduced weight.*

Source: Sacks FM, et al. Comparison of weight-loss diets with different compositions of fat, protein, and carbohydrates. *N Engl J Med* 2009;360:859-873.

THERE HAS BEEN BURNING CONTROVERSY REGARDING THE "BEST" diet(s) for the treatment of overweight individuals, and previous studies have revealed wildly contradictory results. Most past studies were relatively small and adherence was often poor or impossible to ascertain, and few investigations lasted as long as 1 year. Even the longer and thus more realistic studies contradicted each other in terms of detecting the ideal weight-loss diet. The present authors believed that a large study was indicated to select the best weight-loss diet, and they felt that weight change over 2 years would be more revealing than results from shorter trials. A total of 811 particularly well-educated and motivated patients with BMI levels between 25 and 40 kg/m^2 were randomly assigned to 1 of 4 diets with varied targeted percentages of energy from fat, protein, and carbohydrates. Age range was from 30 to 70 years, and diabetes and unstable cardiovascular disease were exclusions as were any medications that might affect body weight. Diets contained similar foods to the extent possible and all diets met guidelines for cardiovascular health (low cholesterol, saturated fat, and high fiber). Food was pre-pared at home. The dietary fat content of the diets was 20% or 40%. Carbohydrate levels were 65%, 55%, 45%, or 35%. Protein made up either 15% or 25% of calories. Primary outcomes were changes in body weight after 2 years in 2 × 2 factorial comparisons of high-fat vs low-fat, average-protein vs high-protein, and highest-

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carbohydrate vs lowest-carbohydrate content. Patients lost an average of 6 kg after 6 months (7% of initial weight), but average weight began to rise after 12 months. There were no differences between any of the assigned diets and degree of weight loss, rate of ultimate weight increases later in the study, or any similar clinical parameter. Overall average weight loss across study groups was 4 kg, and almost 15% of the participants reduced body weight by at least 10%.

Attendance at offered group and individual instructional/counseling sessions was associated with weight loss at the rate of 0.2 kg/session attended. All diets improved lipid-related risk factors and fasting insulin levels. Patients were given daily meal plans, and they were instructed to record daily meal plans in a food diary and using a web-based tool. Each participant had a goal of 90 minutes of moderate physical activity per week. Laboratory data collection was extensive as were questionnaires regarding food craving, satiety, and diet satisfaction. At 2 years, both low-fat diet arms and the highest-carbohydrate diet decreased low-density lipoprotein cholesterol more than the high-fat diets or the lowest-carbohydrate diet. All diets decreased triglycerides by between 12% and 17%. HDL levels were highest with the lowest-carbohydrate diet vs the highest. Food craving and similar measures didn't differ between the diet arms. There were no differences in adverse events between groups. There was a high rate of patient retention, but biochemical studies indicated that none of the groups were very successful in strict adherence to their assigned diets. Patient motivation, probably best mirrored in attendance at counseling sessions, seemed most important as a marker for weight-loss success.

■ COMMENTARY

This important study makes it clear that no miracle diet has emerged as a panacea for the current epidemic of obesity. In fact, it would appear that any diet that successfully lowers caloric intake will lead to weight reduction. As many of us have long suspected, calories seem to be calories, regardless of their format. It is unlikely that any other study will be as well-designed or executed, and the length of the study and excellent patient retention are commendable. As pointed out in an accompanying editorial,[1] the protein intake in the study was supposed to differ by 10% — but the measurement of urinary nitrogen excretion showed that the "real" intake varied by only 1% or 2%. Similar data showed that these patients, despite their excellent motivation, didn't stay on their diets. They obviously ate things that weren't on their diets, and they ate more than the diets allowed. Human nature being what it is, this shouldn't be all that surprising. The editorial did provide a little hope. It described an experiment in Europe that used combined resources of entire "villages" to get their resident children to eat more wisely and get more exercise. Amazingly, the prevalence of overweight children fell from the 17.8% in nearby communities to only 8.8%. If this approach is further documented as widely effective, we should participate (if only we can muster the self-discipline and control a wildly advertising food industry). ■

Reference

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Low-Tech Screen for Heart Disease

ABSTRACT & COMMENTARY

By Allan J. Wilke, MD

Associate Professor of Family Medicine, University of Alabama at Birmingham School of Medicine—Huntsville Regional Medical Campus, Huntsville

Dr. Wilke reports no financial relationship to this field of study.

