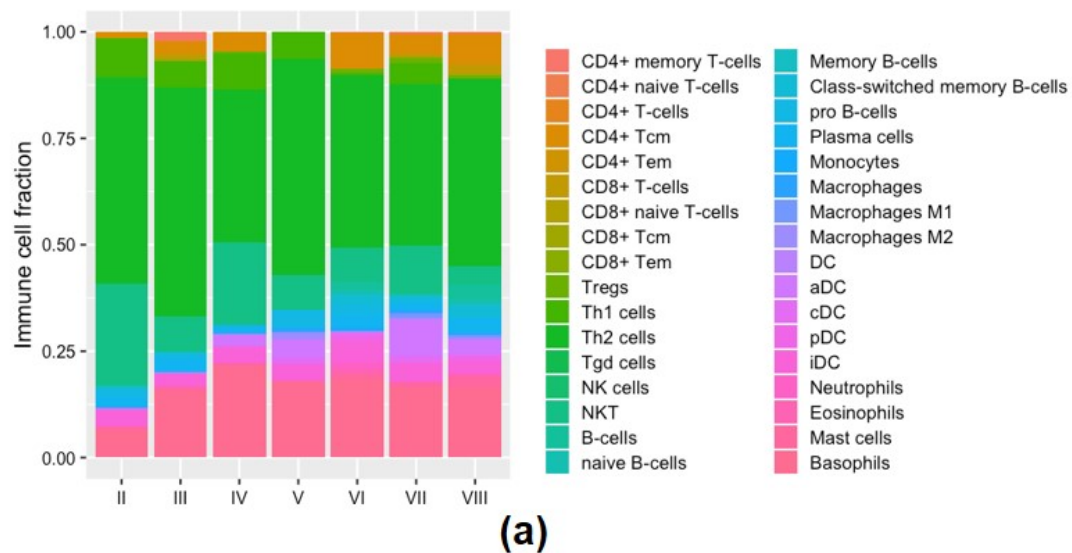


**Table S1.** Demography, molecular subgroup, clinical data, and molecular-clinical correlation in SickKids cohort of MBs.

Molecular subgroup assignment				
N = 763	WNT n = 70 (18.9%)	SHH n = 223 (42.7%)	Group 3 n = 144 (29.2%)	Group 4 n = 326 (9.2%)
Age (median, range) at diagnosis (years)				
8.0 (0.24–56.8)	10.8 (2–56.3)	8.8 (0.2–56.8)	5.1 (1.2–49.6)	8.0 (1.0–48.2)
≤3y (n = 119, 16.3%)	2 (3.1%)	70 (32.6%)	31 (22.8%)	16 (5.1%)
>3y (n = 610, 83.7%)	62 (96.9%)	145 (67.4%)	105 (77.2%)	298 (94.9%)
Sex				
Male, n = 472 (65.6%)	29 (45.3%)	128 (61.0%)	99 (72.3%)	216 (70.1%)
Female, n = 247 (34.4%)	35 (54.7%)	82 (39.0%)	38 (27.7%)	92 (29.9%)
Male/female ratio (1.9/1)	0.8/1	1.6/1	2.6/1	2.3/1
Metastasis stage at diagnosis (M0, Met), number of cases (percentage)				
M0, n = 397 (69.3%)	43 (87.8%)	134 (83.8%)	66 (60.6%)	154 (60.4%)
