SUPPLEMENTARY METHODS

Study population

Each subject completed a questionnaire addressing medications; previous medical and surgical history; and drinking, smoking, and exercise habits. Drinking habits were calculated as grams per day; smoking habits were classified as never, previous, or current; and exercise habits were defined as performing moderate-intensity physical activity for at least 30 minutes for 5 days per week or vigorous-intensity aerobic activity for at least 20 minutes for 3 days per week [1].

Definitions of nonalcoholic fatty liver disease and liver fibrosis

Nonalcoholic fatty liver disease (NAFLD) was diagnosed with hepatic ultrasonography (Ultrasound Systems IU22, Philips, Holland) by expert radiologists unaware of the patients' health data. Fatty liver was diagnosed according to characteristic ultra-sonographic findings, such as parenchymal brightness, liver-to-kidney contrast, blurring vessels, focal sparing, and narrowing of the lumen of the hepatic veins [2]. Fatty liver severity was classified as non-fatty liver, mild, or moderate to severe fatty liver according to the findings of the bright liver, hepatorenal echo contrast, the blurring of vessels, and deep attenuation of the ultrasound signal [3].

Surrogate markers used to predict the presence of NAFLD were also used to evaluate the association of myosteatosis indices and steatosis indices such as Hepatic Steatosis Index (HSI) and Simple NAFLD score (SNS). HSI was calculated from the equation: 8×alanine aminotransferase (ALT)/aspartate aminotransferase (AST) ratio+body mass index (BMI; +2, if diabetes; +2, if female) [4]. SNS was calculated as suggested by the previous study [5]. HIS ≥30 and SNS ≥8 are considered high risk for NAFLD [4,5].

The severity of liver fibrosis in patients with NAFLD was determined using two non-invasive markers of liver fibrosis: the NAFLD fibrosis score (NFS) and the fibrosis-4 (FIB-4) score [6,7] The NFS, which has been validated for assessing the stage of fibrosis in patients with NAFLD, was calculated using the following formula: NFS=−1.675+0.037×age (years)+0.094×BMI (kg/m^2)+1.13×impaired fasting glucose or diabetes (yes= 1, no=0)+0.99×AST/ALT ratio−0.013×platelet (×10^9/L) −0.66×albumin (g/dL). Subjects were categorized into three NFS groups as follows: those with low (<−1.455), intermediate (−1.455 to 0.676), and high (>0.676) probabilities of advanced fibrosis [6]. The FIB-4 score was calculated using the following formula: FIB-4=[age (years)×AST (U/L)]/[platelet count (10^9/L)×ALT (U/L)$^{1/2}$]. Subjects were categorized into three groups as follows: those with low (<1.30), intermediate (1.30 to 2.66), and high (≥2.67) FIB-4 index scores [7].

Computed tomography image collection

The abdomen and pelvis computed tomography (CT) examinations were conducted using the Somatom Definition (Siemens Healthineers, Erlangen, Germany), Discovery CT750 HD (GE Healthcare, Milwaukee, WI, USA), or LightSpeed VCT scanner (GE Healthcare). All CT examinations were performed using the following parameters: 120 kVp; automated dose modulation (CareDose 4D, Siemens Healthineers; automA and smartmA, GE Healthcare); matrix 512×512; collimation of 0.625 mm. All image data were reconstructed with a slice thickness of 5 mm using the filtered back-projection technique with a soft tissue reconstruction algorithm (B30f kernel, Siemens Healthineers; Standard kernel, GE Healthcare). For contrast enhancement, 100 to 150 mL of iopromide (Ultravist 370 or Ultravist 300, Bayer Schering Pharma, Berlin, Germany) was intravenously administered using an automatic power injector.

Assessment of skeletal muscle area

Skeletal muscle mass and body fat mass were measured via a direct segmental multi-frequency bioelectrical impedance analysis using the InBody 720 (InBody Co. Ltd., Seoul, Korea). Body composition was evaluated with abdomen CT using an automated artificial intelligence software developed with a fully convolutional network segmentation technique [8]. The software automatically selected the axial CT slice at the L3 vertebrae inferior endplate level. The selected CT images were then automatically segmented to generate the boundary of total abdominal muscle area (TAMA), visceral fat area, and subcutaneous fat area. The TAMA included all muscles on the selected axial images (i.e., psoas, para-spinal, transversus abdominis, rectus abdominis, quadratus lumborum, and internal and external obliques). An image analyst and a radiologist blinded to the clinical information reviewed all selected CT slices and segmented areas.

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