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Questions & Comments
Please call **Paula Cousins**, Senior Managing Editor, at (404) 262-5468

Synopsis: *An elevated resting heart rate is a risk factor for heart disease.*

Source: Hsia J, et al. Resting heart rate as a low tech predictor of coronary events in women: Prospective cohort study. *BMJ* 2009;338:b219; doi: 10.1136/bmj.b219.

USING THE WOMEN'S HEALTH INITIATIVE DATABASE, these authors examined the predictive role that resting heart rate (RHR) plays in heart disease. The WHI is a very large study with 161,808 postmenopausal women enrolled. This study gathered data from women enrolled in the WHI's randomized trials and from its observational study. After excluding women with a history of myocardial infarction, stroke, or coronary revascularization and those using beta-blockers, digoxin, or calcium channel blockers, 129,135 women were left for analysis. The outcomes of interest were myocardial infarction, coronary death, and stroke. The first two outcomes were grouped as coronary events.

The RHRs were divided into quintiles: ≤ 62 beats per minute (bpm), 63-66 bpm, 67-70 bpm, 71-76 bpm, and > 76 bpm. The women were followed for almost 8 years, during which they suffered 2281 coronary events and 1877 strokes.

Several interesting (and statistically significant) trends emerged when single variables were examined. As RHR increased, so did age at baseline and the percentage of women with hypertension, diabetes mellitus, current smoking status, hypercholesterolemia requiring drug therapy, depression, nervousness, and body mass index. Physical activity, alcohol use, and postmenopausal hormone therapy use all declined with increasing RHR. Using the lowest quintile as the reference, the hazard ratio (HR) for coronary events trended upward, and became statistically significant at 1.68 when comparing the highest to the lowest quintile. It remained statistically significant in multivariate analysis at 1.26. The same was not true for stroke. Although RHR was associated with stroke in univariate analysis, this association disappeared in multivariate analysis. Other more commonly recognized risk factors for coronary events and stroke were also examined. To place RHR in perspective, the hazard ratios for hypertension, diabetes mellitus, and smoking were 1.69, 2.68, and 2.32 for coronary event and 1.87, 1.94, and 1.95 for stroke, respectively.

■ COMMENTARY

Ever since this study came out, I've been paying more attention to RHR in my patients, and it seems like they're all greater than 76! However, the first thing to remember with this study is its population: healthy, postmenopausal women who weren't taking medications that might slow their heart rates. The women sat quietly for 5 minutes before having their pulse taken. In my office, all patients are marched to the vitals station and have their pulse, blood pressure, temperature, and respiratory rate measured without a rest period.

This study's strengths are its large size and prospective nature. Its main limitation is its population lacked younger women and men. What is the link between elevated RHR and coronary events? The authors speculate about high sympathetic or autonomic tone, but since this was not a randomized trial, only associations can be inferred. Elevated RHR in prehypertensives (either 120-139 mm Hg systolic or 80-89 mm Hg diastolic) has been previously shown to be a risk factor for coronary heart disease in the Atherosclerosis Risk in Communities (ARIC) study[1] and a risk factor for death in hypertensives in a primary care setting.[2] In the first study, prehypertensives with a RHR ≥ 80 bpm had a HR of 1.49 for a coronary event or revascularization, compared to the group whose RHR was 60-69 bpm. This is similar to the HR in this study.

Faithful readers will recall that *Internal Medicine Alert*[3] reviewed a related study[4] also derived from the WHI database that associated elevated white blood cell counts and four types of cancer in women. Back then our advice was to perform follow-up testing of any woman with an unexplained WBC elevation, "based on her risk factors and any previous testing." The same approach holds here. If you have a generally healthy, postmenopausal woman with no known heart disease who is not taking a medication that could slow her heart rate, it would be in her best interest for you to review her cardiovascular risk factors closely and aggressively work to reduce them. ■

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Question Authority!

