Methods Fifty-eight patients were enrolled at initiation of belimumab and followed longitudinally for up to 53 months. Surveillance outcomes included the SLE Disease Activity Index 2000 (SLEDAI-2K), 100 mm Visual Analogue Scales for Physician’s Global Assessment (PGA), fatigue, pain and general health, and the Systemic Lupus International Collaborating Clinics/American College of Rheumatology Damage Index (SDI). Assessment of treatment response included the SLE responder index (SRI). B lymphocyte stimulator (BLyS) levels were determined using ELISA.

Results SLEDAI-2K (median baseline score: 8.0; IQR: 4.0–13.8), PGA and corticosteroid use decreased during therapy, and patients reported improvements on fatigue, pain, and general health (p<0.0001 for all). SDI scores remained stable (p=0.08). Patients with baseline SDI scores>1 showed decreased probability and prolonged time to attain SRI response (HR: 0.449; 95% CI: 0.208–0.967), as did current smokers compared with non-smokers (HR: 0.103; 95% CI: 0.025–0.427). In contrast, baseline BLyS levels/21.2 ng/mL predicted increased probability and shorter time to attain SRI response (HR: 2.566; 95% CI: 1.222–5.387).

Conclusions Disease activity and corticosteroid usage decreased, patient-reported improvements, and no significant organ damage was accrued during follow-up. Smoking and organ damage predicted reduced treatment efficacy. These findings might contribute to a better selection of patients who are likely to benefit from belimumab.
(CD19+CD20+IgD−CD27−) declined significantly first at month 6 (p=0.033) and pre-switching B cells (CD19+CD20+IgD+CD27+) showed a trend towards a decrease (p=0.052). Plasma cells (CD138+CD38+CD19+CD3e−CD20+) and switched memory B cells (CD19+CD20+CD27+IgD−) remained stable during the study period, as did T cells and monocytes (p>0.2). Despite continuously decreasing SLE Disease Activity Index, immunological changes correlated with clinical improvements only during early time points (month 0–3). Interestingly, high baseline B cell counts were predictive of non-attaining Lupus Low Disease Activity State at month 24 (area under the ROC-curve: 0.95).

Conclusions B cell alterations betided in two distinct phases, a rapid early and a gradual late phase. Late clinical improvements might reflect preceding immunological changes, implying that early treatment evaluation and discontinuation might underestimate delayed improvements reflecting the late B cell changes.