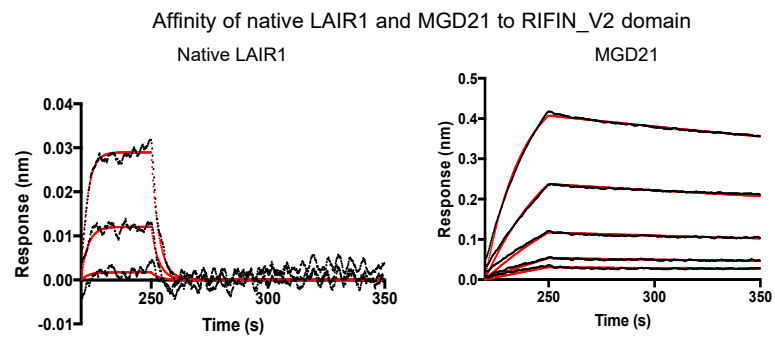
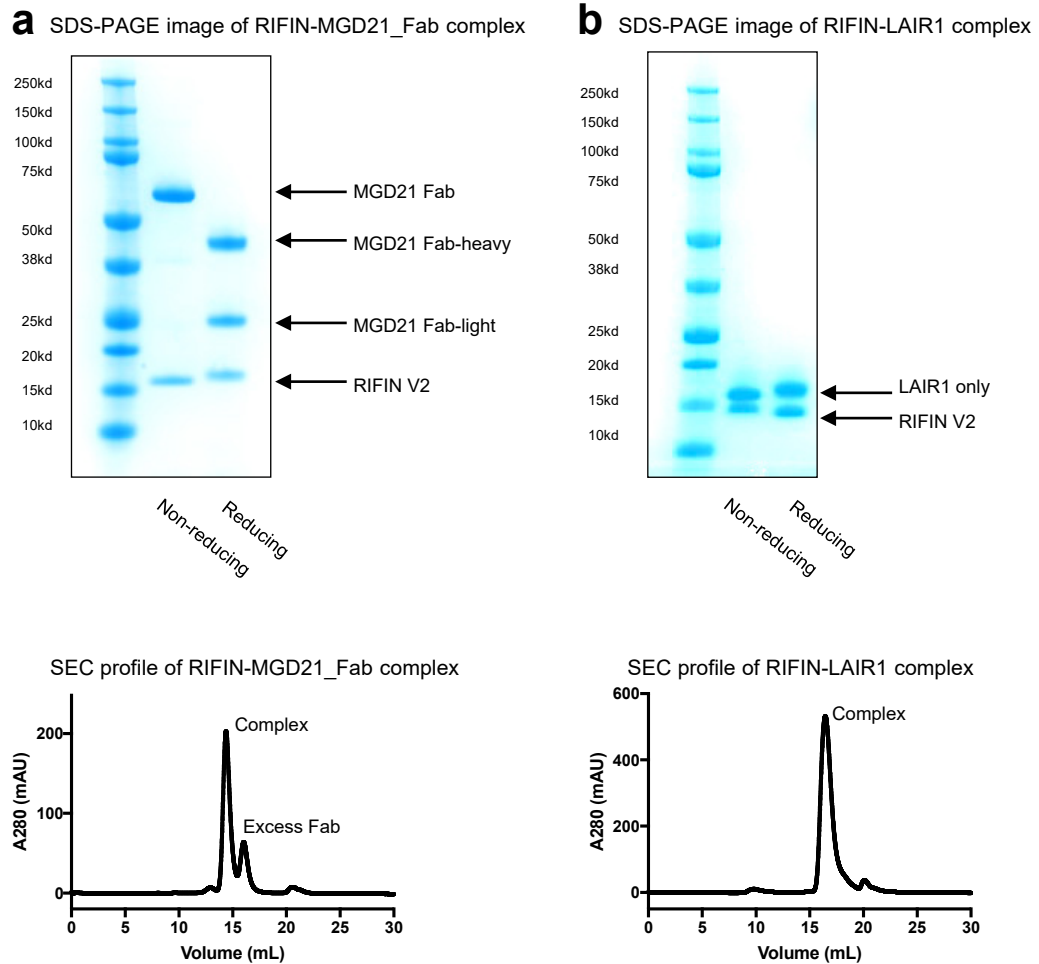