ABSTRACT & COMMENTARY

By Barbara A. Phillips, MD, MSPH

Professor of Medicine, University of Kentucky; Director, Sleep Disorders Center, Samaritan Hospital, Lexington

Dr. Phillips is a retained consultant for Cephalon and Ventus, and serves on the speakers bureau of Cephalon and Boehringer Ingelheim.

Synopsis: *The joint cardiovascular practice guidelines of the American College of Cardiology (ACC) and the American Heart Association (AHA) are largely based on expert opinion, case studies, or "standard of care," rather than on scientific evidence.*

Source: Tricoci P, et al. Scientific evidence underlying the ACC/AHA Clinical Practice Guidelines. *JAMA* 2009;301: 831-841.

THIS PAPER IS A COLLABORATIVE EFFORT FROM INVESTIgators at Duke, the University of North Carolina, and the American College of Cardiology (ACC). The authors set out to understand the underpinnings of the joint practice guidelines of the American College of Cardiology (ACC) and the American Heart Association (AHA). Specifically, they wanted to learn how much of the recommendations are based in scientific evidence, as opposed to being expert opinion. They examined ACC/AHA practice guidelines issued from 1984 to September 2008. They found 53 guidelines on 22 topics, including a total of 7196 recommendations. Each recommendation is designated by class of recommendation and by the level of evidence. The authors evaluated each of the recommendations according to its class of recommendation and level of supporting evidence.

The process of formulating guidelines can be found at www.acc.org and www.aha.org. In brief, the ACC/AHA joint guidelines classify the evidence upon which recommendations are based into 3 categories:

1. **Level of evidence A:** Evidence from multiple randomized trials or meta-analyses;
2. **Level of evidence B:** Evidence from a single randomized trial or nonrandomized studies;
3. **Level of evidence C:** Expert opinion, case studies, or standards of care.

Recommendations are made and classified based both on the strengths of the study data (e.g., level of evidence) and on the relative importance of the risks and benefits identified by the evidence. Recommendations are classified as follows:

- **Class I:** Conditions for which there is evidence and/or general agreement that a given procedure or treatment is useful and effective;
- **Class II:** Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment;
- **Class IIa:** Weight of evidence/opinion is in favor of usefulness/efficacy;
- **Class IIb:** Usefulness/efficacy is less well established by evidence/opinion;
- **Class III:** Conditions for which there is evidence and/or general agreement that the procedure/treatment is not useful/effective and in some cases may be harmful.

As can be inferred from this scheme, level of evidence C and recommendations of class II or higher indicate that there is a lack of definitive supporting evidence and some uncertainty about the appropriate medical decision. Guidelines are also divided into the following categories: 1) disease-based guidelines; 2) interventional procedure-based guidelines; and 3) diagnostic procedure-based guidelines.

Among the 53 guidelines evaluated in this study, 24 were diseased-based, 15 interventional procedure-based, and 14 diagnostic procedure-based. As of September 2008, 17 of the 53 guidelines were listed as the current guidelines on the ACC web site.

With regard to the class of recommendations, 1124 of the 3044 total recommendations were class II, with a median of 41% of recommendations in class II across the guidelines. In general, the guidelines shifted to more class II recommendations and fewer class III recommendations, while the use of class I recommendations remained fairly constant over time. Among disease-based and interventional guidelines, there was a trend toward more class II recommendations, and the proportion of class I recommendations decreased. In diagnostic guidelines, there was an increase in class I recommendations and a decrease in class II recommendations. The proportion of class III recommendations decreased among all guidelines, especially for interventional guidelines.

With regard to the level of evidence on which the guidelines were based, the 16 current guidelines that reported levels of evidence included a total of 2711 recommendations. Of these, only 314 recommendations were from level of evidence A (12%), whereas 1246 were supported by level of evidence C (46%).

■ COMMENTARY

This is a disheartening paper, for several reasons. First, we appear to still be mostly practicing medicine by the seat of our pants. Secondly, everyone from insurance

companies to malpractice lawyers looks to guidelines and standards to determine reimbursement or malfeasance. Thirdly, it is likely that guidelines based on expert opinion are frequently funded by and/or influenced by industry.[1,2] Finally, the overall picture is probably bleaker than this article suggests, since cardiology may well be the best-funded and most rigorously studied field of medicine.