Met, n = 176 (30.7%)	6 (12.2%)	26 (16.2%)	43 (39.4%)	101 (39.6%)
Pathology variant, number of cases (percentage) and median age (years)				
Classic, n = 387 (66.0%), 8.0	40 (80.0%)	78 (43.1%)	68 (66.0%)	201 (79.8%)
DNMB, n = 109 (18.6%), 5.2	5 (10.0%)	73 (40.3%)	8 (7.8%)	23 (9.1%)
MBEN, n = 18 (3.1%), 2.4	0	10 (5.5%)	2 (1.9%)	6 (2.4%)
LCA, n = 72 (12.3%), 7.0	5 (10.0%)	20 (11.0%)	25 (24.3%)	22 (8.7%)
Median follow-up time (range) (years)				
3.9 (0–25.0)	4.2 (1.1–17.9)	3.9 (0.1–25.0)	3.0 (0–19.0).	4.2 (0–22.0)
Survivals of molecular subgroup (percentage)				
5-year OS rate: 74.9%	98.2%	79.1%	56.9%	75.0%

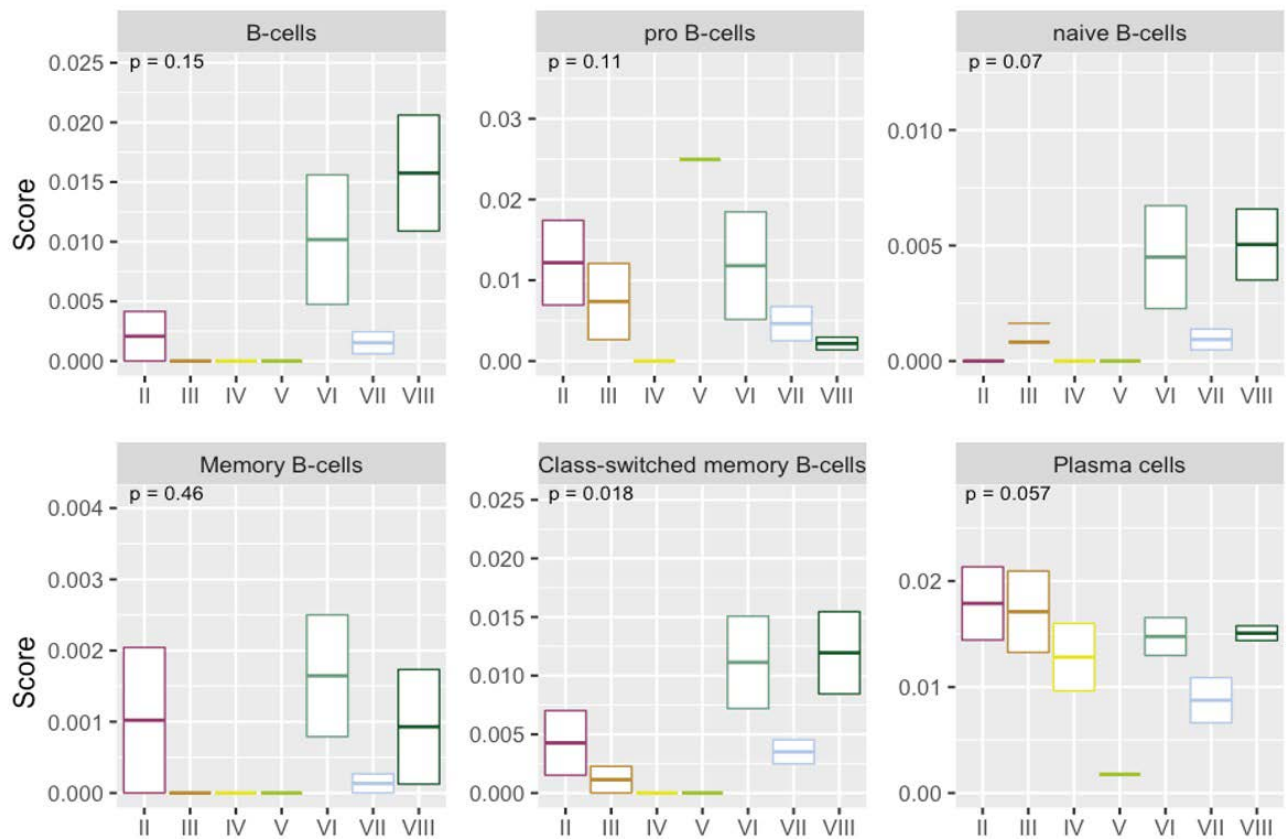
DNMB: Desmoplastic/nodular medulloblastoma, MBEN: Medulloblastoma with extensive nodularity, LCA: Large-cell/anaplastic, M0: no metastasis of tumors, Met: metastasis of tumors, OS: Overall survival.



