**Table S1. Interaction network for CagY (Cag7) protein calculated by STRING server**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| #node1 | node2 | node1\_string\_id | node2\_string\_id | neighborhood\_on\_chromosome | gene\_fusion | phylogenetic\_cooccurrence | homology | coexpression | experimentally\_determined\_interaction | database\_annotated | automated\_textmining | combined\_score |
| HP\_0017 | HP\_0039 | 85962.HP\_0017 | 85962.HP\_0039 | 0.043 | 0 | 0 | 0 | 0.449 | 0 | 0.141 | 0 | 0.507 |
| HP\_0017 | HP\_0530 | 85962.HP\_0017 | 85962.HP\_0530 | 0 | 0 | 0 | 0 | 0.405 | 0.318 | 0 | 0 | 0.577 |
| HP\_0017 | HP\_0528 | 85962.HP\_0017 | 85962.HP\_0528 | 0 | 0 | 0.325 | 0 | 0.449 | 0 | 0.141 | 0 | 0.652 |
| HP\_0017 | HP\_0524 | 85962.HP\_0017 | 85962.HP\_0524 | 0 | 0 | 0.775 | 0 | 0.053 | 0 | 0 | 0.041 | 0.777 |
| HP\_0017 | HP\_0525 | 85962.HP\_0017 | 85962.HP\_0525 | 0 | 0 | 0.724 | 0 | 0.346 | 0 | 0 | 0.041 | 0.811 |
| HP\_0017 | HP\_0040 | 85962.HP\_0017 | 85962.HP\_0040 | 0.043 | 0 | 0.774 | 0 | 0.449 | 0 | 0.141 | 0 | 0.883 |
| HP\_0017 | HP\_0527 | 85962.HP\_0017 | 85962.HP\_0527 | 0.084 | 0 | 0.775 | 0 | 0.597 | 0 | 0.167 | 0.092 | 0.925 |
| HP\_0039 | HP\_0530 | 85962.HP\_0039 | 85962.HP\_0530 | 0 | 0 | 0 | 0 | 0.472 | 0 | 0 | 0 | 0.472 |
| HP\_0039 | HP\_0525 | 85962.HP\_0039 | 85962.HP\_0525 | 0.042 | 0 | 0 | 0 | 0.476 | 0 | 0 | 0.045 | 0.478 |
| HP\_0039 | HP\_0459 | 85962.HP\_0039 | 85962.HP\_0459 | 0.043 | 0 | 0 | 0 | 0.449 | 0 | 0.141 | 0 | 0.507 |
| HP\_0039 | cagE | 85962.HP\_0039 | 85962.HP\_0544 | 0.043 | 0 | 0 | 0 | 0.449 | 0 | 0.141 | 0 | 0.507 |
| HP\_0039 | HP\_0040 | 85962.HP\_0039 | 85962.HP\_0040 | 0.773 | 0.862 | 0 | 0 | 0 | 0 | 0 | 0 | 0.967 |
| HP\_0039 | HP\_0527 | 85962.HP\_0039 | 85962.HP\_0527 | 0.063 | 0 | 0 | 0 | 0.642 | 0.895 | 0.182 | 0.096 | 0.969 |
| HP\_0040 | HP\_0530 | 85962.HP\_0040 | 85962.HP\_0530 | 0 | 0 | 0 | 0 | 0.472 | 0 | 0 | 0 | 0.472 |
| HP\_0040 | HP\_0525 | 85962.HP\_0040 | 85962.HP\_0525 | 0.042 | 0 | 0.518 | 0 | 0.476 | 0 | 0 | 0.045 | 0.738 |
| HP\_0040 | HP\_0524 | 85962.HP\_0040 | 85962.HP\_0524 | 0.047 | 0 | 0.768 | 0 | 0 | 0 | 0 | 0.045 | 0.77 |
| HP\_0040 | cagE | 85962.HP\_0040 | 85962.HP\_0544 | 0.043 | 0 | 0.765 | 0 | 0.449 | 0 | 0.141 | 0 | 0.879 |
| HP\_0040 | HP\_0459 | 85962.HP\_0040 | 85962.HP\_0459 | 0.043 | 0 | 0.775 | 0 | 0.449 | 0 | 0.141 | 0 | 0.884 |
| HP\_0040 | HP\_0527 | 85962.HP\_0040 | 85962.HP\_0527 | 0.063 | 0 | 0.761 | 0 | 0.642 | 0.895 | 0.182 | 0.096 | 0.992 |
| HP\_0459 | HP\_0530 | 85962.HP\_0459 | 85962.HP\_0530 | 0 | 0 | 0 | 0 | 0.405 | 0.318 | 0 | 0 | 0.576 |
| HP\_0459 | HP\_0528 | 85962.HP\_0459 | 85962.HP\_0528 | 0 | 0 | 0.362 | 0 | 0.449 | 0 | 0.141 | 0 | 0.671 |
