Table S1. The clinical features of the 37 patients for peripheral blood validation and tissue validation

Peripheral blood validation					
	Total IgG4-RD patients (n=24)	**Patients with active IgG4-RD (n=13)**	**Patients with inactive IgG4-RD (n=11)**	**Healthy Control (n=13)**	***P***
Age (median, IQR, year)	56.5 (47-63.75)	56 (49-66)	57 (47-62.5)	47 (45-50)	0.09
Sex (male, n, %)	14 (58.3)	8 (61.5)	6 (54.5)	5 (38.5)	0.484
Single-organ involvement （n, %）	8.3 (2)	7.7 (1)	9.1 (1)	NA	
2-organ involvement (n, %)	22 (91.7)	12 (92.3)	10 (90.9)	NA	
Serum IgG4 (median, IQR, g/L)	3.1 (1.41-4.6)	3.8 (3. 5-16.4)	1.5 (1.2-2.4)	NA	
IgG4-RD RI (median, IQR)	8 (4-9)	9 (8.75-15)	4 (2.3-4.8)	NA	
Tissue validation					
	IgG4-RD group (n=10)	**Patients with benign retroperitoneum tumor (n=5)**	**Patients with Sjögren's syndrome (n=5)**		***P***
Age (year)	57.5 (47.8-69.5)	48 (48-57)	42 (36-58)		0.316
Sex (male, %)	90 (9)	40 (2)	0 (0)		0.016

IQR, interquartile range; RI, responder index

Table S2. The cell marker of each cell type.

	Marker
B cell	CD19, CD79A
Plasma cell	SLAMF7, IGKC, MZB1
T cell	CD3G, CD3D, CD3E
NK cell	KLRC1, KLRD1
Macrophage	CD68, CD163
Monocyte	CD14, CD300E
Neutrophil	CXCR1, CMTM2
pDC	CLEC4C
cDC	FLT3, CD1E
Fibroblast	COL1A2, COL1A1, DCN
Endothelial cell	VWF, CDH5
Mast cell	TPSB2, CPA3, MS4A2
Smooth muscle cell	ACTA2, PDGFRA

NK, nature killer; pDC, Plasmacytoid dendritic cell; cDC, classical dendritic cell

Table S3. The proportions of B, plasma, and T cells in the total cells of each sample.

Sample (total cell number)	B cell	plasma cell	T cell
control1 (n=10175)	6.47%	0.93%	25.80%
control2 (n=9328)	0.55%	0.04%	16.34%
control3 (n=8860)	17.12%	1.43%	47.66%
IgG4-RPF1 (n=8017)	23.54%	1.53%	68.75%
IgG4-RPF2 (n=7181)	4.34%	3.15%	54.98%
IgG4-RPF3 (n=7009)	29.36%	0.20%	66.93%

Table S4. The proportions of $CD4^+$ T, $CD8^+$ T, and NK cells in T/NK cells of each sample.

Sample (T/NK cell number)	$CD4^+$ T cell	$CD8^+$ T cell	NK cell
control 1 (n=2625)	47.7%	30.8%	21.5%
control 2 (n=1524)	26.6%	50.7%	22.8%
control 3 (n=4223)	61.9%	23.8%	14.3%
IgG4-RPF 1 (n=5112)	64.7%	25.9%	9.3%
IgG4-RPF 2 (n=3948)	46.6%	24.1%	29.4%
IgG4-RPF 3 (n=4691)	80.2%	14.3%	5.6%