As the authors somewhat understatedly note in their abstract, "The proportion of recommendations for which there is no conclusive evidence is … growing." These findings highlight the need to improve the process of writing guidelines and to expand the evidence base from which clinical practice guidelines are derived." No kidding. But in the meantime, what do we do? In the accompanying editorial (which I highly recommend), Shaneyfelt and Centor say this about guidelines, "If all that can be produced are biased, minimally applicable consensus statements, perhaps guidelines should be avoided completely. Unless there is evidence of appropriate changes in the guideline process, clinicians and policy makers must reject calls for adherence to guidelines. Physicians would be better off making clinical decisions based on valid primary data."[3] I tend to agree! ■

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Ranolazine Extended-release Tablets (Ranexa®)

By William T. Elliott, MD, FACP, and James Chan, PharmD, PhD

Dr. Elliott is Chair, Formulary Committee, Northern California Kaiser Permanente; and Assistant Clinical Professor of Medicine, University of California, San Francisco.
Dr. Chan is Pharmacy Quality and Outcomes Manager, Kaiser Permanente, Oakland, CA.

Drs. Elliott and Chan report no financial relationship to this field of study.

RANOLAZINE HAS GAINED EXPANDED APPROVAL FROM the FDA for the treatment of chronic angina. The drug was initially approved in 2006 for the treatment of chronic angina in patients who have not achieved an adequate response with other anti-angina drugs and in combination with amlodipine, beta-blockers, or nitrates. The new approval was based on ranolazine establishing safety in a large trial in patients with acute coronary syndrome.[1,2]

Indications

Ranolazine is indicated for the treatment of chronic angina.[3]

Dosage

The recommended dose is 500 mg twice daily and may increase to 1000 mg twice daily based on clinical symptoms. The tablets should be taken whole and may be taken without regard to meals.[3]

Ranolazine is available as 500 mg and 1000 mg extended-release tablets.

Potential Advantages

Ranolazine has a different mechanism of action compared to other anti-angina agents (e.g., calcium channel blockers, beta-blockers, nitrates). It exerts its beneficial effect without significant effects on blood pressure, heart rate, or vascular resistance. Ranolazine does not negatively affect lipids or glycemic control and may even improve glycemic control.[4]

Potential Disadvantages

In clinical trials, women benefited less than men in terms of reduction in angina attacks and improved exercise tolerance.[3] Ranolazine is contraindicated in patients with significant hepatic and renal impairment. It should not be used in combination with strong CYP3A inhibitors (e.g., ketoconazole, clarithromycin) and CYP3A inducers (e.g., rifampin, phenobarbital). The most common adverse events are dizziness (6.2%), headache (5.5%), constipation (4.5%), and nausea (4.4%). Dizziness and nausea were the adverse events most likely to lead to discontinuation of therapy during clinical trials.[3] In a long-term safety and tolerability study (n = 746), termination of study participation due to unacceptable adverse events was 7.1% at 1 year and 9.7% at 2 years.[5]

Comments

Ranolazine reduces myocardial ischemia without significant effect on heart rate or blood pressure. It is postulated to work by inhibiting the cardiac late phase of inward sodium current during cardiac repolarization. The drug was originally approved in 2006 based on 2 randomized, placebo-controlled trials in subjects with chronic angina; Combination Assessment of Ranolazine