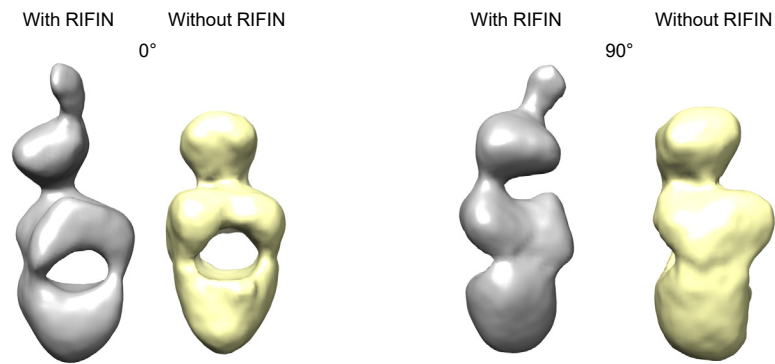
Supplementary Fig. 1 Architectural diversity of LAIR1-inserted antibodies. **a**, Crystal structure of two type 1 LAIR1-containing antibody Fab domains, including MGC34 and MGD21. **b**, Superimposition of MGD21 Fab structure with PDB ID 5NST. **c**, and **d**, ns-EM images of type 2 (MGJ5) and type 3 (MGB46) LAIR1-containing antibodies. **e**, Recognition of RIFIN by type 2 LAIR1 inserted antibodies MGJ5 and MGM1 chimera with MGD21-LAIR1 swapped in. nsEM image of MGJ5 chimera with or without RIFIN-V2 domain (PF3D7_1040300) (right panel). The SDS-PAGE runs were repeated at least twice.



