|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Gene symbol | Protein name | Description | Protein alias | Reference(s) |
| (mTORC1) | Mechanistic target of rapamycin complex 1 | Protein complex involved in proteostasis | Mammalian target of rapamycin complex 1 | 94, 105, 110, 111, 112, 113 |
| ADRM1 | Adhesion-regulating molecule 1 | Proteasome subunit, ubiquitin receptor | RPN13, GP110, ARM1 | 77 |
| AGPAT2 | 1-acylglycerol-3-phosphate O-acyltransferase 2 | One of the first key enzymes of lipogenesis | Acylglycerin-3-phosphate-O-acyltransferase, AGPAT, BSCL, BSCL1, LPAAB, 1-AGPAT2, LPAAT-beta | 3 |
| AMFR | E3 ubiquitin-protein ligase AMFR | E3 ubiquitin-protein ligase involved in ERAD and UPS | AMF receptor, RING finger protein 45, gp78 | 80, 81 |
| ATF4 | Cyclic AMP-dependent transcription factor ATF-4 | Master transcription factor during the integrated stress response | Activating transcription factor-4, CREB-2 | 29, 30 |
| ATF6 | Cyclic AMP-dependent transcription factor ATF-6 alpha | Processed form activates transcription of genes involved in the unfolded protein response during ER stress | Activating transcription factor-6 | 57-62, 176 |
| ATG7 | Autophagy-related-7 protein | Initiates autophagosome formation | GSA7, APG7L, APG7-like | 114, 115, 116 |
| ATP2A3 | Sarco/endoplasmic-reticulum calcium ATPase | Active transport channel that transports calcium into the SR/ER | SERCA, calcium pump | 125, 133, 134 |
| CALCOCO1 | Calcium binding and coiled-coil domain 1 | ER-phagy receptor | Cocoa, PP13275, calphoglin | 121 |
| CALR | Calreticulin | ER chaperone involved in protein quality control and calcium metabolism | RO, CRT, SSA, cC1qR, HEL-S-99n | 128 |
| CAMK2B | Calcium/calmodulin-dependent protein kinase II beta | Kinase involved in calcium signaling | CAM2, CAMK2, CAMKB, MRD54, CaMKII beta | 143 |
| CANX | Calnexin | ER-associated protein that facilitates protein folding and is associated with calcium signaling | CNX, P90, IP90 | 128 |
| CCL2 | C-C motif chemokine ligand 2 | Chemokine involved in inflammation | HC11, MCAF, MCP1, SCYA2, GDCF-2, SMC-CF, HSMCR30 | 207 |
| CDK5RAP3 | CDK5 regulatory subunit associated protein 3 | Cytosolic protein involved in transcriptional regulation of the ISR | C53, IC53, LZAP, HSP-27 | 120 |
| cGAS | Cyclic GMP-AMP synthase | Catalysator of formation of cyclic dinucleotides | MB21D1, h-cGAS, C6orf150 | 208, 209 |
| CHUK | Inhibitor of nuclear factor kappa-B kinase subunit alpha | Cytosolic stress kinase involved in inflammation pathways | IKKA, TCF16 | 188 |
| CREB3L3 | Cyclic AMP-responsive element-binding protein 3-like protein 3 | Transcription factor binding cAMP response elements and box-B elements | CREBH, CREB-H, HYST1481 | 60, 176 |
| DDI2 | Protein DDI1 homolog 2 | Protease that mediates the cleavage of NFE2L1 | - | 84 |
| DDIT3 | DNA damage-inducible transcript 3 | Transcription factor mediating ER stress | C/EBP, CHOP, CHOP10 | 63,64 |
| DGAT | Diacylglycerol O-acyltransferase | Family of proteins involved in TAG synthesis, separate roles for DGAT1 and DGAT2 | - | 10, 172, 173 |
| DNM1L | Dynamin-1-like protein | Mediates fission processes in mitochondrial and peroxisomal division | DNM1P, DVLP, DLP, DRP1 | 13 |
| EIF2AK1 | Eukaryotic translation initiation factor 2 alpha kinase 1 | Inhibits protein synthesis in response to ER stress | HCR, HRI, hHRI, LEMSPAD | 39, 40 |
| EIF2AK2 | Interferon-induced, double-stranded RNA-activated protein kinase | Kinase that phosphorylates EIF2S1, halting protein synthesis | EIF2AK2, PKR, PRKR | 36, 37, 38 |
| EIF2AK3 | Eukaryotic translation initiation factor 2 alpha kinase 3 | ER stress sensor that initiates UPR; also known as PERK | PERK, PEK, WRS | 29, 31 - 34, 60, 201 |