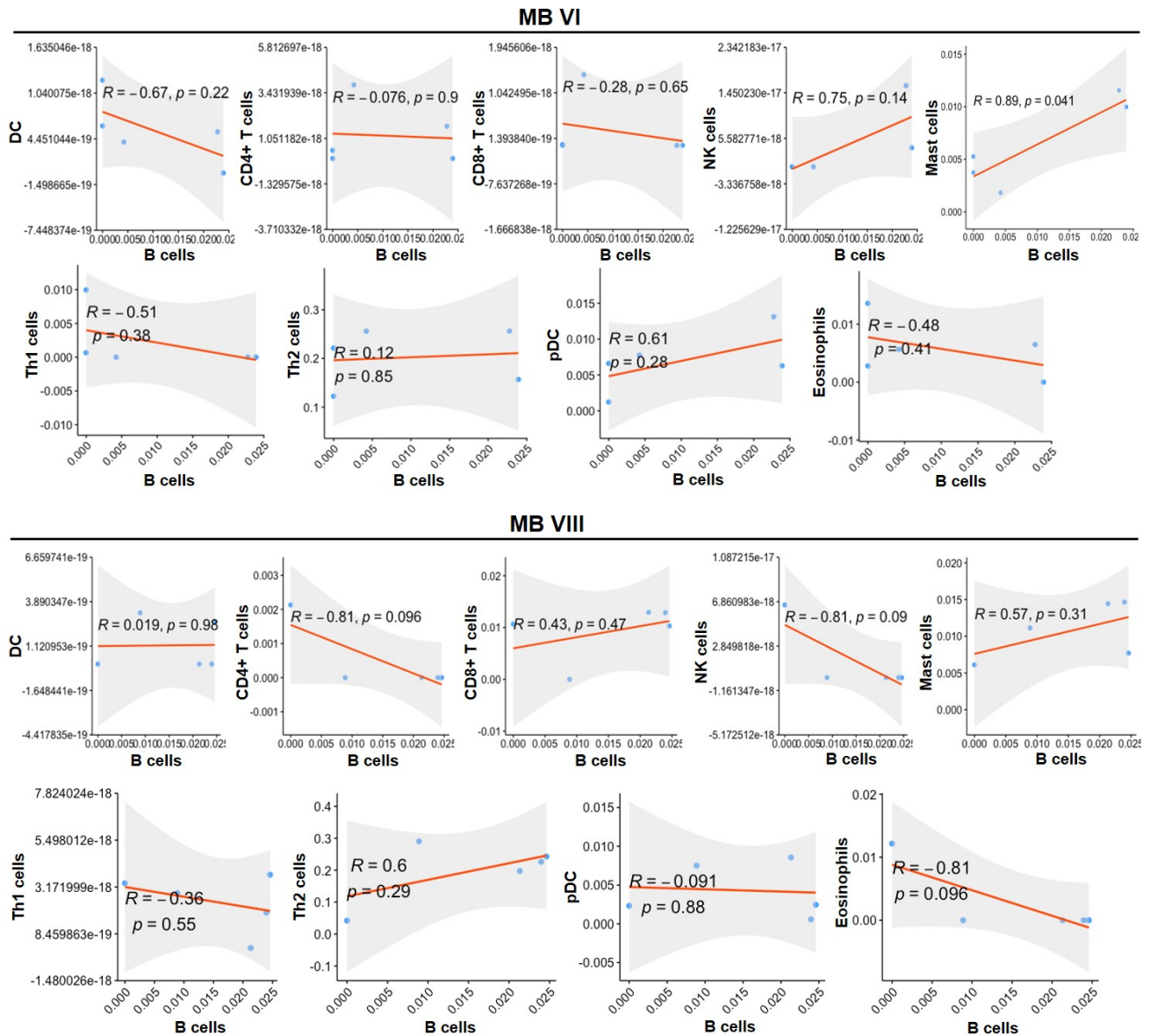
	WNT-α	WNT-β	SHH-α	SHH-β	SHH-γ	II	III	IV	V	VI	VII	VIII	MB
CD4+ memory T-cells	7.819e-03	0.000e+00	1.226e-03	2.750e-19	6.046e-19	1.533e-19	1.006e-02	6.805e-19	0.000e+00	4.894e-04	1.761e-03	1.978e-03	1.944e-03
CD4+ naive T-cells	2.957e-04	7.978e-03	4.480e-04	5.189e-18	3.113e-18	4.419e-18	2.689e-03	1.047e-18	7.434e-18	1.004e-18	1.158e-18	1.949e-18	9.509e-04
CD4+ T-cells	1.586e-18	0.000e+00	1.473e-18	2.300e-18	4.418e-18	1.222e-18	3.216e-20	4.169e-18	2.145e-19	1.191e-18	1.630e-18	4.259e-04	3.549e-05
CD4+ Tcm	4.022e-02	4.408e-02	2.230e-03	1.399e-03	2.661e-03	8.214e-03	1.618e-02	2.581e-02	4.739e-18	4.249e-02	2.440e-02	3.209e-02	1.998e-02
CD4+ Tem	7.941e-18	0.000e+00	4.643e-04	4.194e-03	2.326e-18	4.192e-18	2.772e-18	1.096e-17	3.233e-18	7.166e-18	3.907e-18	4.167e-18	3.882e-04
CD8+ T-cells	1.220e-03	0.000e+00	9.707e-04	1.955e-18	4.038e-03	2.365e-03	7.985e-03	4.816e-19	5.123e-19	2.836e-19	3.920e-03	9.353e-03	2.488e-03
CD8+ naive T-cells	3.073e-03	1.020e-18	2.998e-04	1.191e-03	4.611e-03	1.100e-18	2.205e-20	1.335e-18	5.712e-19	1.015e-18	9.728e-05	1.835e-03	9.256e-04
CD8+ Tcm	4.958e-19	7.676e-19	1.404e-03	1.835e-18	8.439e-04	3.326e-18	2.027e-03	1.596e-18	1.178e-17	9.761e-19	9.550e-04	6.803e-19	4.358e-04
