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REFERENCES

AKIYAMA, Y., KAMITANI, S., KUSUKAWA, N. & ITO, K. (1992) *In vitro* catalysis of oxidative folding of disulfide-bonded proteins by the *Escherichia coli dsbA* (*ppfA*) gene product. *J Biol Chem.* **267**: 31: 22440-22445.

ALBANESE, V., YAM, A. Y., BAUGHMAN, J., PARNOT, C. & FRYDMAN, J. (2006) *Systems analyses reveal two chaperone networks with distinct functions in eukaryotic cells.* *Cell.* **124**: 1: 75-88.

ALLISON, P. R. & JOHNSTONE, A. S. (1953) *The oesophagus lined with gastric mucous membrane.* *Thorax.* **8**: 2: 87-101.

ANDERSSON, H. & GAROFF, H. (2003) *Lectin-mediated retention of p62 facilitates p62-E1 heterodimerization in endoplasmic reticulum of Semliki Forest virus-infected cells.* *J Virol.* **77**: 12: 6676-6682.

ANELLI, T., ALESSIO, M., BACHI, A., BERGAMELLI, L., BERTOLI, G., CAMERINI, S., MEZGHRANI, A., RUFFATO, E., SIMMEN, T. & SITIA, R. (2003) *Thiol-mediated protein retention in the endoplasmic reticulum: the role of ERp44.* *Embo J.* **22**: 19: 5015-5022.

ANELLI, T., ALESSIO, M., MEZGHRANI, A., SIMMEN, T., TALAMO, F., BACHI, A. & SITIA, R. (2002) *ERp44, a novel endoplasmic reticulum folding assistant of the thioredoxin family.* *Embo J.* **21**: 4: 835-844.

ANELLI, T., BERGAMELLI, L., MARGITTAI, E., RIMESSI, A., FAGIOLI, C., MALGAROLI, A., PINTON, P., RIPAMONTI, M., RIZZUTO, R. & SITIA, R. (2011) *Ero1alpha Regulates Ca²⁺ Fluxes at the Endoplasmic Reticulum-Mitochondria Interface (MAM).* *Antioxid Redox Signal.* **16**: 10: 1077-1087.

ANELLI, T. & SITIA, R. (2008) *Protein quality control in the early secretory pathway.* *Embo J.* **27**: 2: 315-327.

APPENZELLER-HERZOG, C. & ELLGAARD, L. (2008) *The human PDI family: versatility packed into a single fold.* *Biochim Biophys Acta.* **1783**: 4: 535-548.

APPENZELLER-HERZOG, C., RIEMER, J., CHRISTENSEN, B., SORENSEN, E. S. & ELLGAARD, L. (2008) *A novel disulphide switch mechanism in Ero1alpha balances ER oxidation in human cells.* *Embo J.* **27**: 22: 2977-2987.

- APPENZELLER-HERZOG, C., RIEMER, J., ZITO, E., CHIN, K. T., RON, D., SPIESS, M. & ELLGAARD, L. (2010) *Disulphide production by Ero1alpha-PDI relay is rapid and effectively regulated*. *Embo J.* **29**: 19: 3318-3329.
- APWEILER, R., HERMJAKOB, H. & SHARON, N. (1999) *On the frequency of protein glycosylation, as deduced from analysis of the SWISS-PROT database*. *Biochim Biophys Acta.* **1473**: 1: 4-8.
- AROLAS, J. L., AVILES, F. X., CHANG, J. Y. & VENTURA, S. (2006) *Folding of small disulfide-rich proteins: clarifying the puzzle*. *Trends Biochem Sci.* **31**: 5: 292-301.
- ATHERFOLD, P. A. & JANKOWSKI, J. A. (2006) *Molecular biology of Barrett's cancer*. *Best Pract Res Clin Gastroenterol.* **20**: 5: 813-827.
- BADER, M., MUSE, W., BALLOU, D. P., GASSNER, C. & BARDWELL, J. C. (1999) *Oxidative protein folding is driven by the electron transport system*. *Cell.* **98**: 2: 217-227.
- BAKER, K. M., CHAKRAVARTHI, S., LANGTON, K. P., SHEPPARD, A. M., LU, H. & BULLEID, N. J. (2008) *Low reduction potential of Ero1alpha regulatory disulphides ensures tight control of substrate oxidation*. *Embo J.* **27**: 22: 2988-2997.
- BANASZAK, K., MECHIN, I., FROST, G. & RYPNIEWSKI, W. (2004) *Structure of the reduced disulfide-bond isomerase DsbC from Escherichia coli*. *Acta Crystallogr D Biol Crystallogr.* **60**: 10: 1747-1752.
- BANHEGYI, G., LUSINI, L., PUSKAS, F., ROSSI, R., FULCERI, R., BRAUN, L., MILE, V., DI SIMPLICIO, P., MANDL, J. & BENEDETTI, A. (1999) *Preferential transport of glutathione versus glutathione disulfide in rat liver microsomal vesicles*. *J Biol Chem.* **274**: 18: 12213-12216.
- BARDWELL, J. C., MCGOVERN, K. & BECKWITH, J. (1991) *Identification of a protein required for disulfide bond formation in vivo*. *Cell.* **67**: 3: 581-589.
- BARRETT, N. R. (1950) *Chronic peptic ulcer of the oesophagus and 'oesophagitis'*. *Br J Surg.* **38**: 150: 175-182.
- BATZRI, S., HARMON, J. W., SCHWEITZER, E. J. & TOLES, R. (1991) *Bile acid accumulation in gastric mucosal cells*. *Proc Soc Exp Biol Med.* **197**: 4: 393-399.

- BAUMGART, E., VANHOOREN, J. C., FRANSEN, M., MARYNEN, P., PUYPE, M., VANDEKERCKHOVE, J., LEUNISSEN, J. A., FAHIMI, H. D., MANNAERTS, G. P. & VAN VELDHOVEN, P. P. (1996) *Molecular characterization of the human peroxisomal branched-chain acyl-CoA oxidase: cDNA cloning, chromosomal assignment, tissue distribution, and evidence for the absence of the protein in Zellweger syndrome*. Proc Natl Acad Sci U S A. **93**: 24: 13748-53.
- BENHAM, A. M., CABIBBO, A., FASSIO, A., BULLEID, N., SITIA, R. & BRAAKMAN, I. (2000) *The CXXCXXC motif determines the folding, structure and stability of human Ero1-Lalpha*. Embo J. **19**: 17: 4493-4502.
- BERKMEN, M., BOYD, D. & BECKWITH, J. (2005) *The nonconsecutive disulfide bond of Escherichia coli phytase (AppA) renders it dependent on the protein-disulfide isomerase, DsbC*. J Biol Chem. **280**: 12: 11387-11394.
- BIHLMAIER, K., MESECKE, N., TERZIYSKA, N., BIEN, M., HELL, K. & HERRMANN, J. M. (2007) *The disulfide relay system of mitochondria is connected to the respiratory chain*. J Cell Biol. **179**: 3: 389-395.
- BOUSCAREL, B., KROLL, S. D. & FROMM, H. (1999) *Signal transduction and hepatocellular bile acid transport: cross talk between bile acids and second messengers*. Gastroenterology. **117**: 2: 433-452.
- BRAAKMAN, I., HELENIUS, J. & HELENIUS, A. (1992) *Manipulating disulfide bond formation and protein folding in the endoplasmic reticulum*. Embo J. **11**: 5: 1717-1722.
- BRAAKMAN, I., HOOVER-LITTY, H., WAGNER, K. & HELENIUS, A. (1991) *Folding of influenza hemagglutinin in the endoplasmic reticulum*. J Cell Biol. **114**: 3: 401-411.
- BREYTON, C., HAASE, W., RAPOPORT, T. A., KUHLEBRANDT, W. & COLLINSON, I. (2002) *Three-dimensional structure of the bacterial protein-translocation complex SecYEG*. Nature. **418**: 6898: 662-665.
- BRUNDAGE, L., HENDRICK, J. P., SCHIEBEL, E., DRIESSEN, A. J. & WICKNER, W. (1990) *The purified E. coli integral membrane protein SecY/E is sufficient for reconstitution of SecA-dependent precursor protein translocation*. Cell. **62**: 4: 649-657.
- BRYNGELSON, J. D. & WOLYNES, P. G. (1987) *Spin glasses and the statistical mechanics of protein folding*. Proc Natl Acad Sci U S A. **84**: 21: 7524-7528.

- CABIBBO, A., PAGANI, M., FABBRI, M., ROCCHI, M., FARMERY, M. R., BULLEID, N. J. & SITIA, R. (2000) *ERO1-L, a human protein that favors disulfide bond formation in the endoplasmic reticulum*. J Biol Chem. **275**: 7: 4827-4833.
- CABRITA, L. D., DOBSON, C. M. & CHRISTODOULOU, J. (2010) *Protein folding on the ribosome*. Curr Opin Struct Biol. **20**: 1: 33-45.
- CALFON, M., ZENG, H., URANO, F., TILL, J. H., HUBBARD, S. R., HARDING, H. P., CLARK, S. G. & RON, D. (2002) *IRE1 couples endoplasmic reticulum load to secretory capacity by processing the XBP-1 mRNA*. Nature. **415**: 6867: 92-96.
- CALI, J. J. & RUSSELL, D. W. (1991) *Characterization of human sterol 27-hydroxylase. A mitochondrial cytochrome P-450 that catalyzes multiple oxidation reaction in bile acid biosynthesis*. J Biol Chem. **266**: 12: 7774-7778.
- CAPITANI, M. & SALLESE, M. (2009) *The KDEL receptor: new functions for an old protein*. FEBS Lett. **583**: 23: 3863-3871.
- CARAMELO, J. J. & PARODI, A. J. (2008) *Getting in and out from calnexin/calreticulin cycles*. J Biol Chem. **283**: 16: 10221-5.
- CHAKRAVARTHI, S. & BULLEID, N. J. (2004) *Glutathione is required to regulate the formation of native disulfide bonds within proteins entering the secretory pathway*. J Biol Chem. **279**: 38: 39872-39879.
- CHAKRAVARTHI, S., JESSOP, C. E. & BULLEID, N. J. (2006) *The role of glutathione in disulphide bond formation and endoplasmic-reticulum-generated oxidative stress*. EMBO Rep. **7**: 3: 271-275.
- CHANG, G. J., HUNT, A. R. & DAVIS, B. (2000) *A single intramuscular injection of recombinant plasmid DNA induces protective immunity and prevents Japanese encephalitis in mice*. J Virol. **74**: 9: 4244-4252.
- CHANG, H. C., TANG, Y. C., HAYER-HARTL, M. & HARTL, F. U. (2007) *SnapShot: molecular chaperones, Part I*. Cell. **128**: 1: 212.
- CHEN, D., JIN, K., KAWAGUCHI, K., NAKAYAMA, M., ZHOU, X., XIONG, Z., ZHOU, A., MAO, X. O., GREENBERG, D. A., GRAHAM, S. H. & SIMON, R. P. (2003) *Ero1-L, an ischemia-inducible gene from rat brain with homology to global ischemia-induced gene 11 (Giig11), is localized to neuronal dendrites by a dispersed identifier (ID) element-dependent mechanism*. J Neurochem. **85**: 3: 670-679.

