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| Supplementary Table 4. Statistically significant effect modification of genotypes between diagnostic radiation exposure and risk of thyroid cancer with large tumor size (n=694). |
|   |   |   |   |   |   |   |   |   |   |   |   |
| Chromosome | Gene name | Genotype |   | Non-exposed |   | Exposed |
| Cases | Controls | OR\* (95% CI) | Cases | Controls | OR\* (95% CI) |
| 3 | TOPBP1\_06 | rs17301766 |  |  |  |  |  |  |  |  |
|  |  |  | CC |  | 15 | 40 | 1.00 |  | 132 | 260 | 1.48 (0.73-2.98) |
|  |  |  | TC or TT |  | 11 | 12 | 1.00 |  | 70 | 152 | 0.63 (0.23-1.68) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.041* |
| 3 | TOPBP1\_09 | rs11706586 |  |  |  |  |  |  |  |  |
|  |  |  | CC |  | 15 | 40 | 1.00 |  | 132 | 262 | 1.50 (0.74-3.03) |
|  |  |  | TC or TT |  | 11 | 12 | 1.00 |  | 70 | 151 | 0.61 (0.23-1.66) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.041* |
| 3 | TOPBP1\_10 | rs7349558 |  |  |  |  |  |  |  |  |
|  |  |  | AA |  | 15 | 40 | 1.00 |  | 133 | 257 | 1.52 (0.75-3.06) |
|  |  |  | AC or CC |  | 11 | 12 | 1.00 |  | 69 | 156 | 0.54 (0.20-1.43) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.029* |
| 7 | RPA3\_01 | rs4720751 |  |  |  |  |  |  |  |  |
|  |  |  | TT |  | 15 | 24 | 1.00 |  | 86 | 217 | 0.57 (0.26-1.24) |
|  |  |  | TC or CC |  | 11 | 28 | 1.00 |  | 116 | 196 | 2.33 (1.01-5.35) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.029* |
| 7 | RPA3\_02 | rs17136898 |  |  |  |  |  |  |  |  |
|  |  |  | AA |  | 16 | 41 | 1.00 |  | 149 | 292 | 1.63 (0.82-3.27) |
|  |  |  | AG or GG |  | 10 | 11 | 1.00 |  | 53 | 121 | 0.50 (0.17-1.45) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.049* |
| 7 | HUS1\_03 | rs3176595 |  |  |  |  |  |  |  |  |
|  |  |  | GG |  | 25 | 36 | 1.00 |  | 165 | 328 | 0.78 (0.42-1.43) |
|  |  |  | AG or AA |  | 1 | 16 | 1.00 |  | 37 | 84 | 16.76 (1.79-157.15) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.024* |
| 11 | ALKBH3\_03 | rs11037690 |  |  |  |  |  |  |  |  |
|  |  |  | GG |  | 10 | 32 | 1.00 |  | 105 | 193 | 2.20 (0.92-5.27) |
|  |  |  | AG or AA |  | 16 | 20 | 1.00 |  | 96 | 220 | 0.63 (0.29-1.37) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.025* |
| 11 | ALKBH3\_14 | rs10768994 |  |  |  |  |  |  |  |  |
|  |  |  | TT |  | 6 | 26 | 1.00 |  | 80 | 131 | 2.77 (0.97-7.93) |
|  |  |  | TC or CC |  | 20 | 26 | 1.00 |  | 123 | 282 | 0.66 (0.33-1.31) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.0046* |
| 11 | ALKBH3\_15 | rs10768995 |  |  |  |  |  |  |  |  |
|  |  |  | GG |  | 15 | 19 | 1.00 |  | 61 | 158 | 0.55 (0.23-1.34) |
|  |  |  | GC or CC |  | 11 | 33 | 1.00 |  | 141 | 255 | 1.88 (0.85-4.13) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.0083* |
| 11 | ALKBH3\_19 | rs868784 |  |  |  |  |  |  |  |  |
|  |  |  | CC |  | 8 | 29 | 1.00 |  | 93 | 155 | 2.49 (0.95-6.54) |
|  |  |  | TC or TT |  | 18 | 23 | 1.00 |  | 109 | 258 | 0.67 (0.32-1.39) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.011* |