CD8+ Tem	1.105e-19	0.000e+00	6.421e-19	3.606e-18	2.738e-18	1.342e-17	1.116e-18	1.201e-18	0.000e+00	1.336e-18	1.400e-18	1.622e-18	2.266e-18
Tregs	5.797e-18	0.000e+00	2.996e-04	9.576e-03	1.018e-02	1.222e-18	3.396e-19	2.878e-03	2.531e-18	6.167e-03	6.525e-03	3.653e-03	3.273e-03
Th1 cells	7.733e-03	1.842e-02	3.519e-02	1.121e-03	2.077e-02	6.402e-02	3.574e-02	4.900e-02	3.820e-02	2.126e-03	2.441e-02	2.411e-18	2.473e-02
Th2 cells	2.685e-01	1.725e-01	2.326e-01	1.386e-01	2.243e-01	3.366e-01	3.093e-01	2.060e-01	3.065e-01	2.026e-01	1.905e-01	1.999e-01	2.323e-01
Tgd cells	6.639e-18	3.520e-18	3.033e-18	8.239e-18	5.328e-18	4.934e-18	0.000e+00	1.210e-17	0.000e+00	6.119e-18	3.028e-18	4.027e-18	4.747e-18
NK cells	2.533e-18	1.656e-18	8.899e-18	5.085e-18	4.612e-18	1.155e-17	9.227e-19	0.000e+00	7.726e-18	3.930e-18	2.690e-18	1.313e-18	4.243e-18
NKT	2.407e-03	7.460e-03	1.227e-02	1.150e-01	3.617e-02	1.668e-01	4.769e-02	1.121e-01	4.930e-02	4.057e-02	5.796e-02	1.997e-02	5.563e-02
B-cells	0.000e+00	4.980e-04	3.134e-18	6.764e-19	1.608e-03	2.077e-03	3.888e-19	1.287e-18	0.000e+00	1.018e-02	1.532e-03	1.575e-02	2.637e-03
naive B-cells	3.805e-04	8.021e-03	8.556e-19	7.582e-18	5.500e-19	1.759e-18	8.164e-04	3.401e-19	0.000e+00	4.499e-03	9.342e-04	5.045e-03	1.641e-03
Memory B-cells	5.847e-18	2.370e-19	9.305e-18	1.443e-17	3.903e-18	1.022e-03	7.765e-18	5.332e-18	0.000e+00	1.646e-03	1.339e-04	9.295e-04	3.109e-04
