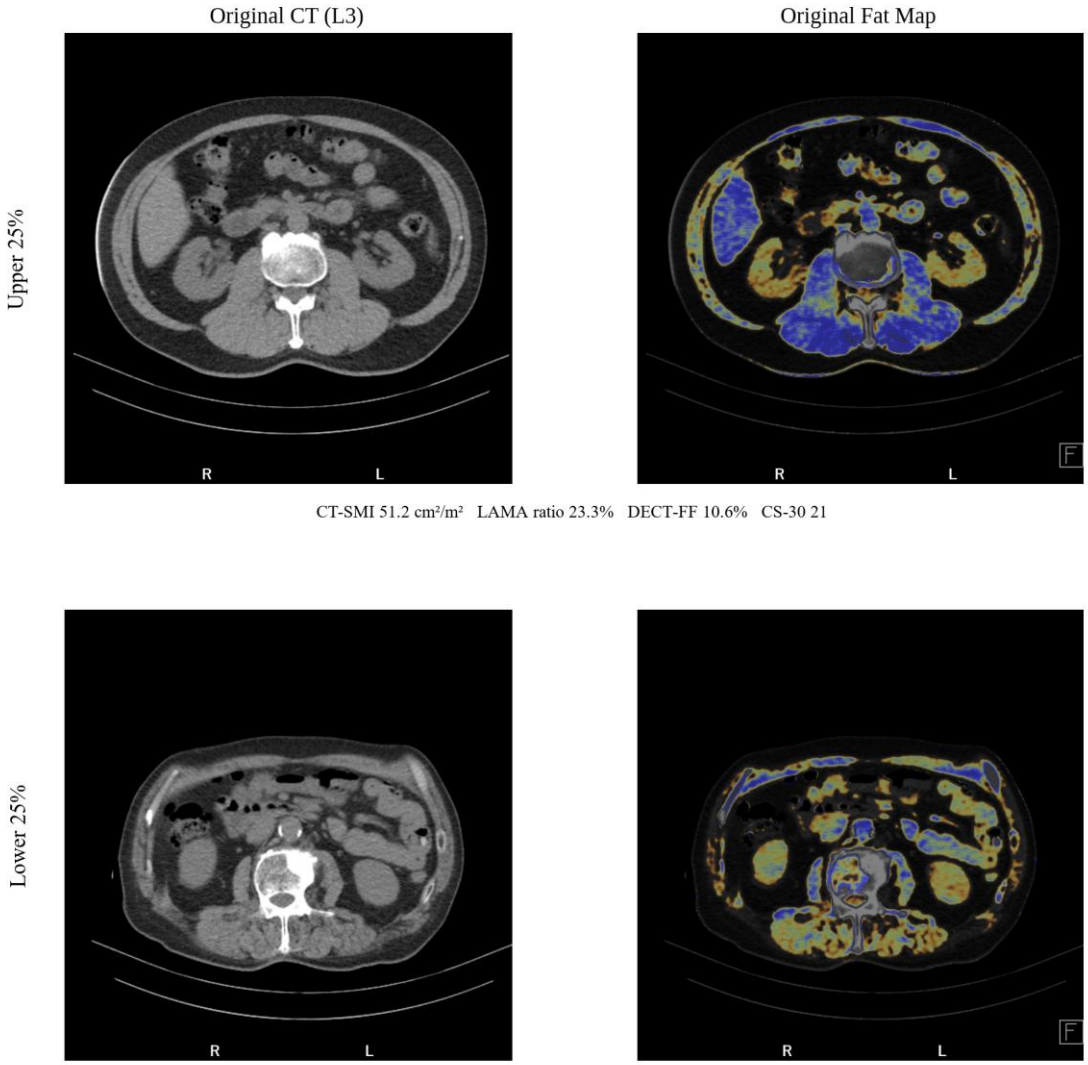
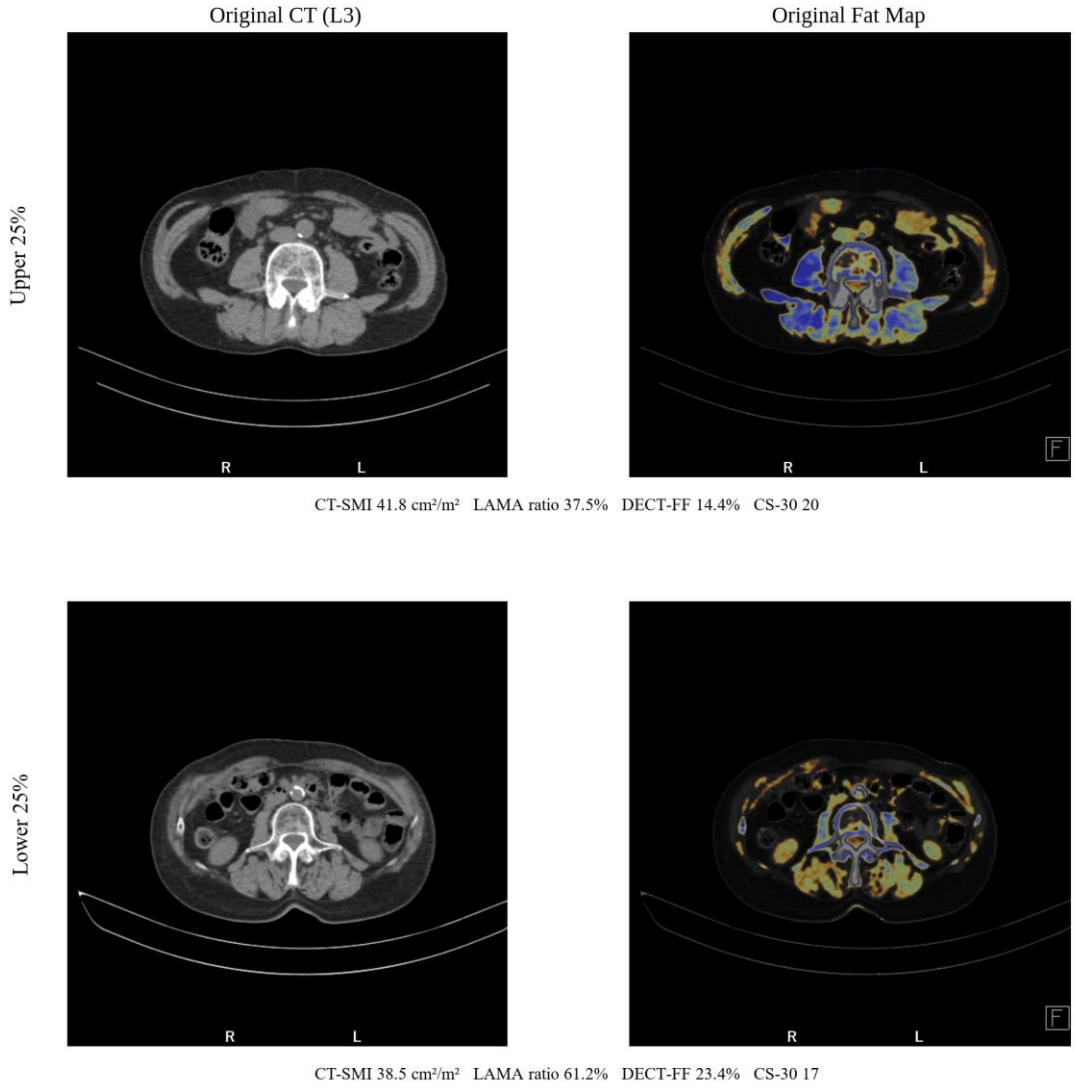
Supplementary Figure S1. Representative male participants with comparable muscle quantity but contrasting muscle quality.



