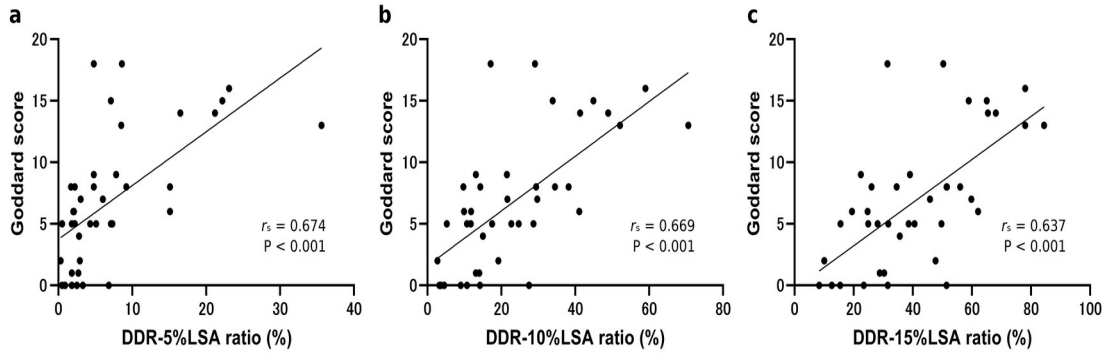
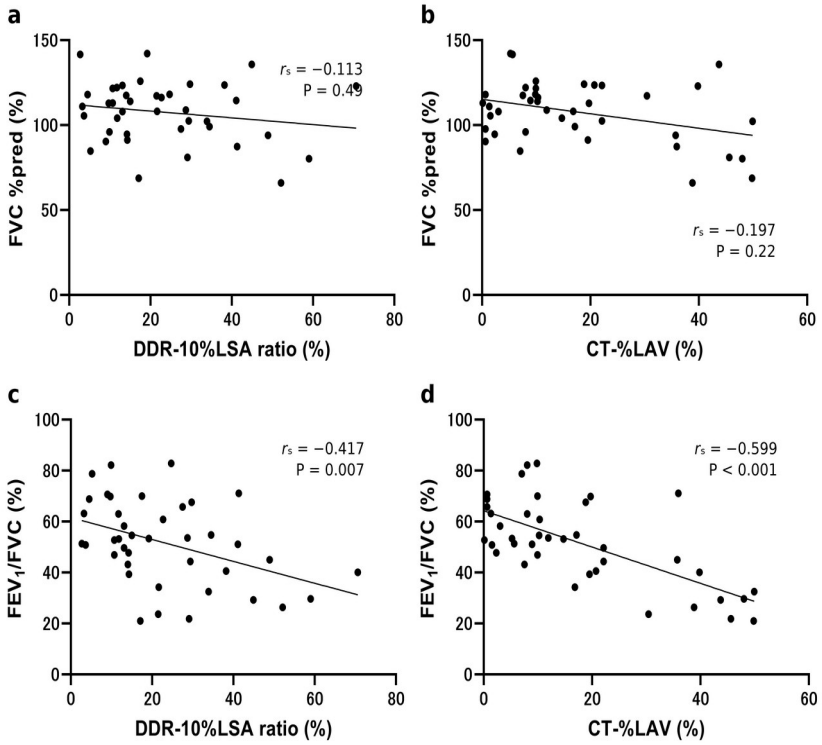
Supplementary Information

Dynamic digital radiography–derived low signal area ratio for assessing emphysema and associated pulmonary vascular changes in COPD

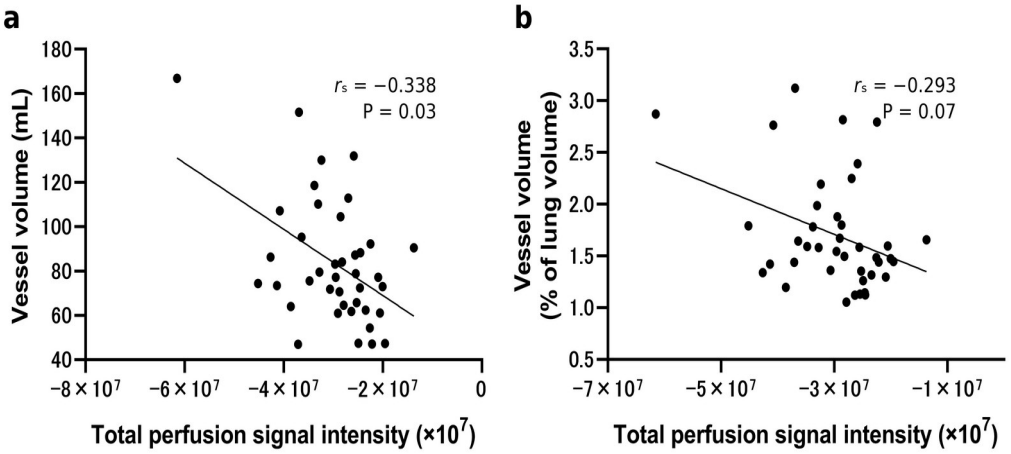
Takashi Oki, Kojiro Ono, Yasuhiro Gon, Kenichiro Tago, Yusuke Kurosawa, Kenji Mizumura, Seito Matsushima, Ryosuke Ozoe, Motoyasu Iikura, Yutaka Kozu, Shiho Yamada, Hisato Hiranuma, Yoshiko Nakagawa, Tetsuo Shimizu, Shuichiro Maruoka, Kenta Shimamura, Noritsugu Matsutani & Masahiro Okada