Class-switched memory B-cells	4.022e-19	0.000e+00	3.928e-18	8.513e-18	1.187e-18	4.270e-03	1.135e-03	2.924e-18	8.002e-19	1.114e-02	3.511e-03	1.195e-02	2.667e-03
pro B-cells	4.774e-18	3.113e-19	1.608e-03	4.027e-20	3.273e-03	1.217e-02	7.367e-03	2.351e-19	2.496e-02	1.180e-02	4.631e-03	2.165e-03	5.664e-03
Plasma cells	5.354e-03	6.131e-03	2.627e-03	2.529e-03	4.619e-03	1.788e-02	1.710e-02	1.282e-02	1.753e-03	1.476e-02	8.749e-03	1.508e-02	9.117e-03
Monocytes	1.123e-02	7.951e-18	4.005e-03	1.208e-02	1.743e-18	1.720e-19	3.494e-19	1.358e-17	0.000e+00	4.049e-03	2.936e-18	3.990e-18	2.613e-03
Macrophages	1.915e-02	1.097e-02	1.328e-02	5.357e-02	1.878e-03	4.076e-19	3.910e-19	3.668e-18	3.237e-03	4.613e-19	3.216e-03	2.178e-03	8.956e-03
Macrophages M1	1.474e-02	1.442e-02	2.118e-02	5.298e-02	9.292e-03	3.181e-19	3.240e-04	6.890e-06	2.727e-03	1.470e-04	5.375e-03	1.775e-03	1.025e-02
Macrophages M2	1.523e-02	0.000e+00	6.498e-03	2.177e-02	1.599e-03	2.241e-19	1.265e-03	2.873e-19	8.556e-03	4.520e-20	1.194e-03	2.669e-03	4.898e-03
DC	2.815e-03	8.044e-04	1.033e-03	5.755e-03	9.060e-04	6.920e-20	1.941e-19	8.267e-19	2.798e-19	5.518e-19	6.909e-04	1.166e-19	1.000e-03
aDC	5.541e-02	4.017e-02	1.041e-01	7.822e-02	6.679e-02	1.068e-18	6.416e-19	1.551e-02	2.701e-02	2.140e-03	4.358e-02	1.585e-02	3.739e-02