| EIF2AK4 | eIF-2-alpha kinase general control nonderepressible 2 | Phosphorylates EIF2S1, halts protein synthesis | GCN2, KIAA1338 | 39, 40, 41, 42, 43 |
| EIF2S1 | Eukaryotic translation initiation factor 2-alpha | Role in protein synthesis, phosphorylation of its protein complex halts protein translation | EIF2α | 27, 28, 29, 30 |
| EIF2S2 | Eukaryotic translation initiation factor 2 subunit 2 | Role in protein synthesis, phosphorylation of its protein complex halts protein translation | eIF-2-beta, EIF2B | 27, 28 |
| ERLEC1 | Endoplasmic reticulum lectin 1 | Lectin that recognizes unfolded proteins in the ER lumen | Erlectin, XTP3-B, XTP3TPB, C2orf30 | 69 |
| ERN1 | Serine/threonine-protein kinase/endoribonuclease IRE1 | Sensor of ER stress that initiates UPR | IRE1, IRE1P, IRE1a, hIRE1p | 49-54 |
| FBXO32 | F-box only protein 32 | E3 ubiquitin-protein ligase complex which mediates the ubiquitination and subsequent proteasomal degradation | Fbx32, MAFbx | 78 |
| FITM2 | Fat storage-inducing transmembrane protein 2 | Fatty acid-CoA diphosphatase involved in lipid droplet biogenesis and ER structure | FIT2, C20orf142 | 174 |
| FOXO1 | Forkhead box protein O 1 | Transcription factor involved in insulin signaling and regulating oxidative stress | FKHR, FOXO1A | 47 |
| G6PC1 | Glucose-6-phosphatase catalytic subunit | Hydrolyzes glucose-6-phosphate to glucose in the ER | G6PT, G6PC, G6Pase, GSD1, GSD1a | 60 |
| HMGCR | 3-hydroxy-3-methylglutaryl-coenzyme A reductase | Catalysator in cholesterol synthesis | HMG-CoA reductase | 3 |
| HSPA5 | Endoplasmic reticulum chaperone BiP | ER chaperone that plays a key role in protein folding and quality control | BiP, GRP-78, HSP70 family protein 5 | 8, 69, 128, 138 |
| IL | Interleukin | Family of inflammatory cytokines | Interleukin-specific | 183 |
| IRF3 | Interferon regulatory factor 3 | Regulator of immune response | - | 208 |
| IRS1 | Insulin receptor substrate 1 | Activator of cellular processes after phosphorylation by insulin receptor | - | 185 |
| ITPR | Inositol triphosphate receptor | Family of receptors regulating calcium homeostasis | IP3R, ACV | 2, 137 |
| LDLR | Low-density lipoprotein receptor | Binds LDL and transports LDL into cells | - | 82 |
| MAPK14 | mitogen-activated protein kinase 14 | Promotes gluconeogenesis through phosphorylation of the cyclic-AMP-responsive element-binding protein | RK, p38MAPK, CSBP, EXIP, Mxi2, CSBP1, CSBP2, CSPB1, PRKM14, PRKM15, SAPK2A, p38ALPHA | 46 |
| MAPK8 | Mitogen-activated protein kinase 8 | Kinase involved in various cell stress responses | JNK, JNK1, PRKM8, SAPk1, SAPK1C | 185, 186, 189-195 |
| MBTPS1 | Membrane-bound transcription factor site-1 protease | Cleaves ATF6 to create the active transcription factor | S1P, PCSK8, SEDKF, SKI-1 | 59 |
| MBTPS2 | Membrane-bound transcription factor site-2 protease | Cleaves ATF6 to create the active transcription factor | S2P, IFAP, KFSD, OI19, KFSDX, OLMSX, BRESEK | 59 |
| MFN1/2 | Mitofusin 1/2 | Mitochondrial membrane proteins playing a role in mitochondrial fusion | MFN1 aliases: hfzo1, hfzo2MFN2 aliases: HSG, MARF, CMT2A | 13-18 |
| MLXIPL | MLX interacting protein-like | Transcription factor that plays a role in TAG synthesis | Carbohydrate-responsive element-binding protein, ChREBP, MIO, MLX | 171 |
| MYLIP | Inducible degrader of LDL receptor protein | E3 ubiquitin ligase and sterol-dependent inhibitor of cholesterol metabolism | IDOL, BZF1 | 82 |
| NFE2L1 | Nuclear factor erythroid 2 related factor-1 | Transcription factor regulating proteasome production | NRF1, TCF11, LCR-F1 | 3, 90, 93 |
| NGLY1 | Peptide-N(4)-(N-acetyl-beta-glucosaminyl) asparagine amidase | Specifically deglycosylates denatured forms of glycoproteins, misfolded protein sensor | PNGase, PNG1 | 84 |
