Supplemental Methods:

Lifestyle modification

Each exercise session included aerobic and resistance training. The aerobic training portion of the study was performed using a stationary bicycle. Each participant exercised for 20 minutes at 60% of their maximal heart rate (maximal heart rate = 220-age) for the first 2 weeks followed by 30 minutes at 75% of their maximal heart rate for the duration of the study. The aerobic exercise was followed by approximately 30 minutes of progressive resistance training on Keiser equipment. Resistance training was based on the progressive resistance exercise concept proposed by DeLorme et al. [1]. The exercises performed were; leg press, chest press, knee extension, lateral pull down, knee flexion, and tricep dip. Participants performed 3 sets of 10 repetitions for each exercise; their effort was increased over 6 months from 60 to 80% of their 1 RM. For those unable to reach 80% of their 1 RM the resistance was increased as tolerated.

The lifestyle intervention also included dietary counseling based on recommendations by the NCEP ATP III and AACE. For the first nine months of the study, study investigators covered a core curriculum modeled after the Diabetes Prevention Program (DPP) [2]. The initial core curriculum sessions were completed within the first 18 weeks with review and reinforcement for the remainder of the study. Specific dietary goals were ≤ 35% of total calories from fat, < 7% of total calories from saturated fat, up to 10% of total calories from polyunsaturated fat, up to 20% of total calories from monounsaturated fat, and 25-35 grams per day of fiber.

Exercise and dietary assessment

Subjects cycled between 50-60 revolutions per minute and the workload was progressively increased in increments of 50 watts in stages lasting 3 minutes. At the end of each stage, separate readings of heart rate and blood pressure were measured, and rate of perceived exertion was measured using the BORG Rate of Perceived Exertion Scale. Once subjects became fatigued or reached their submaximal heart rate (220-age x 85), the test was stopped and separate readings of heart rate and blood pressure were measured at 1, 3, and 5 min of recovery. Throughout the test, a 3-lead electrocardiogram was monitored for safety purposes. Exercise time was calculated based on duration (minutes) each subject rode during the submaximal bicycle test. Weight-adjusted maximum oxygen consumption (VO_{2max}; ml/kg per minute) was determined using the formula established by Storer et al. [3].

Dietary intake information was assessed by a 4-day self-documented food record which was reviewed by a registered dietician and then analyzed for protein, carbohydrate, fiber, fat and micronutrient intake using a computerized dietary database. Dietary intake data were collected and analyzed using Nutrition Data System for Research software version 2006, developed by the Nutrition Coordinating Center (NCC), University of Minnesota, Minneapolis, MN. Food records were completed in all groups prior to every visit during the study.

One repetition maximum (RM) was determined for 6 major muscle groups. Participants performed 8 repetitions of each exercise using 50% of their estimated maximum weight, followed by 5 repetitions of each exercise using 70% of their estimated maximum weight, participants then had 3-4 attempts to attain 100% of their maximum weight. A one-minute rest period was given between each increase in weight. All participants had a 1 RM measured at baseline, 6-month and 12-months. Those randomized to a lifestyle group in the study had additional 1 RM measurements performed monthly for the first 6 months of the study and at 9 months.

Cardiovascular parameters

Coronary Computed Tomography

CT imaging was performed using a dual source multidetector row computed tomography (DSCT) scanner (Somatom Definition, Siemens Medical Solutions, Forchheim, Germany). Image acquisitions were performed during breathhold in inspiration. Computed tomography (CT) datasets were acquired with a detector configuration of 2 x 32 x 1.2 mm slice collimation, a gantry rotation time of 330 ms, tube potential of 120 kVp, and a tube current of 80 mAs/rotation using a prospectively triggered axial mode at 65% of the R-peak to R-peak interval. Axial images were reconstructed with a slice thickness of 2 mm and increment of 2 mm using a half-scan reconstruction algorithm with a temporal resolution of 165 ms.

The reconstructed images were transferred to an offline workstation for analysis (Leonardo; Siemens Medical Solutions). Coronary artery calcium was quantified using commercially available software (Syngo CaScore, Siemens Medical Solutions, Forchheim, Germany). A scoring threshold of 130 Hounsfield Units (HU) was applied, and the calcium burden was expressed as an Agatston score [4]. Calcified plaque volume was calculated by summation of the volumes of all scorable voxels.

Carotid intima media thickness

Digital images were captured directly to a Windows NT workstation using a high-quality, high-speed frame capture card made by Data Translation (Marlboro, MA). Subjects were positioned with a wedge of approximately 35 degrees such that the subject's head and torso were at an incline to reduce respiratory variation and subsequent motion in the jugulars. Imaging of the left and right common carotid artery was performed. Imaging was performed in B-mode, and the transducer was swept in cross-section to note the position and orientation of the bifurcation of the carotid artery. The transducer was then applied to the longitudinal view, with images acquired at two angles, 90 and 45 degrees. The 90-degree imaging plane is a frontal plane of the head at the common carotid artery. The 45-degree imaging plane at the common carotid artery is 45 degrees from the 90-degree plane. In each plane, the transducer was manipulated until the best image of the far wall of the distal 1 cm of the common carotid was acquired. Fifty-frame digital video clips of this region were acquired onto the Windows NT imaging workstation. Differences in interadventitial diameter of the common carotid artery across the 50 frames were used to judge the cardiac cycle and select a frame of minimum diameter (diastole) as the analysis frame. Either the 90- or 45-degree image in diastole was selected as the best view for image quality. Edge detection and mean intima media thickness calculation were accomplished with an in-house computer program. The published reproducibility of the technique is excellent with a SD of 0.007 mm [5]. Measurements of the left carotid IMT are reported.

References

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