- CHEN, G., IZZO, J., DEMIZU, Y., WANG, F., GUHA, S., WU, X., HUNG, M. C., AJANI, J. A. & HUANG, P. (2009) *Different redox states in malignant and nonmalignant esophageal epithelial cells and differential cytotoxic responses to bile acid and honokiol*. *Antioxid Redox Signal*. **11**: 5: 1083-1095.
- CHIN, K.-T., KANG, G., QU, J., GARDNER, L. B., COETZEE, W. A., ZITO, E., FISHMAN, G. I. & RON, D. (2011) *The sarcoplasmic reticulum luminal thiol oxidase ERO1 regulates cardiomyocyte excitation-coupled calcium release and response to hemodynamic load*. *The FASEB Journal*. **25**: 2583–2591.
- CHRISTENSEN, D. (1999) *The rise and fall of bacterium H. pylori*. *Science News*. **156**: 15: 234-236.
- CONNOLLY, T., RAPIEJKO, P. & GILMORE, R. (1991) *Requirement of GTP hydrolysis for dissociation of the signal recognition particle from its receptor*. *Science*. **252**: 5009: 1171-1173.
- CREIGHTON, T. E. (1990) *Protein folding*. *Biochem. J.* **270**: 1: 1-16.
- CROMPTON, M. (1999) *The mitochondrial permeability transition pore and its role in cell death*. *Biochem J.* **341**: 2: 233-249.
- CROWLEY, K. S., LIAO, S., WORRELL, V. E., REINHART, G. D. & JOHNSON, A. E. (1994) *Secretory proteins move through the endoplasmic reticulum membrane via an aqueous, gated pore*. *Cell*. **78**: 3: 461-471.
- CROWLEY, K. S., REINHART, G. D. & JOHNSON, A. J. (1993) *The signal sequence moves through a ribosomal tunnel into a noncytoplasmic aqueous environment at the ER membrane early in translocation*. *Cell*. **73**: 6: 461-471.
- CUEBAS, D. A., PHILLIPS, C., SCHMITZ, W., CONZELMANN, E. & NOVIKOV, D. K. (2002) *The role of alpha-methylacyl-CoA racemase in bile acid synthesis*. *Biochem J.* **363**: Pt 3: 801-807.
- CUNNEA, P. M., MIRANDA-VIZUETE, A., BERTOLI, G., SIMMEN, T., DAMDIMOPOULOS, A. E., HERMANN, S., LEINONEN, S., HUIKKO, M. P., GUSTAFSSON, J.-A., SITIA, R. & SPYROU, G. (2002) *ERdj5, an Endoplasmic Reticulum (ER)-resident Protein Containing DnaJ and Thioredoxin Domains, Is Expressed in Secretory Cells or following ER Stress*. *Journal of Biological Chemistry*. **278**: 2: 1059-1066.
- CUOZZO, J. W. & KAISER, C. A. (1999) *Competition between glutathione and protein thiols for disulphide-bond formation*. *Nat Cell Biol.* **1**: 3: 130-135.

- DABIR, D. V., LEVERICH, E. P., KIM, S. K., TSAI, F. D., HIRASAWA, M., KNAFF, D. B. & KOEHLER, C. M. (2007) *A role for cytochrome c and cytochrome c peroxidase in electron shuttling from Ery1*. *Embo J.* **26**: 23: 4801-4811.
- DANIELS, R., KUROWSKI, B., JOHNSON, A. E. & HEBERT, D. N. (2003) *N-linked glycans direct the cotranslational folding pathway of influenza hemagglutinin*. *Mol Cell.* **11**: 1: 79-90.
- DANILCZYK, U. G. & WILLIAMS, D. B. (2001) *The Lectin Chaperone Calnexin Utilizes Polypeptide-based Interactions to Associate with Many of Its Substrates in Vivo*. *J Biol Chem.* **276**: 27: 25532-25540.
- DARBY, N. J. & CREIGHTON, T. E. (1993) *Dissecting the disulphide-coupled folding pathway of bovine pancreatic trypsin inhibitor. Forming the first disulphide bonds in analogues of the reduced protein*. *J Mol Biol.* **232**: 3: 873-896.
- DARBY, N. J., KEMMINK, J. & CREIGHTON, T. E. (1996) *Identifying and characterizing a structural domain of protein disulfide isomerase*. *Biochemistry.* **35**: 32: 10517-10528.
- DARBY, N. J., PENKA, E. & VINCENNELLI, R. (1998) *The multi-domain structure of protein disulfide isomerase is essential for high catalytic efficiency*. *J Mol Biol.* **276**: 1: 239-247.
- DEKOSTER, G. T. & ROBERTSON, A. D. (1997) *Thermodynamics of unfolding for Kazal-type serine protease inhibitors: entropic stabilization of ovomucoid first domain by glycosylation*. *Biochemistry.* **36**: 8: 2323-2331.
- DENZEL, A., MOLINARI, M., TRIGUEROS, C., MARTIN, J. E., VELMURGAN, S., BROWN, S., STAMP, G. & OWEN, M. J. (2002) *Early postnatal death and motor disorders in mice congenitally deficient in calnexin expression*. *Mol Cell Biol.* **22**: 21: 7398-7404.
- DEPUYDT, M., LEONARD, S. E., VERTOMMEN, D., DENONCIN, K., MORSOMME, P., WAHNI, K., MESSENS, J., CARROLL, K. S. & COLLET, J. F. (2009) *A periplasmic reducing system protects single cysteine residues from oxidation*. *Science.* **326**: 5956: 1109-1111.
- DI COSTANZO, L., DRURY, J. E., PENNING, T. M. & CHRISTIANSON, D. W. (2008) *Crystal structure of human liver Delta4-3-ketosteroid 5beta-reductase (AKR1D1) and implications for substrate binding and catalysis*. *J Biol Chem.* **283**: 24: 16830-16839.

- DIAS-GUNASEKARA, S. & BENHAM, A. M. (2005) *Defining the protein-protein interactions of the mammalian endoplasmic reticulum oxidoreductases (EROs)*. *Biochem Soc Trans.* **33**: Pt 6: 1382-1384.
- DIAS-GUNASEKARA, S. & BENHAM, A. M. (2006-2007) Unpublished. Durham University, School of Biological and Biomedical Sciences.
- DIAS-GUNASEKARA, S., GUBBENS, J., VAN LITH, M., DUNNE, C., WILLIAMS, J. A., KATAKY, R., SCOONES, D., LAPHORN, A., BULLEID, N. J. & BENHAM, A. M. (2005) *Tissue-specific expression and dimerization of the endoplasmic reticulum oxidoreductase Ero1beta*. *J Biol Chem.* **280**: 38: 33066-33075.
- DONG, A., GUPTA, A., PAI, R. K., TUN, M. & LOWE, A. W. (2011) *The human adenocarcinoma-associated gene, AGR2, induces expression of amphiregulin through Hippo pathway co-activator YAP1 activation*. *J Biol Chem.* **286**: 20: 18301-18310.
- DUGGAN, S. P., GALLAGHER, W. M., FOX, E. J., ABDEL-LATIF, M. M., REYNOLDS, J. V. & KELLEHER, D. (2006) *Low pH induces co-ordinate regulation of gene expression in oesophageal cells*. *Carcinogenesis.* **27**: 2: 319-327.
- DVORAK, K., PAYNE, C. M., CHAVARRIA, M., RAMSEY, L., DVORAKOVA, B., BERNSTEIN, H., HOLUBEC, H., SAMPLINER, R. E., GUY, N., CONDON, A., BERNSTEIN, C., GREEN, S. B., PRASAD, A. & GAREWAL, H. S. (2007) *Bile acids in combination with low pH induce oxidative stress and oxidative DNA damage: relevance to the pathogenesis of Barrett's oesophagus*. *Gut.* **56**: 6: 763-771.
- EDA, A., OSAWA, H., SATOH, K., YANAKA, I., KIHIRA, K., ISHINO, Y., MUTOH, H. & SUGANO, K. (2003) *Aberrant expression of CDX2 in Barrett's epithelium and inflammatory esophageal mucosa*. *J Gastroenterol.* **38**: 1: 14-22.
- EDMISTON, J. S., YEUDALL, W. A., CHUNG, T. D. & LEBMAN, D. A. (2005) *Inability of transforming growth factor-beta to cause SnoN degradation leads to resistance to transforming growth factor-beta-induced growth arrest in esophageal cancer cells*. *Cancer Res.* **65**: 11: 4782-4788.
- ELLGAARD, L., RIEK, R., HERRMANN, T., GUNTERT, P., BRAUN, D., HELENIUS, A. & WUTHRICH, K. (2001) *NMR structure of the calreticulin P-domain*. *Proc Natl Acad Sci U S A.* **98**: 6: 3133-3138.
- ELLGAARD, L. & RUDDOCK, L. W. (2005) *The human protein disulphide isomerase family: substrate interactions and functional properties*. *EMBO Rep.* **6**: 1: 28-32.

