

S5 Table. BAGS classifier genes

| ENSEMBL Gene ID ^a | HGNC Symbol | BAGS Subtypes | | | | | |
|------------------------------|-------------|---------------|--------------|--------------|--------------|--------------|--------------|
| | | Pre-BI | Pre-BII | Immature | Naïve | Memory | Plasma cell |
| ENSG00000004468 | CD38 | 0 | 0 | 0,055148822 | 0 | -0,195897288 | 0 |
| ENSG00000005187 | ACSM3 | -0,079835662 | 0,383419171 | 0 | 0 | 0 | 0 |
| ENSG00000007062 | PROM1 | 0,006368928 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000012124 | CD22 | 0 | 0 | 0 | 0 | 0 | -0,009728154 |
| ENSG00000023445 | BIRC3 | -0,095499243 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000026751 | SLAMF7 | 0 | 0 | 0 | 0 | 0 | 0,081333674 |
| ENSG00000042980 | ADAM28 | 0 | -0,120277562 | 0 | 0,12739731 | 0 | 0 |
| ENSG00000048462 | TNFRSF17 | -0,174281415 | 0,135951007 | -0,163019931 | 0 | 0 | 0,121841186 |
| ENSG00000051108 | HERPUD1 | 0 | 0 | 0 | 0 | 0 | 0,016813158 |
| ENSG00000051180 | RAD51 | 0 | 0,015917164 | 0 | 0 | 0 | 0 |
| ENSG00000057657 | PRDM1 | 0 | 0 | 0 | 0 | 0 | 0,066261657 |
| ENSG00000060138 | YBX3 | 0 | 0 | 0 | 0 | -0,03089936 | 0 |
| ENSG00000070540 | WIP1 | 0 | 0 | 0 | 0 | 0 | 0,036604349 |
| ENSG00000071537 | SEL1L | 0 | 0 | 0 | 0 | 0 | 0,057865137 |
| ENSG00000071575 | TRIB2 | 0 | 0 | 0,006207067 | 0 | 0 | 0 |
| ENSG00000075420 | FNDC3B | 0 | 0 | 0 | 0 | 0 | 0,051806894 |
| ENSG00000076003 | MCM6 | 0 | 0 | -0,014482045 | 0 | 0 | 0 |
| ENSG00000077238 | IL4R | 0 | 0 | 0 | 0,435041027 | -0,186048666 | 0 |
| ENSG00000077943 | ITGA8 | 0 | 0 | 0 | 0 | 0 | 0,07554695 |
| ENSG00000078589 | P2RY10 | -0,007941132 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000079263 | SP140 | 0 | -0,065700556 | 0,059031616 | 0 | 0 | 0 |
| ENSG00000082293 | COL19A1 | 0 | 0 | 0 | 0,047623575 | 0 | 0 |
| ENSG00000086967 | MYBPC2 | 0 | 0 | 0,030470208 | 0 | 0 | 0 |
| ENSG00000087086 | FTL | 0 | -0,001774317 | 0 | 0 | 0 | 0 |
| ENSG00000090376 | IRAK3 | 0 | 0 | 0 | 0,025492407 | 0 | 0 |
| ENSG00000091409 | ITGA6 | 0 | 0 | 0 | 0 | 0 | 0,085961417 |
| ENSG00000091972 | CD200 | 0 | 0 | 0 | 0,219445183 | -0,053181588 | 0 |
| ENSG00000092853 | CLSPN | 0 | 0,059381831 | 0 | 0 | 0 | 0 |
| ENSG00000093009 | CDC45 | 0 | 0,021236058 | 0 | 0 | 0 | 0 |
| ENSG00000094804 | CDC6 | 0 | 9,43522E-06 | 0 | 0 | 0 | 0 |
| ENSG00000095015 | MAP3K1 | -0,037929964 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000096006 | CRISP3 | 0 | 0 | 0 | 0 | 0,007467653 | 0 |
| ENSG00000096696 | DSP | 0 | 0 | 0 | 0,008633427 | 0 | 0 |
| ENSG00000100219 | XBP1 | 0 | 0 | 0 | 0 | 0 | 0,022246552 |
| ENSG00000100721 | TCL1A | -0,252421595 | 0,215064951 | 0,068462648 | 0,254363422 | -0,342169495 | 0 |
