

Legends of supplementary figures

Supplementary Fig. 1 Comparison of lymphocyte subsets and cytokines on admission. (A) Percentages of lymphocyte subsets between patients with steroid-refractory and response CIP. (B) Plasma concentration of cytokines between patients with steroid-refractory and response CIP. Bars indicate the mean and SEM (A) or the geometric mean and 95%CI (B). Unpaired t test or Welch's t test. IL, interleukin; IFN, interferon; TNF, tumor necrosis factor; SEM, standard error of mean; CI, confidence interval.

Supplementary Fig. 2 Comparison of peripheral blood biomarkers between patients with initial and late steroid-refractory CIP on admission. (A) Blood cells counts between patients with initial and late steroid-refractory CIP. (B) Plasma concentration of proteins between patients with initial and late steroid-refractory CIP. (C) Plasma concentration of cytokines between patients with initial and late steroid-refractory CIP. Bars indicate the mean and SEM (A-B) or the geometric mean and 95%CI (C). Unpaired t test or Welch's t test. ANC, absolute neutrophil count; ALC, absolute lymphocyte count; AEC, absolute eosinophil count; CRP, C-reaction protein; LDH, lactate dihydrogen; IL, interleukin; IFN, interferon; TNF, tumor necrosis factor; SEM, standard error of mean; CI, confidence interval.

Supplementary Fig. 3 Comparison of radiologic characteristic of lung on admission. (A) Proportion of radiographic patterns between patients with steroid-refractory and response CIP. (B) Proportion of lesion distribution types between patients with steroid-refractory and response CIP. (C) Ichikado CT score between patients with steroid-refractory and response CIP. (D) Proportion of radiographic patterns between patients with initial and late steroid-refractory CIP. (E) Proportion of lesion distribution types between patients with initial and late steroid-refractory CIP. (F) Ichikado CT score between patients with initial and late CIP. Bars indicate the mean and SEM. Logistic regression, unpaired t test or Welch's t test. COP, cryptogenic organizing pneumonia; NSIP, non-specific interstitial pneumonia; AIP, acute interstitial pneumonia; ARDS, acute respiratory distress syndrome; SEM, standard error of mean.

Supplementary Fig. 4 Management, prognosis and IM-related infection. (A) Prognosis between patients with steroid-refractory and response CIP. (B) Prognosis between patients with initial and late steroid-refractory CIP. (C) Prognosis between patients treated with concurrent and sequential additional IM in steroid-refractory CIP. (D) IM-related infection between patients with steroid-refractory and response CIP. (E) IM-related infection between patients with initial and late steroid-refractory CIP. (F) IM-related infection between patients treated with concurrent and sequential additional IM in steroid-refractory CIP. IM, immunomodulators; CIP, checkpoint inhibitor pneumonitis. Logistic regression analysis for adjusted *P* value. Results were adjusted by CIP grade.

Supplementary Fig. 5 Steroid dose and clinical outcomes of steroid-refractory CIP. Maximum steroid dose between patients with improvement and patients with deterioration in all grade (A), grade 2 (B) and grade 3-4 (C) steroid-refractory CIP. Maximum steroid dose between patients with IM-related infection and patients without IM-related infection in total (D), grade 2

(E) and grade 3-4 (F) steroid-refractory CIP. Unpaired t test or Welch's t test. Bars indicate the mean and SEM. Imp, improvement; Det, deterioration; CIP, checkpoint inhibitor pneumonitis. SEM, standard error of mean.