- ELLIS, H. R. & POOLE, L. B. (1997) *Roles for the two cysteine residues of AhpC in catalysis of peroxide reduction by alkyl hydroperoxide reductase from Salmonella typhimurium*. *Biochemistry*. **36**: 43: 13349-13356.
- FALANY, C. N., JOHNSON, M. R., BARNES, S. & DIASIO, R. B. (1994) *Glycine and taurine conjugation of bile acids by a single enzyme. Molecular cloning and expression of human liver bile acid CoA:amino acid N-acyltransferase*. *J Biol Chem*. **269**: 30: 19375-19379.
- FALANY, C. N., XIE, X., WHEELER, J. B., WANG, J., SMITH, M., HE, D. & BARNES, S. (2002) *Molecular cloning and expression of rat liver bile acid CoA ligase*. *J Lipid Res*. **43**: 12: 2062-2071.
- FASS, R., HELL, R. W., GAREWAL, H. S., MARTINEZ, P., PULLIAM, G., WENDEL, C. & SAMPLINER, R. E. (2001) *Correlation of oesophageal acid exposure with Barrett's oesophagus length*. *Gut*. **48**: 3: 310-313.
- FEIN, M., PETERS, J. H., CHANDRASOMA, P., IRELAND, A. P., OBERG, S., RITTER, M. P., BREMNER, C. G., HAGEN, J. A. & DEMEESTER, T. R. (1998) *Duodenoesophageal reflux induces esophageal adenocarcinoma without exogenous carcinogen*. *J Gastrointest Surg*. **2**: 3: 260-268.
- FERRARI, D. M. & SOLING, H. D. (1999) *The protein disulphide-isomerase family : unravelling a string of folds*. *Biochemical Journal*. **339**: 1: 1-10.
- FEWELL, S. W., TRAVERS, K. J., WEISSMAN, J. S. & BRODSKY, J. L. (2001) *The action of molecular chaperones in the early secretory pathway*. *Annu Rev Genet*. **35**: 149-191.
- FINI, A., RODA, A., FUGAZZA, R. & GRIGOLO, B. (1985) *Chemical Properties of Bile Acids: III. Bile Acid structure and solubility in water*. *Journal of Solution Chemistry*. **14**: 8: 595-603.
- FITZGERALD, R. C. (2006) *Molecular basis of Barrett's oesophagus and oesophageal adenocarcinoma*. *Gut*. **55**: 12: 1810-1820.
- FRAND, A. R. & KAISER, C. A. (1998) *The ERO1 gene of yeast is required for oxidation of protein dithiols in the endoplasmic reticulum*. *Mol Cell*. **1**: 2: 161-170.
- FRAND, A. R. & KAISER, C. A. (1999) *Ero1p oxidizes protein disulfide isomerase in a pathway for disulfide bond formation in the endoplasmic reticulum*. *Mol Cell*. **4**: 4: 469-477.

- FRAND, A. R. & KAISER, C. A. (2000) *Two pairs of conserved cysteines are required for the oxidative activity of Ero1p in protein disulfide bond formation in the endoplasmic reticulum.* Mol Biol Cell. **11**: 9: 2833-2843.
- FREEDMAN, R. B., GANE, P. J., HAWKINS, H. C., HLODAN, R., MCLAUGHLIN, S. H. & PARRY, J. W. (1998) *Experimental and theoretical analyses of the domain architecture of mammalian protein disulphide-isomerase.* Biol Chem. **379**: 3: 321-328.
- FREEDMAN, R. B., KLAPPA, P. & RUDDOCK, L. W. (2002) *Protein disulfide isomerases exploit synergy between catalytic and specific binding domains.* EMBO Rep. **3**: 2: 136-140.
- FU, X., BEER, D. G., BEHAR, J., WANDS, J., LAMBETH, D. & CAO, W. (2006) *cAMP-response element-binding protein mediates acid-induced NADPH oxidase NOX5-S expression in Barrett esophageal adenocarcinoma cells.* J Biol Chem. **281**: 29: 20368-20382.
- GAFVELS, M., OLIN, M., CHOWDHARY, B. P., RAUDSEPP, T., ANDERSSON, U., PERSSON, B., JANSSON, M., BJORKHEM, I. & EGGERTSEN, G. (1999) *Structure and chromosomal assignment of the sterol 12alpha-hydroxylase gene (CYP8B1) in human and mouse: eukaryotic cytochrome P-450 gene devoid of introns.* Genomics. **56**: 2: 184-196.
- GAO, B., ADHIKARI, R., HOWARTH, M., NAKAMURA, K., GOLD, M. C., HILL, A. B., KNEE, R., MICHALAK, M. & ELLIOTT, T. (2002) *Assembly and antigen-presenting function of MHC class I molecules in cells lacking the ER chaperone calreticulin.* Immunity. **16**: 1: 99-109.
- GERLOFF, T., STIEGER, B., HAGENBUCH, B., MADON, J., LANDMANN, L., ROTH, J., HOFMANN, A. F. & MEIER, P. J. (1998) *The sister of P-glycoprotein represents the canalicular bile salt export pump of mammalian liver.* J Biol Chem. **273**: 16: 10046-10050.
- GESS, B., HOFBAUER, K. H., WENGER, R. H., LOHAUS, C., MEYER, H. E. & KURTZ, A. (2003) *The cellular oxygen tension regulates expression of the endoplasmic oxidoreductase ERO1-Lalpha.* Eur J Biochem. **270**: 10: 2228-2235.
- GETHING, M. J. (1999) *Role and regulation of the ER chaperone BiP.* Semin Cell Dev Biol. **10**: 5: 465-472.
- GILLEN, P., KEELING, P., BYRNE, P. J., HEALY, M., O'MOORE, R. R. & HENNESSY, T. P. (1988) *Implication of duodenogastric reflux in the pathogenesis of Barrett's oesophagus.* Br J Surg. **75**: 6: 540-543.

- GOLDSTEIN, S. R., YANG, G. Y., CURTIS, S. K., REUHL, K. R., LIU, B. C., MIRVISH, S. S., NEWMARK, H. L. & YANG, C. S. (1997) *Development of esophageal metaplasia and adenocarcinoma in a rat surgical model without the use of a carcinogen*. *Carcinogenesis*. **18**: 11: 2265-2270.
- GORLICH, D. & RAPOPORT, T. A. (1993) *Protein translocation into proteoliposomes reconstituted from purified components of the endoplasmic reticulum membrane*. *Cell*. **75**: 4: 615-630.
- GOTLEY, D. C., MORGAN, A. P. & COOPER, M. J. (1988) *Bile acid concentrations in the refluxate of patients with reflux oesophagitis*. *Br J Surg*. **75**: 6: 587-590.
- GRAUSCHOPF, U., WINTHER, J. R., KORBER, P., ZANDER, T., DALLINGER, P. & BARDWELL, J. C. (1995) *Why is DsbA such an oxidizing disulfide catalyst?* *Cell*. **83**: 6: 947-955.
- GRIFFITHS, E. A., PRITCHARD, S. A., MCGRATH, S. M., VALENTINE, H. R., PRICE, P. M., WELCH, I. M. & WEST, C. M. (2007) *Increasing expression of hypoxia-inducible proteins in the Barrett's metaplasia-dysplasia-adenocarcinoma sequence*. *Br J Cancer*. **96**: 9: 1377-1383.
- GROISMAN, G. M., AMAR, M. & MEIR, A. (2004) *Expression of the intestinal marker Cdx2 in the columnar-lined esophagus with and without intestinal (Barrett's) metaplasia*. *Mod Pathol*. **17**: 10: 1282-1288.
- GROSS, E., KASTNER, D. B., KAISER, C. A. & FASS, D. (2004) *Structure of Ero1p, source of disulfide bonds for oxidative protein folding in the cell*. *Cell*. **117**: 5: 601-610.
- GROSS, E., SEVIER, C. S., HELDMAN, N., VITU, E., BENTZUR, M., KAISER, C. A., THORPE, C. & FASS, D. (2006) *Generating disulfides enzymatically: reaction products and electron acceptors of the endoplasmic reticulum thiol oxidase Ero1p*. *Proc Natl Acad Sci U S A*. **103**: 2: 299-304.
- GUDDAT, L. W., BARDWELL, J. C., GLOCKSHUBER, R., HUBER-WUNDERLICH, M., ZANDER, T. & MARTIN, J. L. (1997) *Structural analysis of three His32 mutants of DsbA: support for an electrostatic role of His32 in DsbA stability*. *Protein Sci*. **6**: 9: 1893-1900.
- GUDDAT, L. W., BARDWELL, J. C. & MARTIN, J. L. (1998) *Crystal structures of reduced and oxidized DsbA: investigation of domain motion and thiolate stabilization*. *Structure*. **6**: 6: 757-67.

- GUNDELFINGER, E. D., KRAUSE, E., MELLI, M. & DOBBERSTEIN, B. (1983) *The organization of the 7SL RNA in the signal recognition particle*. *Nucleic Acids Res.* **11**: 21: 7363-7374.
- HAAS, I. G. & WABL, M. (1983) *Immunoglobulin heavy chain binding protein*. *Nature*. **306**: 5941: 387-389.
- HAMMAN, B. D., CHEN, J. C., JOHNSON, E. E. & JOHNSON, A. E. (1997) *The aqueous pore through the translocon has a diameter of 40-60 Å during cotranslational protein translocation at the ER membrane*. *Cell*. **89**: 4: 535-544.
- HAMMAN, B. D., HENDERSHOT, L. M. & JOHNSON, A. E. (1998) *BiP maintains the permeability barrier of the ER membrane by sealing the luminal end of the translocon pore before and early in translocation*. *Cell*. **92**: 6: 747-758.
- HAMMOND, C., BRAAKMAN, I. & HELENIUS, A. (1994) *Role of N-Linked Oligosaccharide Recognition, Glucose Trimming, and Calnexin in Glycoprotein Folding and Quality Control*. *Proc Natl Acad Sci U S A*. **91**: 3: 913-917.
- HANSON, S. R., CULYBA, E. K., HSU, T. L., WONG, C. H., KELLY, J. W. & POWERS, E. T. (2009) *The core trisaccharide of an N-linked glycoprotein intrinsically accelerates folding and enhances stability*. *Proc Natl Acad Sci U S A*. **106**: 9: 3131-3136.
- HAO, Y., TRIADAFILOPOULOS, G., SAHBAIE, P., YOUNG, H. S., OMARY, M. B. & LOWE, A. W. (2006) *Gene expression profiling reveals stromal genes expressed in common between Barrett's esophagus and adenocarcinoma*. *Gastroenterology*. **131**: 3: 925-933.
- HARDING, H. P., ZHANG, Y. & RON, D. (1999) *Protein translation and folding are coupled by an endoplasmic-reticulum-resident kinase*. *Nature*. **397**: 6716: 271-274.
- HARDWICK, K. G., LEWIS, M. J., SEMENZA, J., DEAN, N. & PELHAM, H. R. (1990) *ERD1, a yeast gene required for the retention of luminal endoplasmic reticulum proteins, affects glycoprotein processing in the Golgi apparatus*. *Embo J*. **9**: 3: 623-630.
- HARTL, F. U. & HAYER-HARTL, M. (2009) *Converging concepts of protein folding in vitro and in vivo*. *Nat Struct Mol Biol*. **16**: 6: 574-581.
- HARTWELL, L. H., MORTIMER, R. K., CULOTTI, J. & CULOTTI, M. (1973) *Genetic Control of the Cell Division Cycle in Yeast: V. Genetic Analysis of cdc Mutants*. *Genetics*. **74**: 2: 267-286.

