# Supplementary Table 1 Primer List

| NO. | Name | Gene ID | Primer Bank ID | Amplicon Size | Sequence（5’-3’） | Length | Tm | Location | Species |
|---|---|---|---|---|---|---|---|---|---|
| 1 | NEU1 | 4758 | 189217412c2 | 111 | F: CTTTGCTGAGGCGAGGAAAA | 21 | 60.9 | 276-296 | Human |
| | | | | | R: TTGACAATGAACGCTGTAGGAG | 22 | 60.3 | 386-365 | |
| 2 | CMAH | 8418 | 3800814a1 | 118 | F: ATGGGCAGCATCGAACAAACA | 21 | 62.9 | 1-21 | Human |
| | | | | | R: AGACGTAGTCTTTGCCAGTGC | 21 | 62.3 | 118-98 | |
| 3 | B3GALNT2 | 148789 | 227498246c1 | 107 | F: GATGTGGTAGTTGGCGTGTTG | 21 | 61.5 | 154-174 | Human |
| | | | | | R: CGTTGACTTAATGTGGGATGCTG | 23 | 61.7 | 260-238 | |
| 4 | ALG2 | 85365 | 91807120c2 | 80 | F: GGCAGACTGCATCTTAGTCAAC | 22 | 60.9 | 507-528 | Human |
| | | | | | R: GGTCTATGTGAGACAGGGACTT | 22 | 60.6 | 586-565 | |
| 5 | FUT8 | 2530 | 332078495c3 | 96 | F: TTCAAGTGGTCGAGCTTCCC | 21 | 61.8 | 857-876 | Human |
| | | | | | R: GTACAAGTCGATCTGCGAGGT | 21 | 61.6 | 952-932 | |
| 6 | ST3GAL2 | 6483 | 151101481c2 | 127 | F: CGTCTGGACCCGAGAGAAC | 19 | 61.4 | 285-303 | Human |
| | | | | | R: GCCAGGCACTATCTGGAACA | 20 | 61.6 | 411-392 | |
| 7 | SLC35A1 | 10559 | 270288772c1 | 201 | F: CAACCACAGCCGTGTGTATCA | 21 | 62.6 | 131-151 | Human |
| | | | | | R: TGCTAAGAGCTAGGAAAGCCAT | 22 | 60.9 | 331-310 | |
| 8 | B3GALT4 | 8705 | 51702476c1 | 220 | F: TGATCGTCTGGACCCTCTTCG | 21 | 63.0 | 50-70 | Human |
| | | | | | R: ATGGCGTTTCTCTGGTTCAGG | 21 | 62.4 | 269-249 | |
| 9 | MGAT2 | 4247 | 62750355c1 | 77 | F: GTGCATAACCGGCCCGAAT | 20 | 62.4 | 370-389 | Human |
| | | | | | R: ACGAGGACGTTGTCAATTCCC | 21 | 62.3 | 446-426 | |
| 10 | NANS | 54187 | 195963408c1 | 75 | F: AACACCCGTGCTTCATCATTG | 21 | 61.2 | 47-67 | Human |
| | | | | | R: GGATCATGCGCTTGGCTAC | 19 | 61.0 | 121-103 | |
| 11 | CMAS | 55907 | 22027483c1 | 144 | F: ACCTGGCAGCCCTAATTCTG | 20 | 61.6 | 131-150 | Human |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | | R: TCGAAACCCATACACTCTGGAA | 22 | 60.8 | 274-253 | |
| 12 | NEU3 | 10825 | 117190518c1 | 140 | F: AAGTGACAACATGCTCCTTCAA<br>R: TCTCCTCGTAGAACGCTTCTC | 22<br>21 | 60.1<br>60.7 | 107-128<br>246-226 | Human |
| 13 | UGGT1 | 56886 | 237649097c1 | 183 | F: GCCTTCCAGCAGATAGCAGC<br>R:GCTTTCAGGATTAGACGAGGGAT | 20<br>23 | 63.0<br>61.5 | 397-416<br>579-557 | Human |
| 14 | UGGT2 | 55757 | 238859592c1 | 249 | F: CCTTCGCAATCTTGGGATCAA<br>R: GCCGGATCAATAAACAGAACCA | 21<br>22 | 60.4<br>60.6 | 1227-1247<br>1475-1454 | Human |
| 15 | GBE1 | 2632 | 189458811c1 | 148 | F: GGAGATCGACCCGTACTTGAA<br>R: ACATCTGTGGACGCCAAATGA | 21<br>21 | 61.0<br>62.0 | 96-116<br>243-223 | Human |
| 16 | GCNT2 | 2651 | 30061504c1 | 171 | F: TGTTCCTGGCTCTATGCCAAA<br>R: TTAGCAAACAGGCTTGGTGAAT | 21<br>22 | 61.4<br>60.4 | 921-941<br>1091-1070 | Human |
| 17 | B3GNT1 | 11041 | 92091577c1 | 208 | F: TCCTACCCCAATAACCTGCTG<br>R: GCTCGTTTTTGTTCATGGGCA | 21<br>21 | 60.9<br>62.0 | 616-636<br>823-803 | Human |
| 18 | B3GAT3 | 26229 | 332164741c1 | 249 | F: AAGGAGTCGTCTACTTTGCTGA<br>R: GGGCATTGGGCTTATCTAACAG | 22<br>22 | 60.8<br>60.8 | 560-581<br>808-787 | Human |
| 19 | B4GALT1 | 2683 | 193211604c1 | 221 | F: GGCGTCACCCTCGTTTACTAC<br>R: GGGCCAGAATCCACGACTG | 19<br>19 | 62.4<br>62.4 | 103-123<br>323-305 | Human |
| 20 | ALG1 | 56052 | 209976995c1 | 127 | F: CCCCGAGTTTTCCAGTACGG | 20<br>20 | 62.2<br>62.0 | 418-399<br>418-399 | Human |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | | R: CAGCAATGCTAGGCAGACCT | | | | |
| 21 | MGAT3 | 4248 | 148539889c1 | 144 | F: ATGAAGATGAGACGCTACAAGC<br>R: GCTGGACACCAGGTTAGGG | 22<br>19 | 61.7<br>61.7 | 1-22<br>144-126 | Human |
| 22 | FUT1 | 2523 | 171906616c3 | 121 | F: GCAGCTTCACGACTGGATGT<br>R: CTCTCTGCGGATCTGTTCCC | 20<br>20 | 61.7<br>61.7 | 432-451<br>552-533 | Human |
| 23 | ST3GAL3 | 6487 | 28373075c1 | 144 | F: GCCTGCTGAATTAGCCACCAA<br>R: GCCCACTTGCGAAAGGAGT | 21<br>19 | 63<br>62.6 | 210-230<br>353-335 | Human |
| 24 | ST3GAL4 | 6484 | 363543344c1 | 79 | F: CTTCCTGCGGCTTGAGGATTA<br>R: CTCACTCCCCTTGGTCCCATA | 21<br>21 | 61.9<br>62.4 | 192-212<br>270-250 | Human |
| 25 | ST3GAL5 | 8869 | 109633043c1 | 235 | F: TCCCTGCAATGGTACACC<br>R: ACTTGGGACGACATTCCTTCT | 19<br>21 | 61.3<br>60.8 | 136-154<br>370-350 | Human |