

Supplemental Table S6. Downregulated Differentially Expressed Genes and Enriched Functional Annotations of RL-PTCs after Adjustment for the Thyroiditis Status according to the Clinicopathological Prognostic Factors

Annotation	<i>q</i> value	Genes
Age		
Extracellular space	2.07×10 ⁻²	<i>IGHM, AMN, TNFRSF9, KLK5, DEFBI, CTSW, CARTPT, MSLN, GDF6, CST6, CXCL14, ORM2, KLK11, KLK12, KLK6, SMR3B, IFNE, ALOX5, SPOCK3</i>
Plasma membrane	2.07×10 ⁻²	<i>PTPRT, IGHM, ANXA8L1, GYPE, CHRNA6, RASGRF1, CAMK2A, AMIGO2, ATP1A4, AQP5, GPR62, ADCY8, MSLN, SLC6A20, RXFP1, NKAIN1, NKAIN3, GALR2, PENK, ANXA8, LY6G6C, KCNN4, CACNG4, SLC18A3, OPCML, AMN, SYT1, KCND2, ESR1, CLDN10, GAP43, KRT19, CD8B, FXYP3, ALPP, IGHD, DSG3, DSC3</i>
Size		
Extracellular region	1.07×10 ⁻¹⁵	<i>ADAMDEC1, IGHV1-46, CHRDL1, JCHAIN, IGHG3, IL4I1, IGHG1, IGKV1-16, PLAUI, SVEP1, EPPIN, IGLC2, IGHV3-7, SERPINB2, MMP7, MMP2, PSG1, IGLV1D-39, MMP12, SFRP2, PAPP, CRH, IGKV2-30, CCL13, PTGFR, CALCA, CFH, NXPH4, NDNF, IGLV3-1, FBLN1, C2, IGLV3-25, IGKC, WIF1, ARSJ, PENK, BCHE, CCL22, IGKV1-5, FN1, WNT7A, A2ML1, S100B, GDF6, IGSF10, SAA1, FGF10, CBLN1</i>
Extracellular space	2.56×10 ⁻¹¹	<i>CCL13, CALCA, CFH, DPT, FBLN1, GLDN, C2, JCHAIN, IGHG3, IGHG1, CST1, SMR3B, IGKC, PLAUI, SFN, IGLC2, EPPIN, CCL18, XDH, MMP7, CCL22, SERPINB2, MYOC, TNFRSF9, MMP2, FN1, WNT7A, A2ML1, PODN, S100B, GDF6, SFRP2, VGF, PAPP, SAA1, LTA, CRH, LTB, FGF10</i>
Complement activation	9.53×10 ⁻¹¹	<i>CFH, IGKV1-5, IGLV3-1, IGHV1-46, IGKV1D-39, C2, IGHG3, IGLV3-25, IGHG1, IGKV1-16, IGKC, IGLC2, IGHV3-7, IGKV2-30</i>
Complement activation, classical pathway	5.67×10 ⁻⁹	<i>IGKV1-5, IGLV3-1, IGHV1-46, IGKV1D-39, C2, IGHG3, IGLV3-25, IGHG1, IGKV1-16, IGKC, IGLC2, IGHV3-7, IGKV2-30</i>
Immune response	2.03×10 ⁻⁸	<i>CCL13, ADAMDEC1, CCL22, TNFRSF9, IGKV1-5, IGLV3-1, IGHV1-46, CD1E, IGLV1D-39, CD1A, JCHAIN, IL1RL1, IGLV3-25, IGKV1-16, IGKC, LTA, CCR8, LTB, IGHV3-7, CCL18, IGKV2-30</i>
Proteolysis	1.53×10 ⁻⁶	<i>ADAMDEC1, MMP7, MME, MMP2, IGKV1-5, IGLV3-1, IGKV1D-39, PRSS23, C2, MMP12, IGHG3, IGLV3-25, IGHG1, IGKV1-16, IGKC, PLAUI, PAPP, IGLC2, IGHV3-7, IGKV2-30</i>