cDC	4.717e-02	4.344e-02	3.285e-02	7.540e-02	2.043e-02	3.887e-03	1.846e-03	7.599e-04	8.326e-03	2.709e-03	7.162e-03	2.456e-03	2.054e-02
pDC	9.102e-19	1.329e-03	4.045e-03	1.624e-03	4.683e-18	5.020e-19	4.153e-04	3.246e-03	3.668e-04	6.995e-03	1.851e-03	4.288e-03	2.013e-03
iDC	4.717e-02	1.162e-01	2.453e-02	1.345e-01	1.930e-02	2.608e-02	1.500e-02	1.933e-02	2.310e-02	2.457e-02	2.168e-02	1.323e-02	4.039e-02
Neutrophils	6.434e-03	0.000e+00	1.762e-19	4.788e-03	4.407e-04	2.817e-04	2.791e-04	1.013e-03	5.678e-20	8.189e-03	3.478e-04	1.717e-03	1.958e-03
Eosinophils	1.411e-18	0.000e+00	3.884e-19	2.672e-03	4.661e-19	3.625e-18	2.298e-03	4.335e-19	3.749e-18	5.701e-03	8.965e-04	2.434e-03	1.167e-03
Mast cells	5.385e-03	7.085e-03	4.845e-03	8.796e-04	3.212e-03	5.557e-03	5.928e-03	3.977e-03	1.026e-03	6.471e-03	5.475e-03	1.081e-02	5.054e-03
Basophils	1.519e-02	1.303e-01	3.034e-02	1.299e-02	1.977e-02	4.498e-02	8.805e-02	1.230e-01	1.079e-01	9.211e-02	8.289e-02	7.472e-02	6.852e-02

(b)

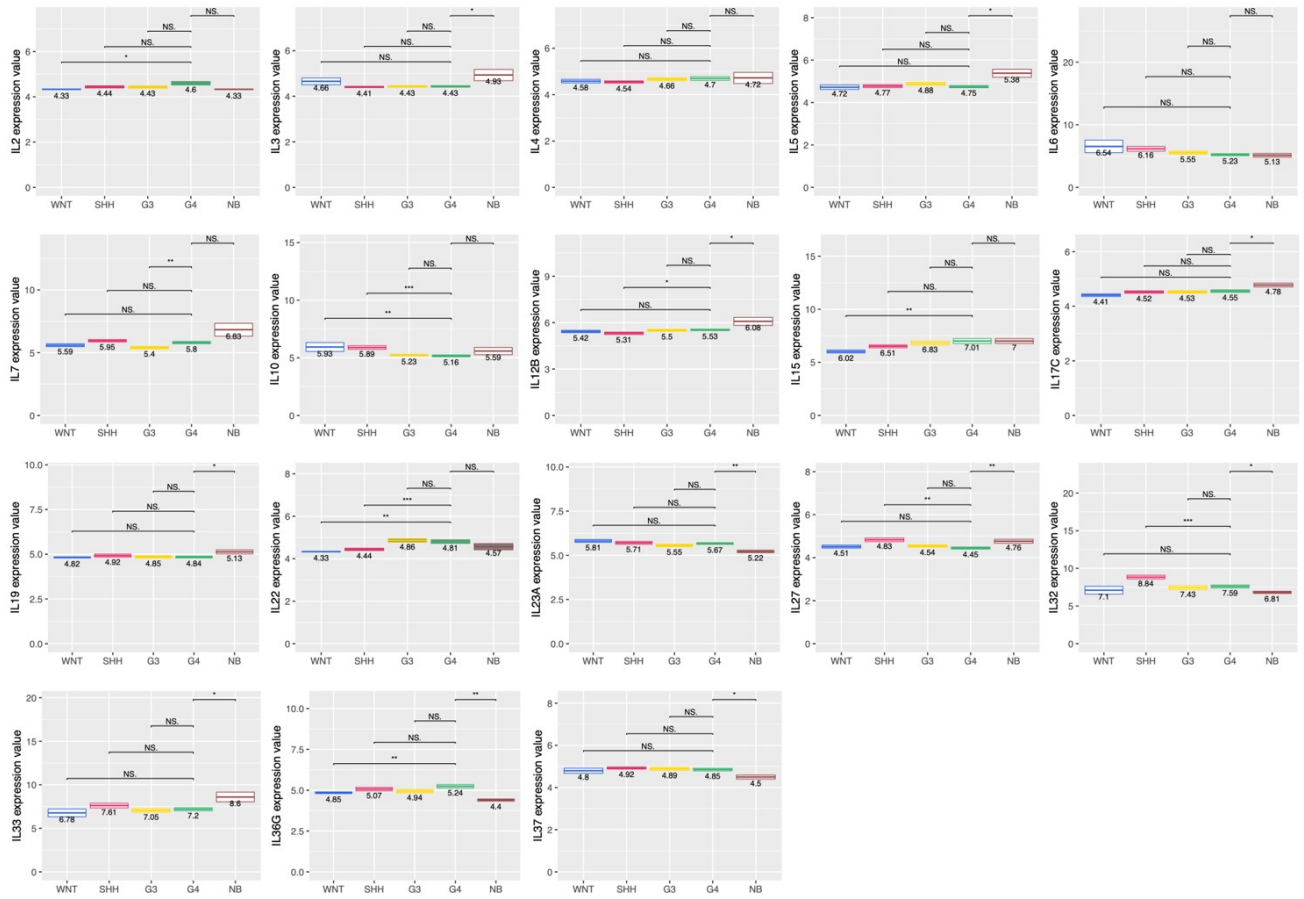
**Figure S1. Analysis of immune cells and B cell subsets from the 70 MB patients based on the 2021 WHO classification of MB subgrouping.** (a) The proportion of T cells, B cells, macrophages, DCs, mast cells and other myeloid cells in MB tumors. (b) The distribution of lymphoid and myeloid cells enrichment.