- HAZE, K., YOSHIDA, H., YANAGI, H., YURA, T. & MORI, K. (1999) *Mammalian transcription factor ATF6 is synthesized as a transmembrane protein and activated by proteolysis in response to endoplasmic reticulum stress*. *Mol Biol Cell*. **10**: 11: 3787-3799.
- HELENIUS, A. & AEBI, M. (2004) *Roles of N-linked glycans in the endoplasmic reticulum*. *Annu Rev Biochem*. **73**: 1019-1049.
- HERAS, B., EDELING, M. A., SCHIRRA, H. J., RAINA, S. & MARTIN, J. L. (2004) *Crystal structures of the DsbG disulfide isomerase reveal an unstable disulfide*. *Proc Natl Acad Sci U S A*. **101**: 24: 8876-8881.
- HERAS, B., KURZ, M., SHOULDICE, S. R. & MARTIN, J. L. (2007) *The name's bond.....disulfide bond*. *Curr Opin Struct Biol*. **17**: 6: 691-698.
- HINIKER, A. & BARDWELL, J. C. (2004) *In vivo substrate specificity of periplasmic disulfide oxidoreductases*. *J Biol Chem*. **279**: 13: 12967-12973.
- HIROTSU, S., ABE, Y., OKADA, K., NAGAHARA, N., HORI, H., NISHINO, T. & HAKOSHIMA, T. (1999) *Crystal structure of a multifunctional 2-Cys peroxiredoxin heme-binding protein 23 kDa/proliferation-associated gene product*. *Proc Natl Acad Sci U S A*. **96**: 22: 12333-12338.
- HOFMANN, B., HECHT, H. J. & FLOHE, L. (2002) *Peroxiredoxins*. *Biol Chem*. **383**: 3-4: 347-364.
- HOIBERG-NIELSEN, R., WESTH, P. & ARLETH, L. (2009) *The effect of glycosylation on interparticle interactions and dimensions of native and denatured phytase*. *Biophys J*. **96**: 1: 153-161.
- HORNE, J., D'AUVERGNE, E. J., COLES, M., VELKOV, T., CHIN, Y., CHARMAN, W. N., PRANKERD, R., GOOLEY, P. R. & SCANLON, M. J. (2007) *Probing the flexibility of the DsbA oxidoreductase from Vibrio cholerae--a 15N - 1H heteronuclear NMR relaxation analysis of oxidized and reduced forms of DsbA*. *J Mol Biol*. **371**: 3: 703-716.
- HOUTEN, S. M., WATANABE, M. & AUWERX, J. (2006) *Endocrine functions of bile acids*. *Embo J*. **25**: 7: 1419-1425.
- HU, Y., WILLIAMS, V. A., GELLERSEN, O., JONES, C., WATSON, T. J. & PETERS, J. H. (2007) *The pathogenesis of Barrett's esophagus: secondary bile acids upregulate intestinal differentiation factor CDX2 expression in esophageal cells*. *J Gastrointest Surg*. **11**: 7: 827-834.

- INABA, K., MASUI, S., IIDA, H., VAVASSORI, S., SITIA, R. & SUZUKI, M. (2010) *Crystal structures of human Ero1alpha reveal the mechanisms of regulated and targeted oxidation of PDI*. *Embo J.* **29**: 19: 3330-3343.
- INABA, K., MURAKAMI, S., SUZUKI, M., NAKAGAWA, A., YAMASHITA, E., OKADA, K. & ITO, K. (2006) *Crystal structure of the DsbB-DsbA complex reveals a mechanism of disulfide bond generation*. *Cell.* **127**: 4: 789-801.
- IRELAND, A. P., PETERS, J. H., SMYRK, T. C., DEMEESTER, T. R., CLARK, G. W., MIRVISH, S. S. & ADRIAN, T. E. (1996) *Gastric juice protects against the development of esophageal adenocarcinoma in the rat*. *Ann Surg.* **224**: 3: 358-370.
- ISMAIL, N., CRAWSHAW, S. G., CROSS, B. C., HAAGSMA, A. C. & HIGH, S. (2008) *Specific transmembrane segments are selectively delayed at the ER translocon during opsin biogenesis*. *Biochem J.* **411**: 3: 495-506.
- ISMAIL, N., CRAWSHAW, S. G. & HIGH, S. (2006) *Active and passive displacement of transmembrane domains both occur during opsin biogenesis at the Sec61 translocon*. *J Cell Sci.* **119**: 13: 2826-2836.
- JAHN, T. R. & RADFORD, S. E. (2005) *The Yin and Yang of protein folding*. *FEBS Journal.* **272**: 23: 5962-5970.
- JANKOWSKI, J. A., PROVENZALE, D. & MOAYYEDI, P. (2002) *Esophageal adenocarcinoma arising from Barrett's metaplasia has regional variations in the west*. *Gastroenterology.* **122**: 2: 588-590.
- JANNATIPOUR, M. & ROKEACH, L. A. (1995) *The Schizosaccharomyces pombe homologue of the chaperone calnexin is essential for viability*. *J Biol Chem.* **270**: 9: 4845-4853.
- JENKINS, G. J., CRONIN, J., ALHAMDANI, A., RAWAT, N., D'SOUZA, F., THOMAS, T., ELTAHIR, Z., GRIFFITHS, A. P. & BAXTER, J. N. (2008) *The bile acid deoxycholic acid has a non-linear dose response for DNA damage and possibly NF-kappaB activation in oesophageal cells, with a mechanism of action involving ROS*. *Mutagenesis.* **23**: 5: 399-405.
- JENKINS, G. J., HARRIES, K., DOAK, S. H., WILMES, A., GRIFFITHS, A. P., BAXTER, J. N. & PARRY, J. M. (2004) *The bile acid deoxycholic acid (DCA) at neutral pH activates NF-kappaB and induces IL-8 expression in oesophageal cells in vitro*. *Carcinogenesis.* **25**: 3: 317-323.

- JESSOP, C. E. & BULLEID, N. J. (2004) *Glutathione directly reduces an oxidoreductase in the endoplasmic reticulum of mammalian cells*. *J Biol Chem.* **279**: 53: 55341-55347.
- JOHNSON, A. E. (2004) *Functional ramifications of FRET-detected nascent chain folding far inside the membrane-bound ribosome*. *Biochem Soc Trans.* **32**: Pt 5: 668-672.
- JOHNSON, A. E. (2009) *The structural and functional coupling of two molecular machines, the ribosome and the translocon*. *J Cell Biol.* **185**: 5: 765-767.
- JOHNSON, A. E. & VAN WAES, M. A. (1999) *The translocon: a dynamic gateway at the ER membrane*. *Annu Rev Cell Dev Biol.* **15**: 799-842.
- JOHNSON, S., MICHALAK, M., OPAS, M. & EGGLETON, P. (2001) *The ins and outs of calreticulin: from the ER lumen to the extracellular space*. *Trends Cell Biol.* **11**: 3: 122-129.
- KADOKURA, H., TIAN, H., ZANDER, T., BARDWELL, J. C. & BECKWITH, J. (2004) *Snapshots of DsbA in action: detection of proteins in the process of oxidative folding*. *Science.* **303**: 5657: 534-537.
- KAUER, W. K., PETERS, J. H., DEMEESTER, T. R., FEUSSNER, H., IRELAND, A. P., STEIN, H. J. & SIEWERT, R. J. (1997) *Composition and concentration of bile acid reflux into the esophagus of patients with gastroesophageal reflux disease*. *Surgery.* **122**: 5: 874-881.
- KAUFMAN, R. J. (2002) *Orchestrating the unfolded protein response in health and disease*. *J Clin Invest.* **110**: 10: 1389-1398.
- KAWAMATA, Y., FUJII, R., HOSOYA, M., HARADA, M., YOSHIDA, H., MIWA, M., FUKUSUMI, S., HABATA, Y., ITOH, T., SHINTANI, Y., HINUMA, S., FUJISAWA, Y. & FUJINO, M. (2003) *A G protein-coupled receptor responsive to bile acids*. *J Biol Chem.* **278**: 11: 9435-9440.
- KAZUMORI, H., ISHIHARA, S., RUMI, M. A., KADOWAKI, Y. & KINOSHITA, Y. (2006) *Bile acids directly augment caudal related homeobox gene Cdx2 expression in oesophageal keratinocytes in Barrett's epithelium*. *Gut.* **55**: 1: 16-25.
- KEMMINK, J., DARBY, N. J., DIJKSTRA, K., NILGES, M. & CREIGHTON, T. E. (1997) *The folding catalyst protein disulfide isomerase is constructed of active and inactive thioredoxin modules*. *Curr Biol.* **7**: 4: 239-245.