Axial CT images at L3 (left) and corresponding dual-energy fat fraction maps (right) for two male participants from the upper (upper row) and lower (lower row) quartiles of the sex-standardized CT-SMI + DECT-FF composite score. Despite similar muscle quantity (CT-SMI, 51.2 vs. 51.8 cm²/m²), the participants differed markedly in muscle quality (LAMA ratio, 23.3% vs. 56.3%; DECT-FF, 10.6% vs. 19.2%) and lower-limb performance (CS-30, 21 vs. 18 repetitions). On the fat fraction maps, blue indicates a low fat fraction and orange to yellow indicates a high fat fraction. These participants were selected for illustration based on similar CT-SMI and are not statistically representative of their respective quartiles. CT-SMI, computed tomography skeletal muscle index; LAMA, low-attenuation muscle area; DECT-FF, dual-energy computed tomography fat fraction; CS-30, 30-second chair-stand test.

Supplementary Figure S2. Representative female participants with comparable muscle quantity but contrasting muscle quality.



Axial CT images at L3 (left) and corresponding dual-energy fat fraction maps (right) for two female participants from the upper (upper row) and lower (lower row) quartiles of the sex-standardized CT-SMI + DECT-FF composite score. The participants had relatively similar muscle quantity (CT-SMI, 41.8 vs. 38.5 cm²/m²) but differed substantially in muscle quality (LAMA ratio, 37.5% vs. 61.2%; DECT-FF, 14.4% vs. 23.4%) and lower-limb performance (CS-30, 20 vs. 17 repetitions). Display conventions and the basis for participant selection are provided in Supplementary Fig. S1.