| 11 | ALKBH3\_20 | rs3893853 |  |  |  |  |  |  |  |  |
|  |  |  | CC |  | 14 | 38 | 1.00 |  | 136 | 247 | 1.67 (0.79-3.52) |
|  |  |  | TC or TT |  | 12 | 14 | 1.00 |  | 67 | 166 | 0.57 (0.23-1.42) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.018* |
| 11 | ALKBH3\_21 | rs4755217 |  |  |  |  |  |  |  |  |
|  |  |  | TT |  | 6 | 26 | 1.00 |  | 80 | 133 | 2.79 (0.98-7.98) |
|  |  |  | TC or CC |  | 20 | 25 | 1.00 |  | 119 | 275 | 0.66 (0.33-1.31) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.0060* |
| 11 | ALKBH3\_22 | rs1973717 |  |  |  |  |  |  |  |  |
|  |  |  | CC |  | 15 | 20 | 1.00 |  | 67 | 165 | 0.65 (0.28-1.52) |
|  |  |  | TC or TT |  | 11 | 32 | 1.00 |  | 135 | 247 | 1.78 (0.80-3.94) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.020* |
| 12 | UBE2N\_01 | rs7968453 |  |  |  |  |  |  |  |  |
|  |  |  | TT |  | 13 | 15 | 1.00 |  | 39 | 96 | 0.38 (0.14-1.00) |
|  |  |  | TC or CC |  | 13 | 37 | 1.00 |  | 162 | 317 | 1.94 (0.94-4.04) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.035* |
| 19 | LIG1\_01 | rs251693 |  |  |  |  |  |  |  |  |
|  |  |  | TT |  | 14 | 18 | 1.00 |  | 54 | 138 | 0.43 (0.18-1.03) |
|  |  |  | TC or CC |  | 12 | 34 | 1.00 |  | 149 | 275 | 2.20 (1.02-4.73) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.0056* |
| 19 | LIG1\_02 | rs2288878 |  |  |  |  |  |  |  |  |
|  |  |  | GG |  | 14 | 18 | 1.00 |  | 51 | 137 | 0.42 (0.17-1.02) |
|  |  |  | AG or AA |  | 12 | 34 | 1.00 |  | 151 | 276 | 2.19 (1.02-4.70) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.0040* |
| 19 | LIG1\_03 | rs274897 |  |  |  |  |  |  |  |  |
|  |  |  | CC |  | 14 | 18 | 1.00 |  | 51 | 138 | 0.40 (0.16-0.98) |
|  |  |  | GC or GG |  | 12 | 34 | 1.00 |  | 151 | 274 | 2.26 (1.05-4.87) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.0038* |
| 19 | LIG1\_04 | rs2386523 |  |  |  |  |  |  |  |  |
|  |  |  | CC |  | 12 | 15 | 1.00 |  | 42 | 103 | 0.43 (0.16-1.14) |
|  |  |  | TC or TT |  | 14 | 37 | 1.00 |  | 161 | 309 | 1.92 (0.93-3.96) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.0073* |
| 19 | LIG1\_05 | rs2163619 |  |  |  |  |  |  |  |  |
|  |  |  | GG |  | 11 | 13 | 1.00 |  | 33 | 95 | 0.31 (0.11-0.89) |
|  |  |  | AG or AA |  | 15 | 39 | 1.00 |  | 169 | 316 | 1.96 (0.97-3.95) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.0013* |
| 19 | LIG1\_07 | rs274873 |  |  |  |  |  |  |  |  |
|  |  |  | AA |  | 11 | 16 | 1.00 |  | 45 | 111 | 0.36 (0.13-1.00) |
|  |  |  | AG or GG |  | 15 | 36 | 1.00 |  | 158 | 302 | 1.83 (0.90-3.69) |
|  |  |  | *P for interaction* |  |  |  |  |  |  |  | *0.022* |
| 19 | LIG1\_10 | rs10421339 |  |  |  |  |  |  |  |  |
|  |  |  | GG |  | 12 | 15 | 1.00 |  | 45 | 113 | 0.29 (0.10-0.81) |
|  |  |  | GC or CC |  | 14 | 37 | 1.00 |  | 157 | 300 | 1.96 (0.96-4.00) |
|   |   |   | *P for interaction* |   |   |   |   |   |   |   | *0.0064* |
| \*Adjusted for age (continuous), gender, race, and BMI. |