| NPC1 | NPC intracellular cholesterol transporter 1 | Cholesterol transporter | Niemann-Pick C1 protein | 9 |
| OGT | O-linked N-acetylglucosamine (GlcNAc) transferase | Glycosyltransferase | OGT1, HRNT1, O-GLCNAC | 180 - 182 |
| ORAI1 | Calcium release-activated calcium channel protein 1 | Involved in ER-calcium uptake through SOCE | CRACM1, TMEM142A | 135, 136 |
| OS9 | OS9 endoplasmic reticulum lectin | Lectin involved in ERAD | Protein OS-9, ERLEC2 | 69 |
| Pik3r1 | phosphoinositide-3-kinase regulatory subunit 1 | Nuclear protein involved in insulin metabolism | PI, p50, p55, p85, PI3K, p50alpha, p55alpha, p85alpha | 48 |
| PSMD2 | Proteasome 26S subunit, non-ATPase 2 | Proteasome subunit | RPN1, P97, TRAP2, S2 | 77 |
| PSMD4 | Proteasome 26S subunit, non-ATPase 4 | Proteasome subunit | RPN10, AF, S5A, MCB1 | 77 |
| PSME3 | Proteasome activator subunit 3 | Proteasome subunit regulating proteasome activation | PA28, PA28g, HEL-S-283, REG-GAMMA, Ki | 91 |
| RETREG1 | Reticulophagy regulator 1 | ER-phagy receptor | JK1, FAM134B | 117 |
| RYR1/2 | Ryanodine receptor 1/2 | Component of calcium channel in skeletal muscle (1) or cardiac muscle (2) | RYR1: CCO, MHS, RYDR, RYR-1RYR2: RyR, ARVC2, ARVD2, RYR-2, VTSIP | 137, 141 |
| SCAP | SREBP cleavage-activating protein | Part of the SCAP-SREBP complex that regulates cholesterol metabolism | KIAA0199 | 160, 161, 162, 170 |
| SDF2L1 | Stromal cell-derived factor 2-like protein 1 | Protein with a role in ERAD substrate recognition | PWP1-interacting protein 8 | 95, 96 |
| SEL1L | Protein sel-1 homolog 1 | Involved in ERAD by assisting in shuttling proteins out of the ER | Sel-1L, TSA305 | 68, 70 |
| SOAT1 | Sterol O-acyltransferase 1 | Catalyzes the formation of fatty acid cholesterol esters | Acyl-coenzyme A:cholesterol transferase, ACAT, ACAT1 | 159-164, 202-204 |
| SREBF1 | Sterol regulatory element-binding protein | ER transcription factor that plays a role in cholesterol biosynthesis | SREBP-1, BHLHD1 | 94, 111, 112, 113 |
| STAT3 | Signal transducer and activator of transcription 3 | Transcription factor that mediates IL and growth factors | APRF, HIES, ADMIO, ADMIO1 | 200 |
| STIM | Stromal interaction molecule | Family of proteins that play a role in SOCE mediated calcium uptake | - | 135, 136 |
| STING | Stimulator of interferon gene protein | Sensor that plays a role in innate immune signaling | hSTING, ERIS, MITA, TMEM173 | 208, 209 |
| SYVN1 | Synoviolin 1 | E3 ubiquitin ligase, mammalian homolog of Hrd1, plays a role in ERAD and UPS | DER3, HRD1 | 68, 70, 79, 86, 89, 97 |
| TBK1 | TANK-binding kinase 1 | Protein kinase that is part of the NFkB signaling pathway, inhibitors of TBK1 improve obesity-related metabolic dysfunctions in mice | NAK, T2K, IIAE8, FTDALS4 | 198,199 |
| TNF | Tumor necrosis factor alpha | Cytokine involved in proliferation and cell death | TNFA, TNF-alpha, DIF, TNFSF2, TNLG1F, cachectin | 185, 191 |
| TRIM63 | E3 ubiquitin-protein ligase TRIM63 | E3 ubiquitin ligase | IRF, SMRZ, MURF1, MURF2, RNF28 | 78 |
| ULK1 | Unc-51-like autophagy activating kinase 1 | Initiator of autophagy by formation of the phagophore | ATG1, ATG1A, UNC51, hATG1, Unc51.1 | 105, 106 |
| VCP | Transitional endoplasmic reticulum ATPase | Translocates substrates out of the ER membrane and breaks up their tertiary structures | ATPase valosin-containing protein, p97 | 71, 85 |
| XBP1 | X-box binding protein 1 | Role in protein quality control; the mRNA of XBP1 controls chaperone gene expression | XBP2, TREB5, XBP-1, TREB-5 | 46, 49-56 |

**Table S1.** Curated table of proteins implicated in ER stress in the context of metabolic disorders. Proteins are listed with their gene symbol, a short functional description, protein and gene aliases, and the references underscoring their role in ER stress.