- KIDA, Y., MORIMOTO, F. & SAKAGUCHI, M. (2007) *Two translocating hydrophilic segments of a nascent chain span the ER membrane during multispanning protein topogenesis*. *J Cell Biol.* **179**: 7: 1441-1452.
- KLAPPA, P., RUDDOCK, L. W., DARBY, N. J. & FREEDMAN, R. B. (1998) *The b' domain provides the principal peptide-binding site of protein disulfide isomerase but all domains contribute to binding of misfolded proteins*. *Embo J.* **17**: 4: 927-935.
- KOBAYASHI, T. & ITO, K. (1999) *Respiratory chain strongly oxidizes the CXXC motif of DsbB in the Escherichia coli disulfide bond formation pathway*. *Embo J.* **18**: 5: 1192-1198.
- KOKAME, K., KATO, H. & MIYATA, T. (2001) *Identification of ERSE-II, a new cis-acting element responsible for the ATF6-dependent mammalian unfolded protein response*. *J Biol Chem.* **276**: 12: 9199-9205.
- KOZLOV, G., AZEROUAL, S., ROSENAUER, A., MAATTANEN, P., DENISOV, A. Y., THOMAS, D. Y. & GEHRING, K. (2010) *Structure of the catalytic a(0)a fragment of the protein disulfide isomerase ERp72*. *J Mol Biol.* **401**: 4: 618-625.
- KOZLOV, G., MAATTANEN, P., SCHRAG, J. D., HURA, G. L., GABRIELLI, L., CYGLER, M., THOMAS, D. Y. & GEHRING, K. (2009) *Structure of the noncatalytic domains and global fold of the protein disulfide isomerase ERp72*. *Structure.* **17**: 5: 651-659.
- KRAMER, G., BOEHRINGER, D., BAN, N. & BUKAU, B. (2009) *The ribosome as a platform for co-translational processing, folding and targeting of newly synthesized proteins*. *Nat Struct Mol Biol.* **16**: 6: 589-597.
- KRIEG, U. C., WALTER, P. & JOHNSON, A. E. (1986) *Photocrosslinking of the signal sequence of nascent preprolactin to the 54-kilodalton polypeptide of the signal recognition particle*. *Proc Natl Acad Sci U S A.* **83**: 22: 8604-8608.
- KULP, M. S., FRICKEL, E. M., ELLGAARD, L. & WEISSMAN, J. S. (2006) *Domain architecture of protein-disulfide isomerase facilitates its dual role as an oxidase and an isomerase in Ero1p-mediated disulfide formation*. *J Biol Chem.* **281**: 2: 876-884.
- KUROSAWA, T., SATO, M., YOSHIMURA, T., JIANG, L. L., HASHIMOTO, T. & TOHMA, M. (1997) *Stereospecific formation of (24R,25R)-3 alpha,7 alpha,12 alpha,24-tetrahydroxy-5 beta-cholestan-26-oic acid catalyzed with a peroxisomal bifunctional D-3-hydroxyacyl-CoA dehydratase/D-3-hydroxyacyl-CoA dehydrogenase*. *Biol Pharm Bull.* **20**: 3: 295-297.

- KURZCHALIA, T. V., WIEDMANN, M., GIRSHOVICH, A. S., BOCHKAREVA, E. S., BIELKA, H. & RAPOPORT, T. A. (1986) *The signal sequence of nascent preprolactin interacts with the 54K polypeptide of the signal recognition particle.* Nature. **320**: 6063: 634-636.
- LABOISSIÈRE, M. C. A., STURLEY, S. L. & RAINES, R. T. (1995) *The Essential Function of Protein-disulfide Isomerase Is to Unscramble Non-native Disulfide Bonds.* J Biol Chem. **270**: 47: 28006-28009.
- LAEMMLI, U. K. (1970) *Cleavage of structural proteins during the assembly of the head of bacteriophage T4.* Nature. **227**: 5259: 680-685.
- LAGERGREN, J., BERGSTROM, R., LINDGREN, A. & NYREN, O. (1999) *Symptomatic gastroesophageal reflux as a risk factor for esophageal adenocarcinoma.* N Engl J Med. **340**: 11: 825-831.
- LANGER, R., FEITH, M., SIEWERT, J. R., WESTER, H. J. & HOEFLER, H. (2008) *Expression and clinical significance of glucose regulated proteins GRP78 (BiP) and GRP94 (GP96) in human adenocarcinomas of the esophagus.* BMC Cancer. **8**: 70: 1-9.
- LAPPI, A. K., LENSINK, M. F., ALANEN, H. I., SALO, K. E., LOBELL, M., JUFFER, A. H. & RUDDOCK, L. W. (2004) *A conserved arginine plays a role in the catalytic cycle of the protein disulphide isomerases.* J Mol Biol. **335**: 1: 283-295.
- LEACH, M. R., COHEN-DOYLE, M. F., THOMAS, D. Y. & WILLIAMS, D. B. (2002) *Localization of the lectin, ERp57 binding, and polypeptide binding sites of calnexin and calreticulin.* J Biol Chem. **277**: 33: 29686-29697.
- LEE, A. S. (2001) *The glucose-regulated proteins: stress induction and clinical applications.* Trends Biochem Sci. **26**: 8: 504-510.
- LEE, C. H., BANG, S. H., LEE, S. K., SONG, K. Y. & LEE, I. C. (2005) *Gene expression profiling reveals sequential changes in gastric tubular adenoma and carcinoma in situ.* World J Gastroenterol. **11**: 13: 1937-1945.
- LEE, K., TIRASOPHON, W., SHEN, X., MICHALAK, M., PRYWES, R., OKADA, T., YOSHIDA, H., MORI, K. & KAUFMAN, R. J. (2002) *IRE1-mediated unconventional mRNA splicing and S2P-mediated ATF6 cleavage merge to regulate XBP1 in signaling the unfolded protein response.* Genes Dev. **16**: 4: 452-466.
- LEOPOLD, P. E., MONTAL, M. & ONUCHIC, J. N. (1992) *Protein folding funnels: a kinetic approach to the sequence-structure relationship.* Proc Natl Acad Sci U S A. **89**: 18: 8721-8725.

- LIAO, S., LIN, J., DO, H. & JOHNSON, A. E. (1997) *Both luminal and cytosolic gating of the aqueous ER translocon pore are regulated from inside the ribosome during membrane protein integration.* Cell. **90**: 1: 31-41.
- LINKE, K. & JAKOB, U. (2003) *Not every disulfide lasts forever: disulfide bond formation as a redox switch.* Antioxid Redox Signal. **5**: 4: 425-434.
- LIU, C. Y., XU, Z. & KAUFMAN, R. J. (2003) *Structure and intermolecular interactions of the luminal dimerization domain of human IRE1alpha.* J Biol Chem. **278**: 20: 17680-17687.
- LODISH, H. F., BERK, A. S., KAISER, C. A., KRIEGER, M., SCOTT, M. P., BRETSCHER, A., PLOEGH, H. L. & MATSUDAIRA, P. T. (2007) *Molecular Biology*, New York, W. H. Freeman.
- LORD, R. V., BRABENDER, J., WICKRAMASINGHE, K., DEMEESTER, S. R., HOLSCHER, A., SCHNEIDER, P. M., DANENBERG, P. V. & DEMEESTER, T. R. (2005) *Increased CDX2 and decreased PITX1 homeobox gene expression in Barrett's esophagus and Barrett's-associated adenocarcinoma.* Surgery. **138**: 5: 924-931.
- LOWRY, O. H., ROSEBROUGH, N. J., FARR, A. L. & RANDALL, R. J. (1951) *Protein measurement with the Folin phenol reagent.* J Biol Chem. **193**: 1: 265-275.
- LU, H., ALLEN, S., WARDLEWORTH, L., SAVORY, P. & TOKATLIDIS, K. (2004) *Functional TIM10 chaperone assembly is redox-regulated in vivo.* J Biol Chem. **279**: 18: 18952-18958.
- LUTCKE, H. (1995) *Signal recognition particle (SRP), a ubiquitous initiator of protein translocation.* Eur J Biochem. **228**: 3: 531-550.
- MA, Q., GUO, C., BARNEWITZ, K., SHELDRIK, G. M., SOLING, H. D., USON, I. & FERRARI, D. M. (2003) *Crystal Structure and Functional Analysis of Drosophila Wind, a Protein-disulfide Isomerase-related Protein.* The Journal of Biological Chemistry. **278**: 45: 44600-44607.
- MA, Y. & HENDERSHOT, L. M. (2004) *Herp is dually regulated by both the endoplasmic reticulum stress-specific branch of the unfolded protein response and a branch that is shared with other cellular stress pathways.* J Biol Chem. **279**: 14: 13792-13799.
- MAMATHAMBIKA, B. S. & BARDWELL, J. C. (2008) *Disulfide-linked protein folding pathways.* Annu Rev Cell Dev Biol. **24**: 211-235.

- MARIETTE, C., PERRAIS, M., LETEURTRE, E., JONCKHEERE, N., HEMON, B., PIGNY, P., BATRA, S., AUBERT, J. P., TRIBOULET, J. P. & VAN SEUNINGEN, I. (2004) *Transcriptional regulation of human mucin MUC4 by bile acids in oesophageal cancer cells is promoter-dependent and involves activation of the phosphatidylinositol 3-kinase signalling pathway*. *Biochem J.* **377**: 3: 701-708.
- MARQUARDT, T., HEBERT, D. N. & HELENIUS, A. (1993) *Post-translational folding of influenza hemagglutinin in isolated endoplasmic reticulum-derived microsomes*. *J Biol Chem.* **268**: 26: 19618-19625.
- MARUYAMA, T., MIYAMOTO, Y., NAKAMURA, T., TAMAI, Y., OKADA, H., SUGIYAMA, E., NAKAMURA, T., ITADANI, H. & TANAKA, K. (2002) *Identification of membrane-type receptor for bile acids (M-BAR)*. *Biochem Biophys Res Commun.* **298**: 5: 714-719.
- MASUI, S., VAVASSORI, S., FAGIOLI, C., SITIA, R. & INABA, K. (2011) *Molecular Bases of Cyclic and Specific Disulfide Interchange between Human ERO1 Protein and Protein-disulfide Isomerase (PDI)*. *Journal of Biological Chemistry.* **286**: 18: 16261-16271.
- MAY, D., ITIN, A., GAL, O., KALINSKI, H., FEINSTEIN, E. & KESHET, E. (2005) *Ero1-L alpha plays a key role in a HIF-1-mediated pathway to improve disulfide bond formation and VEGF secretion under hypoxia: implication for cancer*. *Oncogene.* **24**: 6: 1011-1020.
- MCCARTHY, A. A., HAEBEL, P. W., TORRONEN, A., RYBIN, V., BAKER, E. N. & METCALF, P. (2000) *Crystal structure of the protein disulfide bond isomerase, DsbC, from Escherichia coli*. *Nat Struct Biol.* **7**: 3: 196-199.
- MCPHEE, S. J., LINGPAPPA, V. R., GANONG, W. F. & LANGE, J. D. (1995) *Pathophysiology of Disease: An Introduction to Clinical Medicine*, Stamford, Connecticut, Appleton & Lange.
- MESAELI, N., NAKAMURA, K., ZVARITCH, E., DICKIE, P., DZIAK, E., KRAUSE, K. H., OPAS, M., MACLENNAN, D. H. & MICHALAK, M. (1999) *Calreticulin is essential for cardiac development*. *J Cell Biol.* **144**: 5: 857-868.
- MESECKE, N., TERZIYSKA, N., KOZANY, C., BAUMANN, F., NEUPERT, W., HELL, K. & HERRMANN, J. M. (2005) *A disulfide relay system in the intermembrane space of mitochondria that mediates protein import*. *Cell.* **121**: 7: 1059-1069.