Regulation of immune response	1.77×10 ⁻⁶	<i>IGKV1-5, IGLV3-1, IGHV1-46, IGKV1D-39, CD1C, CD1B, CD1A, IGLV3-25, IGKV1-16, IGKC, IGLC2, IGHV3-7, IGKV2-30</i>
Receptor-mediated endocytosis	2.49×10 ⁻⁶	<i>IGKV1-5, IGLV3-1, IGHV1-46, IGKV1D-39, JCHAIN, IGLV3-25, IGKV1-16, IGKC, CD207, SAA1, IGLC2, IGHV3-7, IGKV2-30</i>
Extrathyroidal extension		
Complement activation, classical pathway	4.66×10 ⁻²⁵	<i>IGHM, IGLC7, IGHV3-33, IGHV4-39, IGHV1-69, IGHG3, IGHG2, IGLV1-40, IGKC, IGLV2-14, IGLV2-23, IGHD, IGKV4-1, IGKV3-15, IGLC3, IGLC2, IGHV3-7</i>
Antigen binding	1.82×10 ⁻²⁴	<i>IGHM, IGLC7, IGHV3-33, IGHV4-39, IGHV1-69, IGHG3, IGHG2, IGLV1-40, IGKC, IGLV2-14, IGLV2-23, IGHD, IGKV4-1, IGKV3-15, IGLC3, IGLC2, IGHV3-7</i>
Complement activation	6.81×10 ⁻²²	<i>IGLC7, IGHV3-33, IGHV4-39, IGHV1-69, IGHG3, IGHG2, IGLV1-40, IGKC, IGLV2-14, IGLV2-23, IGKV4-1, IGKV3-15, IGLC3, IGLC2, IGHV3-7</i>
Fc-gamma receptor signaling pathway involved in phagocytosis	1.23×10 ⁻¹⁹	<i>IGLC7, IGHV3-33, IGHV4-39, IGHV1-69, IGHG3, IGHG2, IGLV1-40, IGKC, IGLV2-14, IGLV2-23, IGKV4-1, IGKV3-15, IGLC3, IGLC2, IGHV3-7</i>
Serine-type endopeptidase activity	5.92×10 ⁻¹⁵	<i>IGLC7, IGHV3-33, IGHV4-39, IGHV1-69, IGHG3, IGHG2, IGLV1-40, IGKC, IGLV2-14, IGLV2-23, IGKV4-1, IGKV3-15, IGLC3, IGLC2, IGHV3-7</i>
Proteolysis	2.68×10 ⁻¹⁴	<i>IGLC7, IGHV3-33, IGHV4-39, IGHV1-69, IGHG3, CAPN12, IGHG2, IGLV1-40, IGKC, IGLV2-14, UBD, IGLV2-23, IGKV4-1, IGKV3-15, IGLC3, IGLC2, IGHV3-7</i>

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Supplemental Table S6. Continued

Annotation	q value	Genes
Fc-epsilon receptor signaling pathway	2.68×10^{-14}	<i>IGLC7, IGHV3-33, IGHV4-39, IGHV1-69, IGLV1-40, IGKC, IGLV2-14, IGLV2-23, IGKV4-1, IGKV3-15, IGLC3, IGLC2, IGHV3-7</i>
Regulation of immune response	2.68×10^{-14}	<i>IGLC7, IGHV3-33, IGHV4-39, IGHV1-69, IGLV1-40, IGKC, IGLV2-14, IGLV2-23, IGKV4-1, IGKV3-15, IGLC3, IGLC2, IGHV3-7</i>
Receptor-mediated endocytosis	3.92×10^{-14}	<i>IGLC7, IGHV3-33, IGHV4-39, IGHV1-69, IGLV1-40, IGKC, IGLV2-14, IGLV2-23, IGKV4-1, IGKV3-15, IGLC3, IGLC2, IGHV3-7</i>