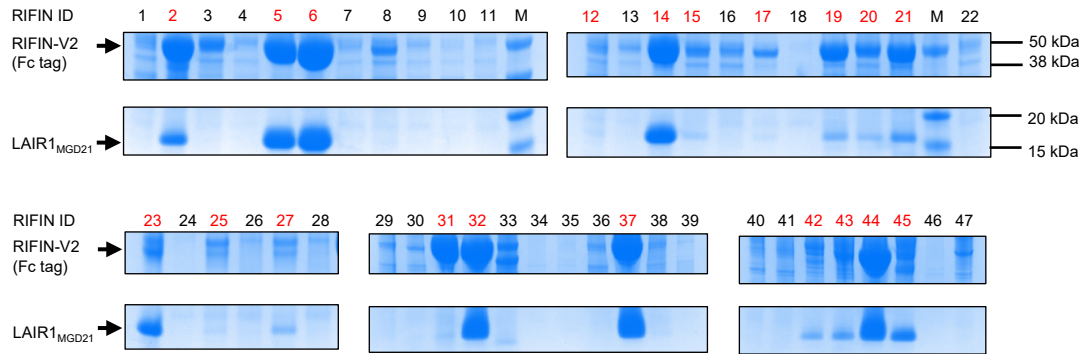
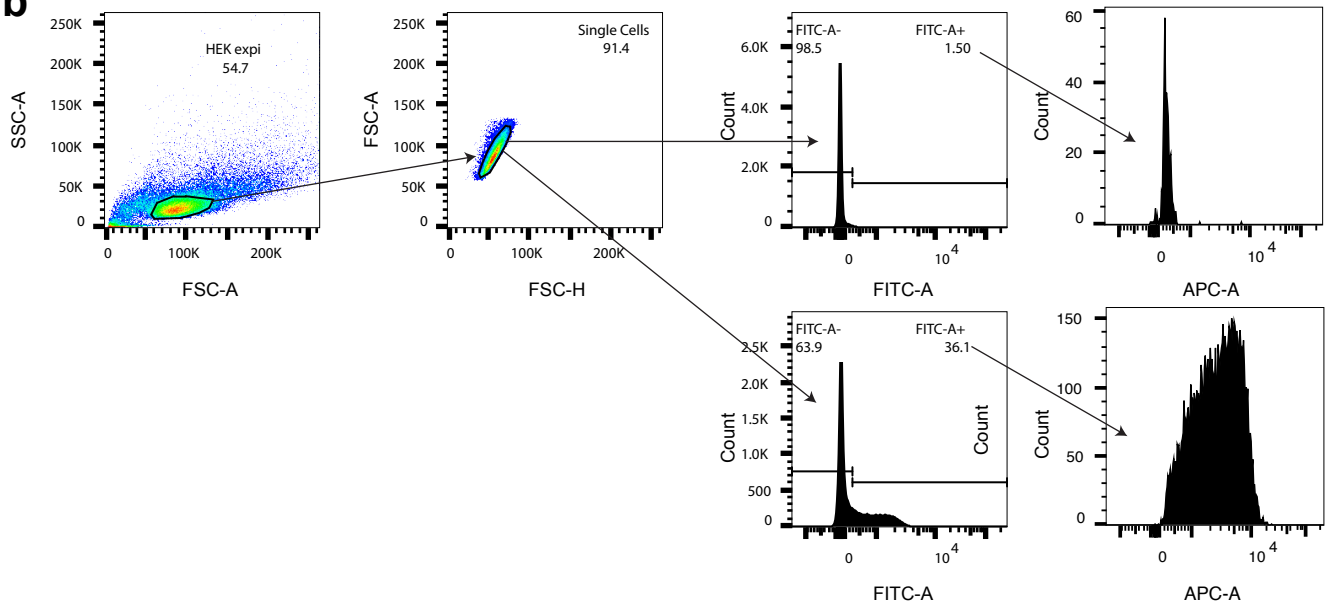
Supplementary Fig. 2 RIFIN-V2 domain mediates LAIR1 binding. Affinity of native and matured LAIR1 to RIFIN (PF3D7_1040300) V2 domain.



Supplementary Fig. 3 Expression and purification of LAIR1 and RIFIN constructs. **a**, Upper panel: SDS-PAGE image of RIFIN-MGD21_Fab (PF3D7_1400600) complex. Lower Panel: SEC profile of RIFIN-MGD21_Fab (PF3D7_1400600) complex. The SDS-PAGE runs were repeated at least twice. **b**, Upper panel: SDS-PAGE image of LAIR1-RIFIN (PF3D7_1040300) complex. Lower Panel: SEC profile of LAIR1-RIFIN (PF3D7_1040300) complex. The SDS-PAGE runs were repeated at least twice.



Supplementary Fig. 4 3D reconstruction of nsEM image of MGD21 Fab alone and in complex with RIFIN-V2 (PF3D7_1400600). Maps are superimposed to each other and shown in orthogonal views.

a**b**

Supplementary Fig. 7 Characterization of RIFIN-LAIR1/LILRB1 interaction. **a**, Coomassie blue-stained SDS-PAGE to assess the co-IP between the LAIR1 domain of MGD21 and various RIFINs. (Related to Fig. 4c with additional Fc-tagged RIFIN-V2 bands shown) Positive LAIR1 binding RIFIN IDs are indicated in red. Lanes marked with “M” are molecular ladders with molecular weights as marked. The SDS-PAGE runs were repeated at least twice. **b**, Gating strategy to determine the percentage of RIFIN positive HEK cells (FITC-A + compartment) and RIFINs that binds to LAIR1 antibodies (APC-A compartment).