- MEUNIER, L., USHERWOOD, Y. K., CHUNG, K. T. & HENDERSHOT, L. M. (2002) *A subset of chaperones and folding enzymes form multiprotein complexes in endoplasmic reticulum to bind nascent proteins*. *Mol Biol Cell*. **13**: 12: 4456-4469.
- MEZGHRANI, A., FASSIO, A., BENHAM, A., SIMMEN, T., BRAAKMAN, I. & SITIA, R. (2001) *Manipulation of oxidative protein folding and PDI redox state in mammalian cells*. *Embo J*. **20**: 22: 6288-6296.
- MICHALAK, M., CORBETT, E. F., MESAELI, N., NAKAMURA, K. & OPAS, M. (1999) *Calreticulin: one protein, one gene, many functions*. *Biochem J*. **344**: 2: 281-292.
- MICHALAK, M., ROBERT PARKER, J. M. & OPAS, M. (2002) *Ca²⁺ signaling and calcium binding chaperones of the endoplasmic reticulum*. *Cell Calcium*. **32**: 5-6: 269-278.
- MIRSKY, A. E. & PAULING, L. (1936) *On the Structure of Native, Denatured, and Coagulated Proteins*. *Proc Natl Acad Sci U S A*. **22**: 7: 439-447.
- MIYAZAKI, J., APPELLA, E., ZHAO, H., FORMAN, J. & OZATO, K. (1986) *Expression and function of a nonglycosylated major histocompatibility class I antigen*. *J Exp Med*. **163**: 4: 856-871.
- MOLINARI, M., ERIKSSON, K. K., CALANCA, V., GALLI, C., CRESSWELL, P., MICHALAK, M. & HELENIUS, A. (2004) *Contrasting functions of calreticulin and calnexin in glycoprotein folding and ER quality control*. *Mol Cell*. **13**: 1: 125-135.
- MOLTENI, S. N., FASSIO, A., CIRIOLO, M. R., FILOMENI, G., PASQUALETTO, E., FAGIOLI, C. & SITIA, R. (2004) *Glutathione limits Ero1-dependent oxidation in the endoplasmic reticulum*. *J Biol Chem*. **279**: 31: 32667-32673.
- MORGAN, C., ALAZAWI, W., SIRIEIX, P., FREEMAN, T., COLEMAN, N. & FITZGERALD, R. (2004) *In vitro acid exposure has a differential effect on apoptotic and proliferative pathways in a Barrett's adenocarcinoma cell line*. *Am J Gastroenterol*. **99**: 2: 218-224.
- MORRISSEY, J. H. (1981) *Silver stain for proteins in polyacrylamide gels: a modified procedure with enhanced uniform sensitivity*. *Anal Biochem*. **117**: 2: 307-310.
- MOTHES, W., PREHN, S. & RAPOPORT, T. A. (1994) *Systematic probing of the environment of a translocating secretory protein during translocation through the ER membrane*. *Embo J*. **13**: 17: 3973-3982.

MULLER-TAUBENBERGER, A., LUPAS, A. N., LI, H., ECKE, M., SIMMETH, E. & GERISCH, G. (2001) *Calreticulin and calnexin in the endoplasmic reticulum are important for phagocytosis*. *Embo J.* **20**: 23: 6772-6782.

MUNRO, S. & PELHAM, H. R. B. (1987) *A C-terminal signal prevents secretion of luminal ER proteins*. *Cell.* **48**: 5: 899-907.

MYANT, N. B. & MITROPOULOS, K. A. (1977) *Cholesterol 7 alpha-hydroxylase*. *J Lipid Res.* **18**: 2: 135-153.

NAGAI, K., OUBRIDGE, C., KUGLSTATTER, A., MENICHELLI, E., ISEL, C. & JOVINE, L. (2003) *Structure, function and evolution of the signal recognition particle*. *EMBOJ.* **22**: 14: 3479-3485.

NAKAGAWA, T. & YUAN, J. (2000) *Cross-talk between two cysteine protease families. Activation of caspase-12 by calpain in apoptosis*. *J Cell Biol.* **150**: 4: 887-894.

NAKAMOTO, H. & BARDWELL, J. C. (2004) *Catalysis of disulfide bond formation and isomerization in the Escherichia coli periplasm*. *Biochim Biophys Acta.* **1694**: 1-3: 111-119.

NEHRA, D., HOWELL, P., WILLIAMS, C. P., PYE, J. K. & BEYNON, J. (1999) *Toxic bile acids in gastro-oesophageal reflux disease: influence of gastric acidity*. *Gut.* **44**: 598-602.

NEMOTO, T., SATO, N., IWANARI, H., YAMASHITA, H. & TAKAGI, T. (1997) *Domain structures and immunogenic regions of the 90-kDa heat-shock protein (HSP90). Probing with a library of anti-HSP90 monoclonal antibodies and limited proteolysis*. *J Biol Chem.* **272**: 42: 26179-26187.

NGUYEN, A. & BOUSCAREL, B. (2008) *Bile acids and signal transduction: role in glucose homeostasis*. *Cell Signal.* **20**: 12: 2180-2197.

NGUYEN, V. D., WALLIS, K., HOWARD, M. J., HAAPALAINEN, A. M., SALO, K. E., SAARANEN, M. J., SIDHU, A., WIERENGA, R. K., FREEDMAN, R. B., RUDDOCK, L. W. & WILLIAMSON, R. A. (2008) *Alternative conformations of the x region of human protein disulphide-isomerase modulate exposure of the substrate binding b' domain*. *J Mol Biol.* **383**: 5: 1144-1155.

NICCHITTA, C. V., MURPHY, E. C., 3RD, HAYNES, R. & SHELNESS, G. S. (1995) *Stage- and ribosome-specific alterations in nascent chain-Sec61p interactions accompany translocation across the ER membrane*. *J Cell Biol.* **129**: 4: 957-970.

- NILSSON, I. & VON HEIJNE, G. (1993) *Determination of the distance between the oligosaccharyltransferase active site and the endoplasmic reticulum membrane.* J Biol Chem. **268**: 8: 5798-5801.
- NILSSON, T., JACKSON, M. & PETERSON, P. A. (1989) *Short cytoplasmic sequences serve as retention signals for transmembrane proteins in the endoplasmic reticulum.* Cell. **58**: 4: 707-718.
- OH, T. Y., LEE, J. S., AHN, B. O., CHO, H., KIM, W. B., KIM, Y. B., SURH, Y. J., CHO, S. W. & HAHM, K. B. (2001) *Oxidative damages are critical in pathogenesis of reflux esophagitis: implication of antioxidants in its treatment.* Free Radic Biol Med. **30**: 8: 905-915.
- OLDEN, K., PARENT, J. B. & WHITE, S. L. (1982) *Carbohydrate moieties of glycoproteins. A re-evaluation of their function.* Biochim Biophys Acta. **650**: 4: 209-232.
- OLDEN, K., PRATT, R. M. & YAMADA, K. M. (1978) *Role of carbohydrates in protein secretion and turnover: effects of tunicamycin on the major cell surface glycoprotein of chick embryo fibroblasts.* Cell. **13**: 3: 461-473.
- ONDO-MBELE, E., VIVES, C., KONE, A. & SERRE, L. (2005) *Intriguing conformation changes associated with the trans/cis isomerization of a prolyl residue in the active site of the DsbA C33A mutant.* J Mol Biol. **347**: 3: 555-563.
- ONWUEGBUSI, B. A., REES, J. R., LAO-SIRIEIX, P. & FITZGERALD, R. C. (2007) *Selective loss of TGFbeta Smad-dependent signalling prevents cell cycle arrest and promotes invasion in oesophageal adenocarcinoma cell lines.* PLoS One. **2**: 1: e177.
- OSTERGAARD, H., TACHIBANA, C. & WINTHER, J. R. (2004) *Monitoring disulfide bond formation in the eukaryotic cytosol.* J Cell Biol. **166**: 3: 337-345.
- OTSU, M., BERTOLI, G., FAGIOLI, C., GUERINI-ROCCO, E., NERINI-MOLTENI, S., RUFFATO, E. & SITIA, R. (2006) *Dynamic Retention of Ero1alpha and Ero1beta in the Endoplasmic Reticulum by Interactions with PDI and ERp44.* Antioxid Redox Signal. **8**: 3-4: 274-282.
- PAGANI, M., FABBRI, M., BENEDETTI, C., FASSIO, A., PILATI, S., BULLEID, N. J., CABIBBO, A. & SITIA, R. (2000) *Endoplasmic reticulum oxidoreductin 1-beta (ERO1-Lbeta), a human gene induced in the course of the unfolded protein response.* J Biol Chem. **275**: 31: 23685-23692.