| ENSG00000101336 | HCK | 0 | 0 | 0,050612299 | -0,011804743 | 0 | 0 |
| ENSG00000102218 | RP2 | 0 | 0 | 0 | -3,26893E-05 | 0 | 0 |
| ENSG00000102445 | KIAA0226L | 0 | 0 | 0 | 0 | 0 | -0,06030621 |
| ENSG00000102580 | DNAJC3 | 0 | 0 | 0 | 0 | 0 | 0,048508443 |
| ENSG00000103528 | SYT17 | 0 | 0 | 0 | 0,291140971 | 0 | 0 |
| ENSG00000104432 | IL7 | 0 | 0 | 0 | 0 | 0,15202983 | 0 |
| ENSG00000104921 | FCER2 | 0 | 0 | 0 | 0,081703434 | 0 | 0 |
| ENSG00000105694 | TCEB1P28 | 0 | 0 | 0 | 0,015525288 | 0 | 0 |
| ENSG00000105854 | PON2 | 0 | 0 | 0,008386052 | 0 | 0 | 0 |
| ENSG00000105889 | STEAP1B | 0 | 0 | 0 | 0,059666484 | 0 | 0 |
| ENSG00000105967 | TFEC | 0 | 0 | 0 | -0,026270125 | 0,272774074 | 0 |
| ENSG00000106624 | AEBP1 | 0 | 0 | 0,008085875 | 0 | 0 | 0 |
| ENSG00000107447 | DNTT | 0,238519145 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000109674 | NEIL3 | 0 | 0,004239307 | 0 | 0 | 0 | 0 |
| ENSG00000109787 | KLF3 | 0 | 0 | 0 | 0,001043312 | 0 | 0 |

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|-----------------|----------|--------------|--------------|--------------|--------------|--------------|--------------|
| ENSG00000109805 | NCAPG | 0 | 0,01656183 | -0,032895735 | 0 | 0 | 0 |
| ENSG00000110077 | MS4A6A | 0 | 0 | 0,208106157 | 0 | 0 | 0 |
| ENSG00000111913 | FAM65B | 0 | 0 | 0 | 0 | 0,030021104 | -0,009183778 |
| ENSG00000112290 | WASF1 | 0 | 0,211256246 | 0,163415154 | -0,108316254 | 0 | 0 |
| ENSG00000113615 | SEC24A | 0 | 0 | 0 | 0 | 0 | 0,025387114 |
| ENSG00000114346 | ECT2 | 0 | 0,002962178 | 0 | 0 | 0 | 0 |
| ENSG00000114948 | ADAM23 | -0,045871791 | 0,136902635 | 0,271397044 | -0,112268779 | 0 | 0 |
| ENSG00000115956 | PLEK | 0 | 0 | 0 | 0,046113831 | 0 | 0 |
| ENSG00000115993 | TRAK2 | 0 | 0 | 0 | 0,068802022 | 0 | 0 |
| ENSG00000116748 | AMPD1 | 0 | 0 | 0 | 0 | 0 | 0,215735065 |
| ENSG00000116815 | CD58 | 0 | 0 | -0,032324773 | 0 | 0 | 0 |
| ENSG00000117090 | SLAMF1 | 0 | 0 | 0 | 0 | -0,013233152 | 0 |
| ENSG00000118113 | MMP8 | 0 | 0 | 0 | 0 | 0,08597789 | 0 |
| ENSG00000118193 | KIF14 | 0 | 0,002393982 | 0 | 0 | 0 | 0 |
| ENSG00000118985 | ELL2 | 0 | 0 | 0 | 0 | 0 | 0,032305437 |
| ENSG00000119782 | FKBP1B | 0 | 0 | 0 | 0 | 0,057395872 | 0 |
| ENSG00000120049 | KCNIP2 | 0 | 0 | 0 | 0,095575932 | 0 | 0 |
| ENSG00000121152 | NCAPH | 0 | 0,02045612 | 0 | 0 | 0 | 0 |
| ENSG00000121807 | CCR2 | 0 | 0 | 0 | 0 | 0 | 0,021441048 |
| ENSG00000121895 | TMEM156 | 0 | -0,043472633 | 0 | 0 | 0 | 0 |
| ENSG00000122025 | FLT3 | 0,104734484 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000122862 | SRGN | 0 | 0 | 0,003228003 | -0,043881598 | 0 | 0 |
| ENSG00000123352 | SPATS2 | 0 | 0 | 0 | 0 | 0 | 0,011213308 |