In Stable Angina (CARISA) with 823 subjects for 12 weeks and Efficacy of Ranolazine In Chronic Angina (ERICA) with 565 subjects for 6 weeks.[6,7] In CARISA, ranolazine (750-1000 mg twice daily) improved treadmill exercise tolerance by about 30 sec (4 hours after dosing) and 24 sec (12 hours after dosing) compared to placebo. Time to angina was similarly improved, ~28 sec and 38 sec, respectively. The mean numbers of angina attacks per week and nitroglycerin doses per week were roughly reduced by 1 with ranolazine (3.3 to 2.5 and 2.1; and 3.1 to 2.1 and 1.8). These effects were statistically significant. In the ERICA trial, with 1000 mg twice daily, the results were similar in terms of mean reductions of attacks (4.3 vs 3.3) and nitroglycerin use (3.6 vs 2.7). The median reductions were less impressive, 2.4 vs 2.2 and 1.7 vs 1.3, suggesting that patients with more frequent attacks are more likely to benefit. In a large study (n = 6560), ranolazine showed no benefit in patients with non-ST elevation acute coronary syndrome in terms of cardiovascular death, MI, or severe recurrent ischemia.[2] However, subjects treated with ranolazine had a significantly greater reduction of recurrent ischemia and a lower incidence of arrhythmias, including ventricular tachycardia.[1,2] Less than 1% (0.9% vs 0.3% for placebo) of patients required dose reduction due to prolonged QTc. This study allayed the concerns about the proarrhythmic effect of ranolazine based on its potential to prolong QTc and helped gain a broader indication for chronic angina. In a post-hoc analysis of diabetic and nondiabetic subjects in the CARISA trial, ranolazine 750 mg and 1000 mg reduced HbA1c vs placebo by 0.48 ± 0.18% (P = 0.008) and 0.70 ± 0.18% (P = 0.0002), respectively.[4]

Clinical Implications

The prevalence of chronic angina is about 3% and the incidence increases with age. These patients continue to have symptoms and evidence of ischemia despite pharmacotherapy.[8] Ranolazine provides another option for these patients and possibly adding benefit for those with diabetes or high risk of developing diabetes. ■

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CME Questions

17. Which of the 4 diets was most effective in producing sustained weight loss?
a. Fat, protein, carbohydrate: 20%, 15%, and 65%
b. Fat, protein, carbohydrate: 20%, 25%, and 55%
c. Fat, protein, carbohydrate: 40%, 15%, and 45%
d. Fat, protein, carbohydrate: 40%, 25%, and 35%
e. Weight loss didn't vary among these diets

18. Among the risk factors for coronary events, the one with the greatest hazard ratio is:
a. hypertension.
b. resting heart rate.
c. smoking.
d. diabetes mellitus.

19. Clinical practice guidelines of the American College of Cardiology (ACC) and the American Heart Association (AHA) are largely based on:
a. randomized controlled trials.
b. meta-analyses.
c. expert opinion, case studies, or standards of care.
d. nonrandomized studies.

Answers: 17. e, 18. d, 19. c.

CME Objectives

The objectives of *Internal Medicine Alert* are:
- to describe new findings in differential diagnosis and treatment of various diseases;
- to describe controversies, advantages, and disadvantages of those advances;
- to describe cost-effective treatment regimens;
- to describe the pros and cons of new screening procedures.

Clinical Briefs

By Louis Kuritzky, MD, Clinical Assistant Professor, University of Florida, Gainesville
Dr. Kuritzky is a consultant for GlaxoSmithKline and is on the speaker's bureau of GlaxoSmithKline, 3M, Wyeth-Ayerst, Pfizer, Novartis, Bristol-Myers Squibb, AstraZeneca, Jones Pharma, and Boehringer Ingelheim.

Best management of acute ankle sprain

Source: Lamb SE, et al. Mechanical supports for acute ankle sprain. *Lancet* 2009;375:575-581.

A SEVERE ANKLE SPRAIN (ANK-S) might seem like a minor injury, but clinicians may be underestimating the burden of consequence. In addition to the immediate period of limited mobility, full functional restoration takes between 3-9 months for as many as 70% of affected individuals. Indeed, it is not uncommon to see long-term symptoms referable to the ankle sprain, including recurrent swelling, pain, and limitation of activity. Because ANK-S is a commonplace event, confirming the best approach to initial management merits investigation.

Lamb et al randomized participants presenting to EDs in the United Kingdom with severe ANK-S (n = 584) to 1 of 4 treatments: an Aircast® brace, Bledsoe boot, below-knee cast, or double-layer tubular compression bandage.