- PAGANI, M., PILATI, S., BERTOLI, G., VALSASINA, B. & SITIA, R. (2001) *The C-terminal domain of yeast Ero1p mediates membrane localization and is essential for function.* FEBS Lett. **508**: 1: 117-120.
- PAPP, E., NARDAI, G., MANDL, J., BANHEGYI, G. & CSERMELY, P. (2005) *FAD oxidizes the ERO1-PDI electron transfer chain: the role of membrane integrity.* Biochem Biophys Res Commun. **338**: 2: 938-945.
- PELHAM, H. R. (1988) *Evidence that luminal ER proteins are sorted from secreted proteins in a post-ER compartment.* Embo J. **7**: 4: 913-918.
- PELHAM, H. R. & MUNRO, S. (1993) *Sorting of membrane proteins in the secretory pathway.* Cell. **75**: 4: 603-605.
- PELLICORO, A. & FABER, K. N. (2007) *Review article: The function and regulation of proteins involved in bile salt biosynthesis and transport.* Aliment Pharmacol Ther. **26**: 2: 149-160.
- PENG, D. F., RAZVI, M., CHEN, H., WASHINGTON, K., ROESSNER, A., SCHNEIDER-STOCK, R. & EL-RIFAI, W. (2009) *DNA hypermethylation regulates the expression of members of the Mu-class glutathione S-transferases and glutathione peroxidases in Barrett's adenocarcinoma.* Gut. **58**: 1: 5-15.
- PERSSON, S., ROSENQUIST, M., KNOBLACH, B., KHOSRAVI-FAR, R., SOMMARIN, M. & MICHALAK, M. (2005) *Diversity of the protein disulfide isomerase family: identification of breast tumor induced Hag2 and Hag3 as novel members of the protein family.* Mol Phylogenet Evol. **36**: 3: 734-740.
- PHAM, V. T., EWING, E., KAPLAN, H., CHOMA, C. & HEFFORD, M. A. (2008) *Glycation improves the thermostability of trypsin and chymotrypsin.* Biotechnol Bioeng. **101**: 3: 452-459.
- PHILLIPS, R. W., FRIERSON, H. F., JR. & MOSKALUK, C. A. (2003) *Cdx2 as a marker of epithelial intestinal differentiation in the esophagus.* Am J Surg Pathol. **27**: 11: 1442-1447.
- PIRNESKOSKI, A., KLAPPA, P., LOBELL, M., WILLIAMSON, R. A., BYRNE, L., ALANEN, H. I., SALO, K. E., KIVIRIKKO, K. I., FREEDMAN, R. B. & RUDDOCK, L. W. (2004) *Molecular characterization of the principal substrate binding site of the ubiquitous folding catalyst protein disulfide isomerase.* J Biol Chem. **279**: 11: 10374-10381.

- PITONZO, D., YANG, Z., MATSUMURA, Y., JOHNSON, A. E. & SKACH, W. R. (2009) *Sequence-specific retention and regulated integration of a nascent membrane protein by the endoplasmic reticulum Sec61 translocon*. *Mol Biol Cell*. **20**: 2: 685-698.
- POHL, H. & WELCH, H. G. (2005) *The role of overdiagnosis and reclassification in the marked increase of esophageal adenocarcinoma incidence*. *J Natl Cancer Inst*. **97**: 2: 142-146.
- POHLER, E., CRAIG, A. L., COTTON, J., LAWRIE, L., DILLON, J. F., ROSS, P., KERNOHAN, N. & HUPP, T. R. (2004) *The Barrett's antigen anterior gradient-2 silences the p53 transcriptional response to DNA damage*. *Mol Cell Proteomics*. **3**: 6: 534-547.
- POLLARD, M. G., TRAVERS, K. J. & WEISSMAN, J. S. (1998) *Ero1p: a novel and ubiquitous protein with an essential role in oxidative protein folding in the endoplasmic reticulum*. *Mol Cell*. **1**: 2: 171-182.
- POOL, M. R. (2009) *A trans-membrane segment inside the ribosome exit tunnel triggers RAMP4 recruitment to the Sec61p translocase*. *J Cell Biol*. **185**: 5: 889-902.
- POPOV, M., TAM, L. Y., LI, J. & REITHMEIER, R. A. (1997) *Mapping the ends of transmembrane segments in a polytopic membrane protein. Scanning N-glycosylation mutagenesis of extracytosolic loops in the anion exchanger, band 3*. *J Biol Chem*. **272**: 29: 18325-18332.
- PRACH, A. T., MACDONALD, T. A., HOPWOOD, D. A. & JOHNSTON, D. A. (1997) *Increasing incidence of Barrett's oesophagus: education, enthusiasm, or epidemiology?* *Lancet*. **350**: 9082: 933.
- RAMOS, M. & LOPEZ DE CASTRO, J. A. (2002) *HLA-B27 and the pathogenesis of spondyloarthritis*. *Tissue Antigens*. **60**: 3: 191-205.
- RANCY, P. C. & THORPE, C. (2008) *Oxidative protein folding in vitro: a study of the cooperation between quiescin-sulfhydryl oxidase and protein disulfide isomerase*. *Biochemistry*. **47**: 46: 12047-12056.
- RAO, R. V., CASTRO-OBREGON, S., FRANKOWSKI, H., SCHULER, M., STOKA, V., DEL RIO, G., BREDESEN, D. E. & ELLERBY, H. M. (2002) *Coupling endoplasmic reticulum stress to the cell death program. An Apaf-1-independent intrinsic pathway*. *J Biol Chem*. **277**: 24: 21836-21842.
- RAPOPORT, T. A. (2007) *Protein translocation across the eukaryotic endoplasmic reticulum and bacterial plasma membranes*. *Nature*. **450**: 7170: 663-669.

- RASHEED, S., NELSON-REES, W. A., TOTH, E. M., ARNSTEIN, P. & GARDNER, M. B. (1974) *Characterization of a newly derived human sarcoma cell line (HT-1080)*. *Cancer*. **33**: 4: 1027-1033.
- RAYKHEL, I., ALANEN, H., SALO, K., JURVANSUU, J., NGUYEN, V. D., LATVA-RANTA, M. & RUDDOCK, L. (2007) *A molecular specificity code for the three mammalian KDEL receptors*. *J Cell Biol*. **179**: 6: 1193-1204.
- RIEMER, J., BULLEID, N. & HERRMANN, J. M. (2009) *Disulfide formation in the ER and mitochondria: two solutions to a common process*. *Science*. **324**: 5932: 1284-1287.
- RIETSCH, A., BELIN, D., MARTIN, N. & BECKWITH, J. (1996) *An in vivo pathway for disulfide bond isomerization in Escherichia coli*. *Proc Natl Acad Sci U S A*. **93**: 23: 13048-13053.
- ROCKETT, J. C., LARKIN, K., DARNTON, S. J., MORRIS, A. G. & MATTHEWS, H. R. (1997) *Five newly established oesophageal carcinoma cell lines: phenotypic and immunological characterization*. *Br J Cancer*. **75**: 2: 258-263.
- RODA, A., HOFMANN, A. F. & MYSELS, K. J. (1983) *The influence of bile salt structure on self-association in aqueous solutions*. *J Biol Chem*. **258**: 10: 6362-6370.
- RUDDOCK, L. W., FREEDMAN, R. B. & KLAPPA, P. (2000) *Specificity in substrate binding by protein folding catalysts: tyrosine and tryptophan residues are the recognition motifs for the binding of peptides to the pancreas-specific protein disulfide isomerase PDIp*. *Protein Sci*. **9**: 4: 758-764.
- RUDIGER, S., BUCHBERGER, A. & BUKAU, B. (1997) *Interaction of Hsp70 chaperones with substrates*. *Nat Struct Biol*. **4**: 5: 342-349.
- RUTKOWSKI, D. T. & KAUFMAN, R. J. (2004) *A trip to the ER: coping with stress*. *Trends Cell Biol*. **14**: 1: 20-28.
- SADLISH, H., PITONZO, D., JOHNSON, A. E. & SKACH, W. R. (2005) *Sequential triage of transmembrane segments by Sec61alpha during biogenesis of a native multispanning membrane protein*. *Nat Struct Mol Biol*. **12**: 10: 870-878.
- SAITO, Y., IHARA, Y., LEACH, M. R., COHEN-DOYLE, M. F. & WILLIAMS, D. B. (1999) *Calreticulin functions in vitro as a molecular chaperone for both glycosylated and non-glycosylated proteins*. *Embo J*. **18**: 6718 - 6729.

- SCHNELL, T. G., SONTAG, S. J., CHEJFEC, G., ARANHA, G., METZ, A., O'CONNELL, S., SEIDEL, U. J. & SONNENBERG, A. (2001) *Long-term nonsurgical management of Barrett's esophagus with high-grade dysplasia*. *Gastroenterology*. **120**: 7: 1607-1619.
- SCHRAG, J. D., BERGERON, J. J., LI, Y., BORISOVA, S., HAHN, M., THOMAS, D. Y. & CYGLER, M. (2001) *The Structure of calnexin, an ER chaperone involved in quality control of protein folding*. *Mol Cell*. **8**: 3: 633-644.
- SCHRODER, M. & KAUFMAN, R. J. (2005) *The mammalian unfolded protein response*. *Annu Rev Biochem*. **74**: 739-89.
- SCHWARZ, M., WRIGHT, A. C., DAVIS, D. L., NAZER, H., BJORKHEM, I. & RUSSELL, D. W. (2000) *The bile acid synthetic gene 3 beta-hydroxy-delta(5)-C-27-steroid oxidoreductase is mutated in progressive intrahepatic cholestasis*. *Journal of Clinical Investigation*. **106**: 1175-1184.
- SCHWEITZER, E. J., BASS, B. L., BATZRI, S. & HARMON, J. W. (1986) *Bile acid accumulation by rabbit esophageal mucosa*. *Dig Dis Sci*. **31**: 10: 1105-1113.
- SCORRANO, L., OAKES, S. A., OPFERMAN, J. T., CHENG, E. H., SORCINELLI, M. D., POZZAN, T. & KORSMEYER, S. J. (2003) *BAX and BAK regulation of endoplasmic reticulum Ca²⁺: a control point for apoptosis*. *Science*. **300**: 5616: 135-139.
- SCOTT, D. R., WEEKS, D., HONG, C., POSTIUS, S., MELCHERS, K. & SACHS, G. (1998) *The role of internal urease in acid resistance of Helicobacter pylori*. *Gastroenterology*. **114**: 1: 58-70.
- SCOTT, J. E. & DAWSON, J. R. (1995) *MHC class I expression and transport in a calnexin-deficient cell line*. *J Immunol*. **155**: 1: 143-148.
- SEEDORF, U. & ASSMANN, G. (1991) *Cloning, expression, and nucleotide sequence of rat liver sterol carrier protein 2 cDNAs*. *J Biol Chem*. **266**: 1: 630-636.
- SEMENZA, J. C., HARDWICK, K. G., DEAN, N. & PELHAM, H. R. (1990) *ERD2, a yeast gene required for the receptor-mediated retrieval of luminal ER proteins from the secretory pathway*. *Cell*. **61**: 7: 1349-1357.
- SEVIER, C. S., KADOKURA, H., TAM, V. C., BECKWITH, J., FASS, D. & KAISER, C. A. (2005) *The prokaryotic enzyme DsbB may share key structural features with eukaryotic disulfide bond forming oxidoreductases*. *Protein Sci*. **14**: 6: 1630-1642.