| ENSG00000123975 | CKS2 | 0 | 0,039191105 | 0,0735212 | -0,32861928 | 0 | 0 |
| ENSG00000124942 | AHNAK | 0 | -0,064162651 | 0 | 0 | 0,030115394 | 0 |
| ENSG00000126353 | CCR7 | 0 | 0 | 0 | 0,184076656 | 0 | 0 |
| ENSG00000128641 | MYO1B | 0 | 0 | 0 | 0,000895254 | 0 | 0 |
| ENSG00000128833 | MYO5C | 0,124529232 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000129173 | E2F8 | 0 | 0,117496115 | 0 | 0 | 0 | 0 |
| ENSG00000129824 | RPS4Y1 | 0 | 0 | 0 | 0,050504228 | 0 | 0 |
| ENSG00000131002 | TXLNGY | 0 | -0,012078363 | 0 | 0 | 0 | 0 |
| ENSG00000131724 | IL13RA1 | 0 | 0 | 0 | 0,14567796 | 0 | 0 |
| ENSG00000131781 | FMOS | 0 | 0 | 0 | 0,016333712 | 0 | 0 |
| ENSG00000132274 | TRIM22 | 0 | 0 | 0 | 0 | 0 | -0,015002068 |
| ENSG00000133119 | RFC3 | 0 | 0,004903487 | 0 | 0 | 0 | 0 |
| ENSG00000133935 | C14orf1 | 0 | 0 | -0,034070368 | 0 | 0 | 0 |
| ENSG00000134061 | CD180 | -0,121919412 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000134460 | IL2RA | 0 | 0 | 0 | 0 | 0,146896989 | 0 |
| ENSG00000135048 | TMEM2 | 0 | 0 | 0 | 0,0168304 | 0 | 0 |
| ENSG00000135116 | HRK | 0 | 0 | 0,062288047 | 0 | 0 | 0 |
| ENSG00000135318 | NTSE | 0 | 0 | 0 | 0,145090155 | 0 | 0 |
| ENSG00000136982 | DSCC1 | 0 | 0,000790732 | 0 | 0 | 0 | 0 |
| ENSG00000137101 | CD72 | 0 | 0 | 0 | 0 | 0 | -0,010197401 |
| ENSG00000137265 | IRF4 | -0,037015874 | 0,114326553 | 0 | 0 | 0 | 0 |
| ENSG00000138180 | CEP55 | 0 | 0,00775363 | 0 | 0 | 0 | 0 |
| ENSG00000138587 | MNS1 | 0 | 0,099680726 | 0 | 0 | 0 | 0 |
| ENSG00000138639 | ARHGAP24 | 0 | 0 | 0 | 0 | 0,084370548 | 0 |
| ENSG00000138778 | CENPE | 0 | 0,028131749 | 0 | 0 | 0 | 0 |
| ENSG00000141293 | SKAP1 | 0 | 0 | 0 | 0,082320327 | 0 | 0 |
| ENSG00000142731 | PLK4 | 0 | 0,021804705 | 0 | 0 | 0 | 0 |
| ENSG00000143476 | DTL | 0 | 0,059506275 | 0 | 0 | 0 | 0 |
| ENSG00000143756 | FBXO28 | 0 | 0 | 0 | 0,051248175 | 0 | 0 |
| ENSG00000145386 | CCNA2 | 0 | 0,00227826 | 0 | 0 | 0 | 0 |
| ENSG00000147168 | IL2RG | 0 | -0,092324224 | 0 | 0 | 0 | 0 |
| ENSG00000149054 | ZNF215 | 0 | 0 | 0 | 0 | 0 | 0,050655318 |

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|-----------------|----------|--------------|--------------|--------------|--------------|--------------|--------------|
| ENSG00000149177 | PTPRJ | 0 | 0 | 0,13923948 | 0 | 0 | 0 |
| ENSG00000152253 | SPC25 | 0 | 0,096086846 | 0 | 0 | 0 | 0 |
| ENSG00000152256 | PDK1 | 0 | 0 | 0 | 0 | 0 | 0,051758699 |
| ENSG00000152689 | RASGRP3 | 0 | 0 | 0 | 0,066087802 | 0 | 0 |
| ENSG00000152785 | BMP3 | 0 | 0 | 0,210912983 | -0,021609218 | 0 | 0 |
| ENSG00000153064 | BANK1 | 0 | 0 | 0 | 0 | 0,053426533 | 0 |
| ENSG00000153253 | SCN3A | 0 | 0 | 0 | 0,013136137 | 0 | 0 |
