Supplementary Table S4 | Detail information of 15 genes in the risk signature.

|  |  |  |
| --- | --- | --- |
| Gene symbol | Full name | Function of the encoded protein |
| *PPIA* | Peptidylprolyl isomerase A | CypA is incorporated into the HIV type 1 (HIV-1) virion and promotes HIV-1 infectivity by facilitating virus uncoating.(1) |
| *ALG3* | Alpha‐1,3‐mannosyltransferase | ALG3 catalyzes the first Dol-P-Man-dependent mannosylation step, which is critical for lipid-linked oligosaccharides and protein N-linked glycosylation, at the luminal side of the ER.(2) |
| *CTSA* | Cathepsin A | CTSA is a serine protease cathepsin member of the cathepsin lysosomal protease family, which with a role in protecting β-galactosidase and neuraminidase-1 from intra-lysosomal proteolysis.(3) |
| *CAD* | Carbamoyl-phosphate synthetase 2, aspartate transcarbamylase and dihydroorotase | CAD is a single large polypeptide with three highly conserved enzymatic activities: carbamoyl phosphate synthase (CPS2), aspartate transcarbamylase (ATCase), Dihydroorotase (DHOase); these are the first three enzymes of de novo pyrimidine, and the name of CAD is the abbreviation of these enzymes.(4) |
| *B3GAT3* | Beta-1,3-glucuronyltransferase 3 | GlcAT-I completes the last step of transfer of a glucuronic acid (GlcA) from the donor substrate uridine diphosphate-glucuronic acid (UDP-GlcUA) to the linkage region Gal-β-(1-3)-Gal-β-(1-4)-Xyl.(5) |
| *TRAPPC3* | Trafficking protein particle complex subunit 3 | TRAPPC3 is important for membrane tethering events in the formation of the pre-Golgi compartment or vesicular tubular clusters (VTCs).(6) |
| *HSP90AA1* | Heat shock protein 90 alpha family class A member 1 | HSP90 is a group of inducible ATP‐dependent molecular chaperones in response to cellular stress. Four isoforms of HSP90 have been identified in mammalian cells, including Hsp90α (encoded by HSP90AA1).(7) |
| *SRD5A3* | Steroid 5 alpha-reductase 3 | SRD5A3 codes for polyprenol reductase which converts polyprenol to dolichol. This is a major pathway for dolichol biosynthesis for N-glycosylation, O-mannosylation, C-mannosylation, and GPI anchor synthesis.(8) |
| *BAG2* | Bcl-2 Associated Athanogene 2 | BAG2, as an anti-apoptotic gene, can promote cell proliferation, inhibit cell apoptosis and arrest the cell cycle, and a raised BAG2 expression is found in a number of tumor types, such as thyroid cancer and breast cancer.(9) |
| *DNAJC1* | DnaJ heat shock protein family (Hsp40) member C1 | DNAJC1 encodes a member of the heat shock family proteins (hsp), which are well characterized in stress and immune responses, and its transcripts and proteins are highly expressed in thyroid samples.(10) |
| *ADAMTS5* | A disintegrin and metalloproteinase with thrombospondin motifs 5 | ADAMTSs are a family of zinc metalloendopeptidases that participate in diverse biological processes, such as procollagen processing, ECM remodeling, inflammation, cell migration, and vascular biological processes. In particular, ADAMTS5 overexpression is a key risk factor in degenerative joint diseases and intervertebral disc degeneration.(11) |
| *PLOD2* | Procollagen-Lysine,2-Oxoglutarate 5-Dioxygenase 2 | The accumulation of stabilized collagen is enhanced by different covalent collagen cross-links, lysyl hydroxylases 2 (encoded by the PLOD2 gene) is the key enzyme mediating the formation of the stabilized collagen cross-link. Interestingly, PLOD2 is overexpressed in different cancers and closely related to a poor prognosis.(12) |
| *DYNC1LI1* | Dynein cytoplasmic 1 light intermediate chain 1 | Dync1li1, a subunit of cytoplasmic dynein 1, is reported to play important roles in intracellular retrograde transport in many tissues.(13) |
| *ST6GALNAC4* | ST6 (alpha-N-acetyl-neuraminyl-2,3-beta-galactosyl-1,3)-N-acetylgalactosaminide alpha-2,6-sialyltransferase 4 | ST6GALNAC4 catalyzes the addition of sialic acid (Neu5Ac) to the 69 carbon of N-acetylgalactosamine (GalNAc) of the acceptor motif Neu5Ac-alpha-2,3-Gal-beta-1,3-GalNAc on glycoproteins and glycolipids, resulting in a terminal, diallylated glycan structures.(14) |
| *CHP1* | Calcineurin B homologous protein 1 | CHP1 binds and activates GPAT4, which catalyzes the initial rate-limiting step in glycerolipid synthesis.(15) |

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