Lymph node metastasis		
Antigen binding	1.87×10^{-34}	<i>IGHM, IGHV3-33, IGKV1-5, IGHV3-23, IGHV4-39, IGHV1-46, IGKV1D-39, IGHG3, IGLL5, IGHG1, IGHG2, IGLV1-40, IGKC, IGKV1-17, IGLV2-14, IGLV2-23, IGLV1-44, IGKV3-15, IGLC3, IGLC1, IGLC2, IGKV3-20</i>
Complement activation, classical pathway	5.32×10^{-34}	<i>IGHM, IGHV3-33, IGKV1-5, IGHV3-23, IGHV4-39, IGHV1-46, IGKV1D-39, IGHG3, IGLL5, IGHG1, IGHG2, IGLV1-40, IGKC, IGKV1-17, IGLV2-14, IGLV2-23, IGLV1-44, IGKV3-15, IGLC3, IGLC1, IGLC2, IGKV3-20</i>
Complement activation	5.43×10^{-31}	<i>IGHV3-33, IGKV1-5, IGHV3-23, IGHV4-39, IGHV1-46, IGKV1D-39, IGHG3, IGHG1, IGHG2, IGLV1-40, IGKC, IGKV1-17, IGLV2-14, IGLV2-23, IGLV1-44, IGKV3-15, IGLC3, IGLC1, IGLC2, IGKV3-20</i>
Fc-gamma receptor signaling pathway involved in phagocytosis	9.12×10^{-28}	<i>IGHV3-33, IGKV1-5, IGHV3-23, IGHV4-39, IGHV1-46, IGKV1D-39, IGHG3, IGHG1, IGHG2, IGLV1-40, IGKC, IGKV1-17, IGLV2-14, IGLV2-23, IGLV1-44, IGKV3-15, IGLC3, IGLC1, IGLC2, IGKV3-20</i>
Serine-type endopeptidase activity	3.51×10^{-24}	<i>IGHV3-33, IGKV1-5, IGHV3-23, IGHV4-39, IGHV1-46, IGKV1D-39, KLK11, IGHG3, IGHG1, IGHG2, IGLV1-40, IGKC, IGKV1-17, IGLV2-14, IGLV2-23, IGLV1-44, IGKV3-15, IGLC3, IGLC1, IGLC2, IGKV3-20</i>
Fc-epsilon receptor signaling pathway	1.53×10^{-19}	<i>IGHV3-33, IGKV1-5, IGHV3-23, IGHV4-39, IGHV1-46, IGKV1D-39, IGLV1-40, IGKC, IGKV1-17, IGLV2-14, IGLV2-23, IGLV1-44, IGKV3-15, IGLC3, IGLC1, IGLC2, IGKV3-20</i>
Regulation of immune response	1.53×10^{-19}	<i>IGHV3-33, IGKV1-5, IGHV3-23, IGHV4-39, IGHV1-46, IGKV1D-39, IGLV1-40, IGKC, IGKV1-17, IGLV2-14, IGLV2-23, IGLV1-44, IGKV3-15, IGLC3, IGLC1, IGLC2, IGKV3-20</i>
Receptor-mediated endocytosis	2.61×10^{-19}	<i>IGHV3-33, IGKV1-5, IGHV3-23, IGHV4-39, IGHV1-46, IGKV1D-39, IGLV1-40, IGKC, IGKV1-17, IGLV2-14, IGLV2-23, IGLV1-44, IGKV3-15, IGLC3, IGLC1, IGLC2, IGKV3-20</i>
Proteolysis	4.86×10^{-18}	<i>IGHV3-33, IGKV1-5, IGHV3-23, IGHV4-39, IGKV1D-39, KLK11, IGHG3, IGHG1, IGHG2, IGLV1-40, IGKC, IGKV1-17, IGLV2-14, UBD, IGLV2-23, IGLV1-44, IGKV3-15, IGLC3, IGLC1, IGLC2, IGKV3-20</i>