| ENSG00000156136 | DCK | 0 | 0 | 0 | 0 | 0 | -0,096811026 |
| ENSG00000156738 | MS4A1 | -0,09674709 | -0,035599607 | 0,203383245 | 0 | 0,183879563 | -0,125120737 |
| ENSG00000157554 | ERG | 0,080812772 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000158164 | TMSB15A | 0 | 0,161372502 | 0 | 0 | 0 | 0 |
| ENSG00000158481 | CD1C | 0 | 0 | 0 | 0 | 0,220838254 | 0 |
| ENSG00000160683 | CXCR5 | 0 | 0 | 0 | 0,024110902 | 0 | 0 |
| ENSG00000161405 | IKZF3 | -0,31501003 | 0,005680736 | 0 | 0 | 0 | 0 |
| ENSG00000162188 | GNG3 | 0 | -0,019196563 | 0,233395141 | 0 | 0 | 0 |
| ENSG00000162692 | VCAM1 | 0,00650845 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000162924 | REL | 0 | 0 | 0 | 0 | 0 | -0,052314869 |
| ENSG00000163106 | HPGDS | 0,033544742 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000163563 | MNDA | 0 | 0 | 0 | 0 | 0,040735911 | 0 |
| ENSG00000163564 | PYHIN1 | 0 | 0 | 0 | 0 | 0,0098032 | 0 |
| ENSG00000163568 | AIM2 | 0 | 0 | -0,028023942 | 0 | 0,441238531 | 0 |
| ENSG00000163808 | KIF15 | 0 | 0,022153672 | 0 | 0 | 0 | 0 |
| ENSG00000164543 | STK17A | 0 | 0 | 0 | 0,01605094 | 0 | 0 |
| ENSG00000164821 | DEFA4 | 0 | 0 | 0,062887765 | 0 | 0 | 0 |
| ENSG00000166086 | JAM3 | 0 | 0 | 0 | 0 | 0,007661801 | 0 |
| ENSG00000168078 | PBK | 0 | 0,004008476 | 0 | 0 | 0 | 0 |
| ENSG00000169397 | RNASE3 | -0,044264185 | 0 | -0,022762663 | 0 | 0 | 0 |
| ENSG00000169413 | RNASE6 | 0 | -0,173432968 | 0,089903968 | 0 | 0 | 0 |
| ENSG00000169508 | GPR183 | 0 | 0 | 0 | 0 | 0,207631154 | 0 |
| ENSG00000169575 | VPREB1 | 0 | 0,005245374 | 0 | -0,02397329 | 0 | 0 |
| ENSG00000171848 | RRM2 | 0 | 0,11862101 | 0 | 0 | 0 | 0 |
| ENSG00000173141 | MRPL57 | 0 | 0 | -0,01772027 | 0 | 0 | 0 |
| ENSG00000173208 | ABCD2 | 0 | 0 | 0 | -0,055545843 | 0 | 0 |
| ENSG00000173559 | NABP1 | 0 | 0 | 0 | 0 | 0,017519542 | 0 |
| ENSG00000174059 | CD34 | 0,176848326 | -0,053565491 | 0 | 0 | 0 | 0 |
| ENSG00000174371 | EXO1 | 0 | 0,042747304 | 0 | 0 | 0 | 0 |
| ENSG00000174944 | P2RY14 | 0 | 0 | 0 | 0,31531888 | -0,213049831 | 0 |
| ENSG00000177575 | CD163 | 0,013386319 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000179344 | HLA-DQB1 | -0,0157371 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000181631 | P2RY13 | 0 | 0 | 0 | 0 | 0,02862413 | 0 |
| ENSG00000181690 | PLAG1 | 0 | 0 | -0,019735914 | 0 | 0 | 0 |
| ENSG00000184226 | PCDH9 | 0 | 0,007525214 | 0,199798101 | 0 | 0 | 0 |
| ENSG00000184566 | | 0 | 0 | 0 | -0,017447206 | 0 | 0 |
| ENSG00000188404 | SELL | 0 | 0 | 0 | 0,010491759 | 0 | 0 |
| ENSG00000196368 | NUDT11 | 0,041081648 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000196549 | MME | 0 | 0 | 0 | -0,022613468 | 0 | 0 |