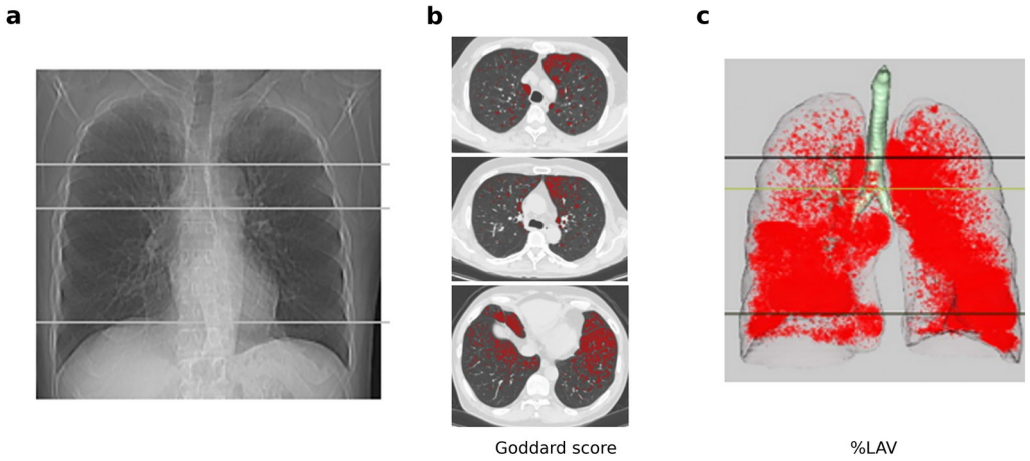
Supplementary Figure S1. Associations between the Goddard score and the low signal area (LSA) ratio at different histogram thresholds (n = 40). Scatterplots show the CT-based Goddard score against the LSA ratio calculated using threshold coefficients of 5% (**a**), 10% (**b**) and 15% (**c**). All three thresholds showed comparable positive correlations with the Goddard score (r_s = 0.674, 0.669 and 0.637, respectively; all P < 0.001). Solid lines indicate least-squares regression lines, shown to aid visual interpretation; associations were quantified using Spearman rank correlation. CT, computed tomography; DDR, dynamic digital radiography; LSA, low signal area.



Supplementary Figure S2. Relationships between imaging indices and forced vital capacity and the FEV_1/FVC ratio (n = 40). FVC %pred is plotted against the DDR–10%LSA ratio (**a**) and CT–%LAV (**b**), and FEV_1/FVC against the DDR–10%LSA ratio (**c**) and CT–%LAV (**d**). FVC %pred was not correlated with either index (r_s = −0.113, P = 0.49, and r_s = −0.197, P = 0.22, respectively), whereas FEV_1/FVC was inversely correlated with both (r_s = −0.417, P = 0.007, and r_s = −0.599, P < 0.001, respectively). Solid lines indicate least-squares regression lines, shown to aid visual interpretation; associations were quantified using Spearman rank correlation. CT–%LAV, percentage low attenuation volume at computed tomography; FEV_1, forced expiratory volume in 1 s; FVC, forced vital capacity; %pred, percentage of the predicted value; other abbreviations as in Supplementary Fig. S1.



Supplementary Figure S3. Association between DDR-derived total perfusion signal intensity and pulmonary vessel volume at CT in 40 patients with COPD. Total perfusion signal intensity is plotted against absolute pulmonary vessel volume (**a**) and against percentage vessel volume (**b**). A weak inverse correlation was observed with absolute vessel volume (r_s = −0.338; P = 0.03), whereas no significant correlation was observed with percentage vessel volume (r_s = −0.293; P = 0.07). Solid lines indicate least-squares regression lines, shown to aid visual interpretation; associations were quantified using Spearman rank correlation. Because the total perfusion signal intensity is an unnormalised sum over the lung-field region of interest, it was not used in the main analyses. COPD, chronic obstructive pulmonary disease; other abbreviations as in Supplementary Figs S1 and S2.



Supplementary Figure S4. Quantitative assessment of pulmonary emphysema at high-resolution CT. (**a**) Coronal minimum intensity projection image showing the three anatomical levels at which axial images were assessed. (**b**) Corresponding axial high-resolution CT images; the Goddard score was derived by visually grading the extent of low attenuation areas at each level. (**c**) Three-dimensional reconstruction showing regions classified as low attenuation (red); the percentage low attenuation volume (%LAV) was calculated with automated analysis software, with voxels below −950 Hounsfield units (HU) classified as low attenuation areas. CT, computed tomography; HU, Hounsfield unit; LAV, low attenuation volume.