MACIS score		
Antigen binding	6.66×10^{-52}	<i>IGHV2-5, IGHV3-23, IGHV4-59, IGHV3-48, IGLV3-1, IGHV1-46, IGHV1-69, IGHG3, IGLV3-25, IGHG1, IGLV1-40, IGHG2, IGKV1-16, IGLV1-47, IGKC, IGKV1-17, IGLV2-14, IGLV3-21, IGLV1-44, IGLC3, IGKV3-15, IGLC1, TRDC, IGLC2, IGHV3-7, IGHV3-30, IGHV3-53, IGHV3-33, IGHV3-11, IGKV1-5, IGHV3-13, IGKV1D-39, LILRB4, IGLL5, IGLV2-23, IGHD, IGKV4-1, IGKV3-20, IGLV3-19</i>
Complement activation, classical pathway	6.28×10^{-51}	<i>IGHV2-5, IGHV3-23, IGHV4-59, IGHV3-48, IGLV3-1, IGHV1-46, IGHV1-69, C2, IGHG3, IGLV3-25, IGHG1, IGLV1-40, IGHG2, IGKV1-16, IGLV1-47, IGKC, IGKV1-17, IGLV2-14, IGLV3-21, IGLV1-44, IGLC3, IGKV3-15, IGLC1, TRDC, IGLC2, IGHV3-7, IGHV3-30, IGHV3-53, IGHV3-33, IGHV3-11, IGKV1-5, IGHV3-13, IGKV1D-39, IGLL5, IGLV2-23, IGHD, IGKV4-1, IGKV3-20, IGLV3-19</i>

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Supplemental Table S6. Continued

Annotation	<i>q</i> value	Genes
Complement activation	8.17×10^{-48}	<i>IGHV2-5, IGHV3-23, IGHV4-59, IGHV3-48, IGLV3-1, IGHV1-46, IGHV1-69, C2, IGHG3, IGLV3-25, IGHG1, IGLV1-40, IGHG2, IGKV1-16, IGLV1-47, IGKC, IGKV1-17, IGLV2-14, IGLV3-21, IGLV1-44, IGLC3, IGKV3-15, IGLC1, IGLC2, IGHV3-7, IGHV3-30, IGHV3-53, IGHV3-33, IGHV3-11, IGKV1-5, IGHV3-13, IGKV1D-39, IGLV2-23, IGKV4-1, IGKV3-20, IGLV3-19</i>
Fc-gamma receptor signaling pathway involved in phagocytosis	2.12×10^{-39}	<i>IGHV2-5, IGHV3-23, IGHV4-59, IGHV3-48, IGLV3-1, IGHV1-46, IGHV1-69, IGHG3, IGLV3-25, IGHG1, IGLV1-40, IGHG2, IGKV1-16, IGLV1-47, IGKC, IGKV1-17, IGLV2-14, IGLV3-21, IGLV1-44, IGLC3, IGKV3-15, IGLC1, IGLC2, IGHV3-7, IGHV3-30, IGHV3-53, IGHV3-33, IGHV3-11, IGKV1-5, IGHV3-13, IGKV1D-39, IGLV2-23, IGKV4-1, IGKV3-20, IGLV3-19</i>
Serine-type endopeptidase activity	5.77×10^{-37}	<i>IGHV2-5, IGHV3-23, IGHV4-59, IGHV3-48, IGLV3-1, IGHV1-46, IGHV1-69, C2, KLK6, IGHG3, IGLV3-25, IGHG1, IGLV1-40, IGHG2, IGKV1-16, IGLV1-47, IGKC, IGKV1-17, IGLV2-14, PLAU, IGLV3-21, IGLV1-44, IGLC3, IGKV3-15, IGLC1, IGLC2, IGHV3-7, IGHV3-30, IGHV3-53, IGHV3-33, IGHV3-11, IGKV1-5, IGHV3-13, IGKV1D-39, KLK11, KLK12, IGLV2-23, IGKV4-1, IGKV3-20, IGLV3-19</i>