Participants generally used treatments short-term, i.e., 10 days, and then PRN. Tubular compression bandage was the least efficacious method at 1, 3, and 9 months and was similar in efficacy to the Bledsoe boot. The below-knee cast was the most effective treatment, but Aircast outcomes were similar for ankle functionality at 3 months. Overall, the below-knee cast showed the best early symptomatic recovery, as well as functional recovery by 3 months. Although the philosophy of early mobilization has achieved some popularity, these data would suggest that tools that limit mobilization early (i.e., cast, Aircast), should be considered preferential. (Note: There is more than one Bledsoe boot; because Bledsoe provides boots with either flexion-extension mobility or full immobilization, it is possible that other versions of the Bledsoe boot might be more efficacious). ■

Low back radiology: Roadmap or mirage?

Source: Chou R, et al. Imaging strategies for low-back pain. *Lancet* 2009;373:463-472.

LOW BACK PAIN (LBP) IS RESPONSIBLE for as much as one-third of all disability dollars spent in the United States. When patients present with acute LBP, clinicians are tempted to perform radiographic studies (MRI, CT, plain films) to try to identify the source of the symptomatology. Unfortunately, the preponderance of current evidence suggests that findings commonly reported on radiographic studies such as narrowed disk space, loss of lumbar lordosis, and osteoarthritic changes, are just as common in asymptomatic volunteers as in symptomatic LBP sufferers.

Chou et al performed a meta-analysis of clinical trials which enrolled patients and included immediate imaging (CT, MRI, or plain films) and compared them with trials of similar patients who did not undergo imaging (total n = 1804). In addition to reporting radiography utilization, included trials had to provide information on outcomes of pain or function, quality of life, mental health, overall improvement, and patient satisfaction.

Chou et al found that in the absence of signs of a serious underlying condition (e.g., fever, weight loss, history of cancer), immediate imaging was not associated with improved outcomes. Indicative of the need for more public education, the article also reminds us that in one study, patient preference to undergo radiography was as high as 80%.

Routine radiography for acute LBP does not improve outcomes, is associated with substantial cost, and may suggest pathology which is, in effect, unrelated to the symptomatology. ■

Oseltamivir-resistant influenza

Source: Dharan NJ, et al. Infections with oseltamivir-resistant influenza A(H1N1) virus in the United States. *JAMA* 2009;301:1034-1041.

PROGRESSIVE RESISTANCE OF INFLUenza A virus (FLU-A) to adamantanes (i.e., amantadine, rimantadine) led to the 2006 CDC recommendation against their use. Initial resistance patterns of next-generation pharmacotherapies for FLU-A, the neuraminidase inhibitors (i.e., oseltamivir, zanamivir), were very reassuring. Recently, growing resistance patterns to oseltamivir (OSTV) are shaping revised CDC recommendations.

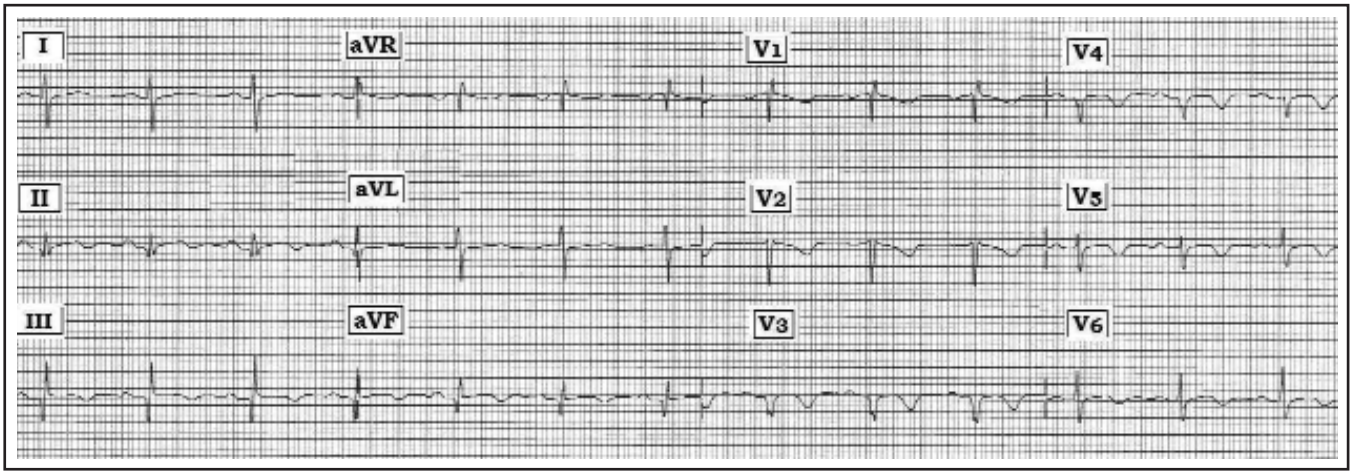
Volunteer clinicians around the United States, known as sentinel physicians, monitor patients who present with influenza-like illness and send samples to the CDC for confirmation of influenza virus status. Among FLU-A viruses assessed in the 2007-2008 influenza season, only 12.3% were OSTV-resistant. Comparison of the demographics of subjects with OSTV-resistant FLU-A to subjects with non-resistant profiles did not provide any insight into particular at-risk groups (or protected groups), including age, geography, symptoms, etc.