**Figure S2. Expression of the infiltrating B cells subsets from in the MB subgroups.** The analysis of B cell subsets from the 70 clinical patients based on the 2021 WHO classification of MB. The p values were determined by Kruskal-Wallis test.

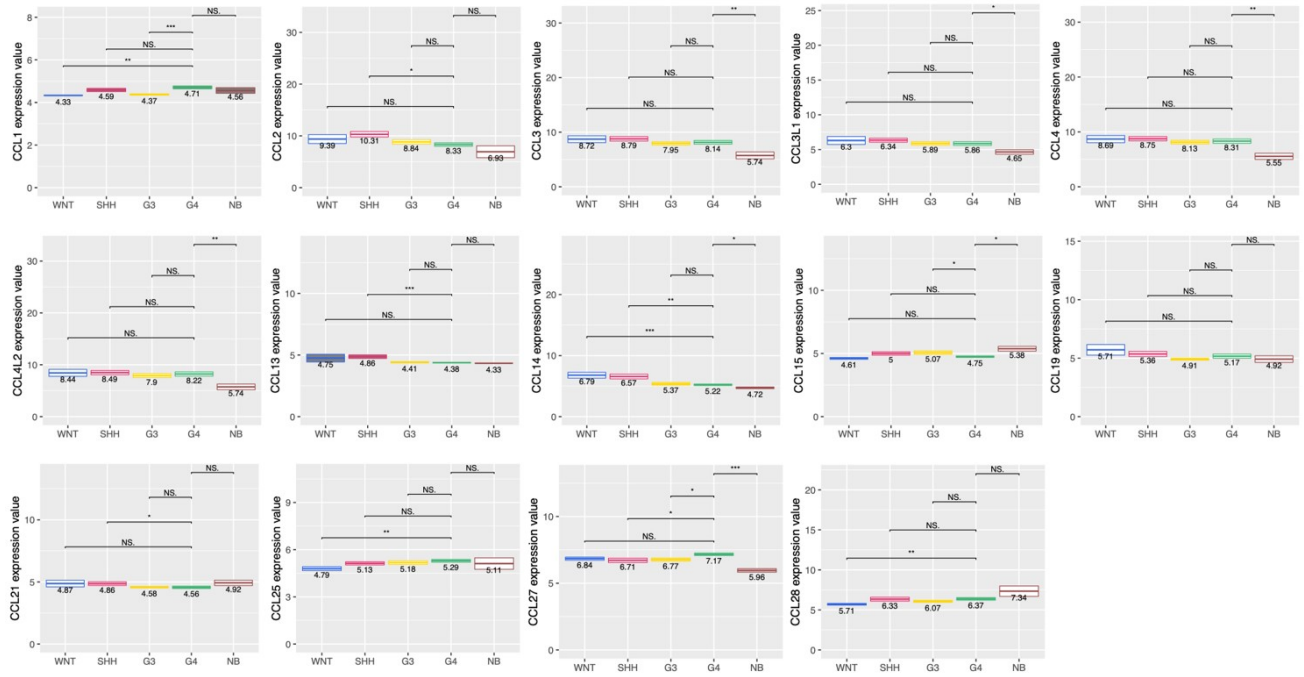


**Figure S3. Correlation of B cells with other immune cell types in the VI and VIII subgroups of MB tumors.** Correlation between the expression of B cells and the expression of DCs, CD4<sup>+</sup> T cells, CD8<sup>+</sup> T cells, NK cells, mast cells, Th1 cells, Th2 cells, pDCs and eosinophils in the VI and VIII subgroups of MB tumors. Correlation coefficients (R) were obtained by using Pearson's correlation coefficient test.