Regulation of immune response	1.37×10^{-35}	<i>IGHV2-5, IGHV3-23, IGHV4-59, IGHV3-48, IGLV3-1, IGHV1-46, IGHV1-69, CD1A, IGLV3-25, IGLV1-40, IGKV1-16, IGLV1-47, IGKC, IGKV1-17, IGLV2-14, IGLV3-21, CD19, IGLV1-44, IGLC3, IGKV3-15, SLAMF7, IGLC1, IGLC2, IGHV3-7, IGHV3-30, IGHV3-53, IGHV3-33, IGHV3-11, IGKV1-5, IGHV3-13, IGKV1D-39, CD8B, IGLV2-23, IGKV4-1, IGKV3-20, IGLV3-19</i>
Receptor-mediated endocytosis	6.16×10^{-32}	<i>IGHV2-5, IGHV3-23, IGHV4-59, IGHV3-48, IGLV3-1, IGHV1-46, IGHV1-69, IGLV3-25, IGLV1-40, IGKV1-16, IGLV1-47, IGKC, IGKV1-17, IGLV2-14, IGLV3-21, IGLV1-44, IGLC3, IGKV3-15, IGLC1, IGLC2, APOE, IGHV3-7, AMN, IGHV3-30, IGHV3-53, IGHV3-33, IGHV3-11, IGKV1-5, IGHV3-13, IGKV1D-39, IGLV2-23, IGKV4-1, IGKV3-20, IGLV3-19</i>
Fc-epsilon receptor signaling pathway	1.10×10^{-29}	<i>IGHV2-5, IGHV3-23, IGHV4-59, IGHV3-48, IGLV3-1, IGHV1-46, IGHV1-69, IGLV3-25, IGLV1-40, IGKV1-16, IGLV1-47, IGKC, IGKV1-17, IGLV2-14, IGLV3-21, IGLV1-44, IGLC3, IGKV3-15, IGLC1, IGLC2, IGHV3-7, IGHV3-30, IGHV3-53, IGHV3-33, IGHV3-11, IGKV1-5, IGHV3-13, IGKV1D-39, IGLV2-23, IGKV4-1, IGKV3-20, IGLV3-19</i>
Immune response	2.28×10^{-28}	<i>ADAMDECI, IGHV2-5, IGHV3-23, IGHV4-59, IGHV3-48, IGLV3-1, IGHV1-46, IGHV1-69, CXCL13, CXCL14, CD1A, IL1RL1, IGLV3-25, IGLV1-40, IGKV1-16, IGLV1-47, IGKC, IGKV1-17, IGLV2-14, IGLV3-21, IGLV1-44, IGKV3-15, IGLC1, CCL18, IGHV3-7, HLA-DQA1, IGHV3-30, IGHV3-53, IGHV3-33, TNFRSF9, IGHV3-11, IGKV1-5, IGHV3-13, IGKV1D-39, CD8B, GPR183, IGLV2-23, IGHD, IGKV4-1, IGKV3-20, IGLV3-19</i>
Proteolysis	8.37×10^{-28}	<i>ADAMDECI, IGHV2-5, IGHV3-23, IGHV4-59, IGHV3-48, IGLV3-1, IGHV1-69, C2, IGHG3, IGLV3-25, IGHG1, IGLV1-40, IGHG2, IGKV1-16, IGLV1-47, IGKC, IGKV1-17, IGLV2-14, PLAU, IGLV3-21, UBD, IGLV1-44, IGLC3, IGKV3-15, IGLC1, IGLC2, IGHV3-7, IGHV3-30, IGHV3-53, IGHV3-33, IGHV3-11, IGKV1-5, IGHV3-13, IGKV1D-39, KLK11, KLK12, CAPN12, MMP16, PAPP, IGLV2-23, IGKV4-1, IGKV3-20, IGLV3-19</i>

RL-PTC, *RAS*-like papillary thyroid carcinoma; MACIS, metastasis-age-completeness of resection-invasion-size.