OSTV resistance profiles changed dramatically in the FLU-A samples from Sept. 28, 2008, to Feb. 19, 2009: 98.5% of H1N1 FLU-A samples (264/268) were OSTV-resistant! Experts are uncertain about the mechanism by which OSTV resistance has proliferated. Current options in an environment of high OSTV resistance include zanamivir, or OSTV plus rimantadine. ■

Acute Stroke and More

By Ken Grauer, MD, *Professor, Department of Community Health and Family Medicine, University of Florida*

Dr. Grauer is the sole proprietor of KG-EKG Press, and publisher of an ECG pocket brain book.



Clinical Scenario

The ECG shown above was obtained from a 60-year-old woman who presented with an acute stroke. Is her ECG consistent with this diagnosis, and/or suggestive of something more?

Interpretation

Given the multiple findings seen on this tracing, discussion is best served by initial detailed descriptive analysis. The rhythm is regular and sinus at a rate of about 80/min. The PR and QRS intervals are normal; however, the QT interval appears to be at least borderline prolonged. There is RAD (right axis deviation) with a predominant S wave in lead I. There is no evidence of atrial enlargement, and voltage for LVH (left ventricular hypertrophy) is lacking. The most interesting findings relate to assessment for Q-R-S-T changes. Q waves are seen in several leads — in each of the inferior leads, and in the form of QS complexes in leads V_3 and V_4. R wave progression is unusual due to the rSr' pattern in leads V_1 and V_2, which is followed by loss of R with the QS complexes seen in leads V_3,V_4. A small r wave returns in lead V_5, and it is only between V_5-V_6 that transition (when R wave amplitude exceeds S wave depth) finally occurs. ST segment coving with slight elevation and T wave inversion is seen in the inferior leads and across the precordium. S waves persist in leads V_5,V_6. Given the finding of an S wave in lead I as well, the rSr' pattern in lead V_1 is consistent with IRBBB (incomplete right bundle branch block). ST-T wave depression is common and expected in leads V_1,V_2 with incomplete or complete RBBB, but ST segment coving and deep T wave inversion should not persist across the precordium with the conduction disturbances seen here.

In the absence of a prior tracing for comparison, it is difficult to know which findings are new, and how the ECG fits with the patient's overall presentation of acute stroke. Of obvious concern are the inferior lead findings of Q waves, ST segment coving with slight elevation, and T wave inversion. Even in the absence of reciprocal ST segment depression, the possibility of acute evolving inferior infarction accompanying the patient's acute stroke needs to be strongly considered. There are several possibilities that might explain the precordial lead findings. The diffuse precordial ST segment coving and T wave inversion could be ischemic and part of the acute coronary syndrome. Alternatively, acute CNS events are known to prolong the QT interval and produce various patterns of disturbing ST-T wave abnormalities that may sometimes closely simulate acute infarction. RVH (right ventricular hypertrophy) or at least right ventricular "strain" could be present given the RAD, IRBBB, persistent precordial S waves, and diffuse T wave inversion. If these findings were acute, the constellation of abnormalities seen here could be consistent with acute pulmonary embolus, which might also be an accompaniment of the patient's acute stroke. Alas, abnormal serum markers and serial follow-up tracings confirmed the simultaneous occurrence of acute myocardial infarction that occurred in association with acute stroke. ■