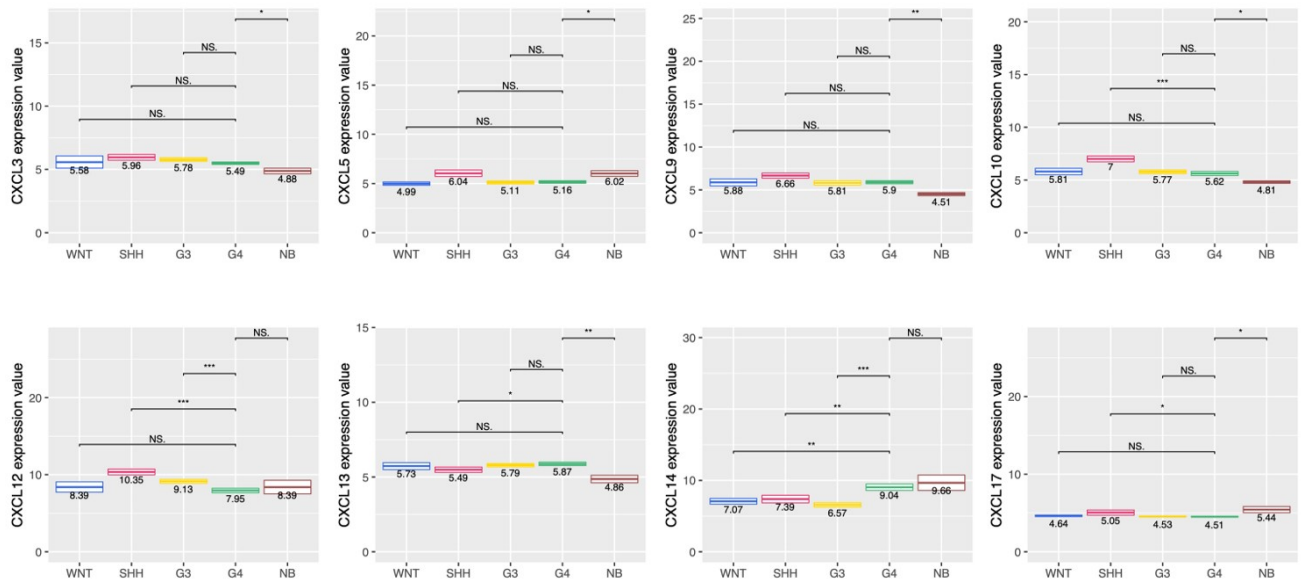


**Figure S4. Expression of interleukins in different MB subgroups tumors and normal brain.** The expressions of interleukins among 4 subgroups of MB tumors and normal brain tissue were analyzed from the transcriptome data. \*,  $p < 0.05$ ; \*\*,  $p < 0.01$ ; \*\*\*,  $p < 0.001$ , compared to G4 subgroup tumors. NS: no significant difference.





**Figure S5. Expression of CCL chemokines in different MB subgroups tumors and normal brain.** The expressions of CCL chemokines among 4 subgroups of MB tumors and normal brain tissue were analyzed from the transcriptome data. \*,  $p < 0.05$ ; \*\*,  $p < 0.01$ ; \*\*\*,  $p < 0.001$ , compared to G4 subgroup tumors. NS: no significant difference.



**Figure S6. Expression of CXCL chemokines in different MB subgroups tumors and normal brain.** The expressions of CXCL chemokines among 4 subgroups of MB tumors and normal brain tissue were analyzed from the transcriptome data. \*,  $p < 0.05$ ; \*\*,  $p < 0.01$ ; \*\*\*,  $p < 0.001$ , compared to G4 subgroup tumors. NS: no significant difference.