| ENSG00000196584 | XRCC2 | 0 | 0,025030886 | 0 | 0 | 0 | 0 |
| ENSG00000197429 | IPP | -0,012224959 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000197879 | MYO1C | 0 | 0 | 0,030171869 | 0 | 0 | 0 |
| ENSG00000198692 | EIF1AY | 0 | 0 | -0,04238152 | 0,151798094 | 0 | 0 |
| ENSG00000198825 | INPP5F | 0 | 0 | -0,045977305 | 0,045464168 | 0 | 0 |
| ENSG00000204287 | HLA-DRA | 0 | 0 | 0 | 0 | 0,01761542 | -0,240799272 |
| ENSG00000204389 | HSPA1A | 0 | -0,083658749 | 0 | 0 | 0 | 0 |
| ENSG00000204852 | TCTN1 | 0 | 0 | 0 | 0,056953717 | 0 | 0 |
| ENSG00000211598 | IGKV4-1 | 0 | 0 | 0 | 0 | 0 | 0,051039937 |

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|-----------------|-------------|--------------|-------------|--------------|--------------|---|--------------|
| ENSG00000211640 | IGLV6-57 | 0 | 0 | 0 | 0 | 0 | 0,10268902 |
| ENSG00000211653 | IGLV1-40 | 0 | 0 | 0,034170107 | 0 | 0 | 0,072178525 |
| ENSG00000213005 | PTTG3P | 0 | 0 | 0,071672376 | 0 | 0 | 0 |
| ENSG00000218690 | HIST1H2APS4 | 0 | 0,018873909 | 0 | 0 | 0 | 0 |
| ENSG00000220506 | | 0 | 0 | -0,02943808 | 0,138309229 | 0 | 0 |
| ENSG00000220541 | | 0 | 0 | 0,048105374 | -0,006145234 | 0 | 0 |
| ENSG00000227234 | SPANXB1 | 0,144284596 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000231991 | ANXA2P2 | -0,017051882 | 0 | 0 | -0,072334697 | 0 | 0 |
| ENSG00000241106 | HLA-DOB | -0,243722552 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000242574 | HLA-DMB | 0 | 0 | 0 | 0 | 0 | -0,146703441 |
| ENSG00000254087 | LYN | -0,014003892 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000261371 | PECAM1 | 0 | -0,14321088 | 0 | 0 | 0 | 0 |
| ENSG00000263639 | MSMB | 0,042322611 | 0 | 0 | 0 | 0 | 0 |
| ENSG00000265241 | RBM8A | 0 | 0 | 0,077893246 | 0 | 0 | 0 |
| ENSG00000269404 | SPIB | -0,104827171 | 0 | 0,121865529 | 0 | 0 | 0 |
| ENSG00000273703 | HIST1H2BM | 0 | 0,057518809 | 0 | 0 | 0 | 0 |
| ENSG00000275302 | CCL4 | 0 | 0 | 0,318426424 | 0 | 0 | 0 |
| ENSG00000277734 | TRAC | 0 | 0 | 0,184305101 | 0 | 0 | 0 |
| ENSG00000277775 | HIST1H3F | -0,063830715 | 0,253385852 | -0,021812031 | 0 | 0 | 0 |
| ENSG00000278272 | HIST1H3C | 0 | 0,099113231 | 0 | 0 | 0 | 0 |
| ENSG00000278463 | HIST1H2AB | 0 | 0,110638332 | 0 | 0 | 0 | 0 |
| ENSG00000278588 | HIST1H2BI | 0 | 0,146629096 | -0,036035928 | 0,071288536 | 0 | 0 |
| ENSG00000278705 | HIST1H4B | 0 | 0 | -0,062725095 | 0 | 0 | 0 |
| ENSG00000279530 | | 0 | 0 | 0,02168593 | 0 | 0 | 0 |

^aEnsembl gene id and corresponding HGNC symbols for classifier genes ($n=184$), derived from sternal bone marrow B-cell data, are listed along with relative expression values for the respective classifier-specific subtype(s).