myocardial infarction (AMI) who would benefit from lifestyle modifications or statin therapy [Yoon YE et al. *Prev Cardiol* 2009].

Noninvasive imaging may improve risk prediction and primary prevention of coronary artery disease (CAD). However, existing guidelines on the imaging of asymptomatic CAD patients differ regarding the need for additional imaging studies in patients without established CAD [Ferket BS et al. *J Am Coll Cardiol* 2011].

Evidence supporting the use of noninvasive imaging includes a 3-year follow-up study, in which computed tomography (CT) imaging of coronary calcium increased compliance with statin use [Kalia NK, Budoff M. *J Am Coll Cardiol* 2012]. The EISNER trial also showed the ability and cost-effectiveness of imaging in spurring improvements in management of risk factors [Rozanski A et al. *J Am Coll Cardiol* 2011]. However, other studies have had different results [McEvoy JW et al. *Arch Intern Med* 2011].

Defining whether imaging studies have a role in guiding lipid therapy is important in light of the proven benefits of statins in the prevention of and treatment following AMI [Penning-van Beest FJ et al. *Eur Heart J* 2007; Chapman RH et al. *Patient Prefer Adherence* 2009]. The CREATIVES study assessed whether use of ultrasound scanning of carotid intima media thickness (CIMT) or plaque to classify asymptomatic hypertensive patients for their cardiovascular disease (CVD) risk encouraged beneficial behavioral changes.

Patients (n=347) were enrolled from 22 hospitals in South Korea. Patients included in the study had hypertension (defined as systolic blood pressure [SBP] ≥140 mm Hg or use of antihypertensive medication) and were aged 45 to 75 years (men) and 55 to 75 years (women). Patients with previously documented CAD, cerebrovascular, or peripheral arterial disease, and those with symptomatic heart failure were excluded.

Patients were considered to be high risk for CVD if they had a carotid plaque or CIMT >0.9 mm on ultrasound. Patients were surveyed with a questionnaire and scored based upon the health-related behaviors such as smoking, exercise, consumption of salty foods and vegetables, and medication compliance. The high- and non-high risk groups comprised 182 and 165 patients, respectively. Significant differences at baseline were present in average age (62±7 and 60±8 years, respectively; p<0.001), duration of hypertension (5.3±6.0 and 4.0±4.3 years; p=0.024), triglyceride level (138±71 and 156±96 mg/dL; p=0.040), use of antiplatelet agents (72% and 47%; p=0.030), and higher Framingham scores for high-risk patients (Table 1; p=0.005).

After carotid ultrasound examination, SBP and LDL-C were lowered in 26% and 52% of the high-risk patients, respectively, versus 6% and 24% of the non-high-risk patients, respectively. The findings persisted in patients classified as low- and moderate-risk by NCEP-ATP III criteria. Smoking, salty food intake, and medication compliance were improved in all patients after 6 months.

Table 1. Framingham Risk Scores

	High-Risk	Non-High-Risk
FRS <10%	73 (46.5)	84 (65.6)
FRS 10-20%	71 (45.2)	33 (26.4)
FRS >20%	13 (8.3)	8 (6.4)

FRS=Framingham Risk Score.

Multivariate analysis of the improvements in SBP and LDL-C revealed that classification as high-risk by carotid ultrasound was the sole independent factor associated with improved cholesterol level.

These findings that carotid ultrasound screening is associated with improved management of hyperlipidemia add support for the value of noninvasive imaging to screen for CVD risk in asymptomatic hypertensive patients. The benefits included improved physician behavior to reach target levels for SBP and LDL-C and improved health behaviors in both patient groups.

Exercise and Healthy Diet for Management of Abdominal Obesity

Written by Toni Rizzo

PHYSICAL ACTIVITY IN THE MANAGEMENT OF ABDOMINAL OBESITY

Robert Ross, PhD, Queen's University, Kingston, Ontario, Canada, studied the effects of diet or exercise with or without weight loss on abdominal obesity and insulin resistance [Ross R et al. *Ann Intern Med* 2000; Ross R et al. *Obes Res* 2004]. Obese men and women who exercised and lost weight had the greatest reductions in abdominal and visceral fat. There was no difference in fat reduction between those who dieted with weight loss or exercised without weight loss; however, both groups had significant fat reduction compared with controls. More recently, modest reductions in waist circumference in abdominally obese men, but not in women, were observed in a randomized trial on behavioral, lifestyle-based intervention in clinical settings [Ross R et al. *Arch Intern Med* 2012].

Several studies provided insight into the comparative benefits of various types of exercise. A recent study showed that individuals who exercise without weight loss have decreased abdominal and visceral fat and waist circumference, increased skeletal muscle mass and cardiorespiratory fitness, and decreased blood pressure [Ross R, Bradshaw AJ. *Nature Rev Endocrinol* 2009]. In a study comparing exercise modalities, aerobic exercise and

combined aerobic and resistance exercise significantly improved insulin sensitivity but resistance exercise alone did not [Davidson LE et al. *Arch Intern Med* 2009]. Exercise that had both resistance and aerobic components was optimal (p<0.001 versus resistance exercise alone). A recent meta-analysis provided additional support for the benefits of aerobic exercise concluding that visceral fat was significantly reduced with aerobic but not resistance exercise (p<0.01) [Ismail I et al. *Obes Rev* 2012].

Individuals who exercise and lose weight gain the greatest benefits in terms of improved fitness and insulin sensitivity. Aerobic plus resistance exercise provides the greatest fat loss and skeletal muscle increases.

TARGETING CARDIOMETABOLIC RISK IN CLINICAL PRACTICE

According to Jean-Pierre Després, PhD, Université Laval, Québec City, Québec, Canada, targeting health behaviors is at least as important as targeting biologic risk factors for CVD. Visceral adiposity and ectopic fat are key risk factors for the development of cardiovascular disease (CVD). Levesque, Després, and colleagues of Université Laval found that a 1-year lifestyle modification program in men undergoing coronary artery bypass graft surgery decreased visceral and intrathoracic adipose tissue volumes and improved glucose and insulin homeostasis, cardiorespiratory fitness, and cardiometabolic risk profile.

In another study conducted at the workplace, a total of 2399 employees participated in the Grand Défi Entreprise (GDE). The employees were challenged to eat better, stop smoking, and be more active. The key findings of this 3-month pilot intervention included reductions in mean waist circumference (-4.2 cm; p<0.0001), resting blood pressure (SBP, -6 mm Hg; DBP, -4 mm Hg), heart rate (-2 beats per minute; p<0.0001 for all), mean plasma lipid levels (p<0.0001) and increased mean estimated VO_2max (+1.4 mL/kg/minute; p<0.01). Carriers of hypertriglyceridemic waist (marker of visceral obesity) decreased by 34%. The proportion of employees with prediabetes decreased from 51.5% to 48.0% and healthy employees increased from 43.5% to 47.0%. HbA1C levels decreased in employees with prediabetes (-0.1%), untreated diabetes (-0.7%), and treated diabetes (-0.7%).

Prof. Després concluded that behaviors, rather than weight, should be targeted for the prevention and treatment of obesity, diabetes, and CVD. A lifestyle modification program with regular physical activity and healthy diet is key to reducing cardiometabolic risk. Achieving lifestyle therapeutic targets results in increased cardiorespiratory fitness and decreased visceral adipose tissue and ectopic fat depots, which improves the cardiometabolic risk profile and reduces CV risk.