| HP\_0459 | HP\_0524 | 85962.HP\_0459 | 85962.HP\_0524 | 0 | 0 | 0.775 | 0 | 0.053 | 0 | 0 | 0.041 | 0.777 |
| HP\_0459 | HP\_0525 | 85962.HP\_0459 | 85962.HP\_0525 | 0 | 0.001 | 0.728 | 0 | 0.346 | 0 | 0 | 0.041 | 0.814 |
| HP\_0459 | HP\_0527 | 85962.HP\_0459 | 85962.HP\_0527 | 0.084 | 0 | 0.775 | 0 | 0.596 | 0 | 0.167 | 0.276 | 0.94 |
| HP\_0524 | cagT | 85962.HP\_0524 | 85962.HP\_0532 | 0.352 | 0 | 0 | 0 | 0.046 | 0 | 0 | 0.563 | 0.706 |
| HP\_0524 | HP\_0530 | 85962.HP\_0524 | 85962.HP\_0530 | 0.387 | 0 | 0 | 0 | 0 | 0 | 0 | 0.586 | 0.735 |
| HP\_0524 | cagE | 85962.HP\_0524 | 85962.HP\_0544 | 0 | 0.058 | 0.775 | 0 | 0.053 | 0 | 0 | 0.508 | 0.888 |
| HP\_0524 | HP\_0528 | 85962.HP\_0524 | 85962.HP\_0528 | 0.568 | 0 | 0.388 | 0 | 0 | 0 | 0 | 0.636 | 0.895 |
| HP\_0524 | HP\_0525 | 85962.HP\_0524 | 85962.HP\_0525 | 0.774 | 0.161 | 0.727 | 0 | 0 | 0 | 0 | 0.541 | 0.973 |
| HP\_0524 | HP\_0527 | 85962.HP\_0524 | 85962.HP\_0527 | 0.604 | 0 | 0.775 | 0 | 0 | 0.282 | 0 | 0.631 | 0.973 |
| HP\_0525 | cagT | 85962.HP\_0525 | 85962.HP\_0532 | 0.216 | 0 | 0 | 0 | 0 | 0 | 0 | 0.507 | 0.597 |
| HP\_0525 | HP\_0530 | 85962.HP\_0525 | 85962.HP\_0530 | 0.387 | 0 | 0 | 0 | 0.363 | 0 | 0 | 0.611 | 0.835 |
| HP\_0525 | HP\_0528 | 85962.HP\_0525 | 85962.HP\_0528 | 0.472 | 0 | 0.229 | 0 | 0.476 | 0 | 0 | 0.639 | 0.913 |
| HP\_0525 | cagE | 85962.HP\_0525 | 85962.HP\_0544 | 0 | 0.222 | 0.751 | 0 | 0.346 | 0 | 0 | 0.461 | 0.922 |
| HP\_0525 | HP\_0527 | 85962.HP\_0525 | 85962.HP\_0527 | 0.505 | 0 | 0.731 | 0 | 0.495 | 0 | 0 | 0.625 | 0.971 |
| HP\_0527 | HP\_0530 | 85962.HP\_0527 | 85962.HP\_0530 | 0.594 | 0 | 0 | 0 | 0.609 | 0 | 0 | 0.61 | 0.933 |
| HP\_0527 | cagE | 85962.HP\_0527 | 85962.HP\_0544 | 0.084 | 0 | 0.775 | 0 | 0.596 | 0 | 0.167 | 0.558 | 0.963 |
| HP\_0527 | cagT | 85962.HP\_0527 | 85962.HP\_0532 | 0.289 | 0 | 0 | 0 | 0.044 | 0.8 | 0 | 0.767 | 0.964 |
| HP\_0527 | HP\_0528 | 85962.HP\_0527 | 85962.HP\_0528 | 0.751 | 0 | 0.671 | 0 | 0.642 | 0.978 | 0.182 | 0.814 | 0.999 |
| HP\_0528 | cagE | 85962.HP\_0528 | 85962.HP\_0544 | 0 | 0 | 0.502 | 0 | 0.449 | 0 | 0.141 | 0.534 | 0.875 |
| HP\_0528 | HP\_0530 | 85962.HP\_0528 | 85962.HP\_0530 | 0.613 | 0 | 0 | 0 | 0.472 | 0 | 0 | 0.591 | 0.909 |
| HP\_0528 | cagT | 85962.HP\_0528 | 85962.HP\_0532 | 0.447 | 0 | 0 | 0 | 0 | 0.8 | 0 | 0.638 | 0.956 |
| HP\_0530 | cagT | 85962.HP\_0530 | 85962.HP\_0532 | 0.285 | 0 | 0 | 0 | 0 | 0 | 0 | 0.526 | 0.646 |
| HP\_0530 | cagE | 85962.HP\_0530 | 85962.HP\_0544 | 0 | 0 | 0 | 0 | 0.405 | 0.318 | 0 | 0.439 | 0.752 |
| cagE | cagT | 85962.HP\_0544 | 85962.HP\_0532 | 0 | 0 | 0 | 0 | 0.192 | 0 | 0 | 0.726 | 0.769 |