- SEVIER, C. S. & KAISER, C. A. (2002) *Formation and transfer of disulphide bonds in living cells*. *Nat Rev Mol Cell Biol.* **3**: 11: 836-847.
- SEVIER, C. S. & KAISER, C. A. (2008) *Ero1 and redox homeostasis in the endoplasmic reticulum*. *Biochim Biophys Acta.* **1783**: 4: 549-556.
- SEVIER, C. S., QU, H., HELDMAN, N., GROSS, E., FASS, D. & KAISER, C. A. (2007) *Modulation of cellular disulfide-bond formation and the ER redox environment by feedback regulation of Ero1*. *Cell.* **129**: 2: 333-344.
- SHEN, J., CHEN, X., HENDERSHOT, L. & PRYWES, R. (2002) *ER stress regulation of ATF6 localization by dissociation of BiP/GRP78 binding and unmasking of Golgi localization signals*. *Dev Cell.* **3**: 1: 99-111.
- SHEN, X., ELLIS, R. E., LEE, K., LIU, C. Y., YANG, K., SOLOMON, A., YOSHIDA, H., MORIMOTO, R., KURNIT, D. M., MORI, K. & KAUFMAN, R. J. (2001) *Complementary signaling pathways regulate the unfolded protein response and are required for C. elegans development*. *Cell.* **107**: 7: 893-903.
- SHENTAL-BECHOR, D. & LEVY, Y. (2008) *Effect of glycosylation on protein folding: a close look at thermodynamic stabilization*. *Proc Natl Acad Sci U S A.* **105**: 24: 8256-8261.
- SHENTAL-BECHOR, D. & LEVY, Y. (2009) *Folding of glycoproteins: toward understanding the biophysics of the glycosylation code*. *Curr Opin Struct Biol.* **19**: 5: 524-533.
- SI, J., FU, X., BEHAR, J., WANDS, J., BEER, D. G., SOUZA, R. F., SPECHLER, S. J., LAMBETH, D. & CAO, W. (2007) *NADPH oxidase NOX5-S mediates acid-induced cyclooxygenase-2 expression via activation of NF-kappaB in Barrett's esophageal adenocarcinoma cells*. *J Biol Chem.* **282**: 22: 16244-16255.
- SMALL, D. M., PENKETT, S. A. & CHAPMAN, D. (1969) *Studies on simple and mixed bile salt micelles by nuclear magnetic resonance spectroscopy*. *Biochim Biophys Acta.* **176**: 1: 178-189.
- SOLA, R. J., RODRIGUEZ-MARTINEZ, J. A. & GRIEBENOW, K. (2007) *Modulation of protein biophysical properties by chemical glycosylation: biochemical insights and biomedical implications*. *Cell Mol Life Sci.* **64**: 16: 2133-2152.
- SOUSA, M. C., FERRERO-GARCIA, M. A. & PARODI, A. J. (1992) *Recognition of the oligosaccharide and protein moieties of glycoproteins by the UDP-Glc:glycoprotein glucosyltransferase*. *Biochemistry.* **31**: 1: 97-105.

- SPIRO, R. G., ZHU, Q., BHOYROO, V. & SOLING, H. D. (1996) *Definition of the lectin-like properties of the molecular chaperone, calreticulin, and demonstration of its copurification with endomannosidase from rat liver Golgi*. J Biol Chem. **271**: 19: 11588-11594.
- STAM, N. J., SPITS, H. & PLOEGH, H. L. (1986) *Monoclonal antibodies raised against denatured HLA-B locus heavy chains permit biochemical characterization of certain HLA-C locus products*. J Immunol. **137**: 7: 2299-2306.
- STAMP, D. H. (2002) *Three hypotheses linking bile to carcinogenesis in the gastrointestinal tract: certain bile salts have properties that may be used to complement chemotherapy*. Med Hypotheses. **59**: 4: 398-405.
- STONER, G. D., DOMBKOWSKI, A. A., REEN, R. K., CUKOVIC, D., SALAGRAMA, S., WANG, L. S. & LECHNER, J. F. (2008) *Carcinogen-altered genes in rat esophagus positively modulated to normal levels of expression by both black raspberries and phenylethyl isothiocyanate*. Cancer Res. **68**: 15: 6460-6467.
- TANG, Y. C., CHANG, H. C., HAYER-HARTL, M. & HARTL, F. U. (2007) *SnapShot: molecular chaperones, Part II*. Cell. **128**: 2: 412.
- TAVENDER, T. J., SHEPPARD, A. M. & BULLEID, N. J. (2008) *Peroxioredoxin IV is an endoplasmic reticulum-localized enzyme forming oligomeric complexes in human cells*. Biochem J. **411**: 1: 191-199.
- TIAN, G., KOBER, F. X., LEWANDROWSKI, U., SICKMANN, A., LENNARZ, W. J. & SCHINDELIN, H. (2008) *The catalytic activity of protein-disulfide isomerase requires a conformationally flexible molecule*. J Biol Chem. **283**: 48: 33630-33640.
- TIAN, G., XIANG, S., NOIVA, R., LENNARZ, W. J. & SCHINDELIN, H. (2006) *The crystal structure of yeast protein disulfide isomerase suggests cooperativity between its active sites*. Cell. **124**: 1: 61-73.
- TOLL, A., WIKVALL, K., SUDJANA-SUGIAMAN, E., KONDO, K. H. & BJORKHEM, I. (1994) *7 alpha hydroxylation of 25-hydroxycholesterol in liver microsomes. Evidence that the enzyme involved is different from cholesterol 7 alpha-hydroxylase*. Eur J Biochem. **224**: 2: 309-316.
- TOWNSLEY, F. M. & PELHAM, H. R. (1994) *The KKXX signal mediates retrieval of membrane proteins from the Golgi to the ER in yeast*. Eur J Cell Biol. **64**: 1: 211-216.

- TU, B. P., HO-SCHLEYER, S. C., TRAVERS, K. J. & WEISSMAN, J. S. (2000) *Biochemical basis of oxidative protein folding in the endoplasmic reticulum*. *Science*. **290**: 5496: 1571-1574.
- TU, B. P. & WEISSMAN, J. S. (2002) *The FAD- and O(2)-dependent reaction cycle of Ero1-mediated oxidative protein folding in the endoplasmic reticulum*. *Mol Cell*. **10**: 5: 983-994.
- VALKO, M., LEIBFRITZ, D., MONCOL, J., CRONIN, M. T., MAZUR, M. & TELSNER, J. (2007) *Free radicals and antioxidants in normal physiological functions and human disease*. *Int J Biochem Cell Biol*. **39**: 1: 44-84.
- VAN DEN BERG, B., CLEMONS, W. M., JR., COLLINSON, I., MODIS, Y., HARTMANN, E., HARRISON, S. C. & RAPOPORT, T. A. (2004) *X-ray structure of a protein-conducting channel*. *Nature*. **427**: 6969: 36-44.
- VAN LAAR, T., VAN DER EB, A. J. & TERLETH, C. (2001) *Mif1: a missing link between the unfolded protein response pathway and ER-associated protein degradation?* *Curr Protein Pept Sci*. **2**: 2: 169-190.
- VASSILAKOS, A., MICHALAK, M., LEHRMAN, M. A. & WILLIAMS, D. B. (1998) *Oligosaccharide binding characteristics of the molecular chaperones calnexin and calreticulin*. *Biochemistry*. **37**: 10: 3480-3490.
- WALTER, P., IBRAHIMI, I. & BLOBEL, G. (1981) *Translocation of proteins across the endoplasmic reticulum. I. Signal recognition protein (SRP) binds to in-vitro-assembled polysomes synthesizing secretory protein*. *J Cell Biol*. **91**: 2: 545-550.
- WANG, C., CHEN, S., WANG, X., WANG, L., WALLIS, A. K., FREEDMAN, R. B. & WANG, C. C. (2010) *Plasticity of human protein disulfide isomerase: evidence for mobility around the X-linker region and its functional significance*. *J Biol Chem*. **285**: 35: 26788-26797.
- WANG, L., ZHU, L. & WANG, C. C. (2011a) *The endoplasmic reticulum sulfhydryl oxidase Ero1beta drives efficient oxidative protein folding with loose regulation*. *Biochem J*. **434**: 1: 113-21.
- WANG, X., OUYANG, H., YAMAMOTO, Y., KUMAR, P. A., WEI, T. S., DAGHER, R., VINCENT, M., LU, X., BELLIZZI, A. M., HO, K. Y., CRUM, C. P., XIAN, W. & MCKEON, F. (2011b) *Residual Embryonic Cells as Precursors of a Barrett's-like Metaplasia*. *Cell*. **145**: 7: 1023-1035.

- WANG, Y., SHEN, J., ARENZANA, N., TIRASOPHON, W., KAUFMAN, R. J. & PRYWES, R. (2000) *Activation of ATF6 and an ATF6 DNA binding site by the endoplasmic reticulum stress response*. *J Biol Chem.* **275**: 35: 27013-27020.
- WARE, F. E., VASSILAKOS, A., PETERSON, P. A., JACKSON, M. R., LEHRMAN, M. A. & WILLIAMS, D. B. (1995) *The molecular chaperone calnexin binds Glc1Man9GlcNAc2 oligosaccharide as an initial step in recognizing unfolded glycoproteins*. *J Biol Chem.* **270**: 9: 4697-4704.
- WHITE, S. H. & VON HEIJNE, G. (2008) *How translocons select transmembrane helices*. *Annu Rev Biophys.* **37**: 23-42.
- WILD, K., ROSENDAL, K. R. & SINNING, I. (2004) *A structural step into the SRP cycle*. *Mol Microbiol.* **53**: 2: 357-363.
- WILLIAMS, D. B. (2006) *Beyond lectins: the calnexin/calreticulin chaperone system of the endoplasmic reticulum*. *J Cell Sci.* **119**: Pt 4: 615-623.
- WILSON, I. A., SKEHEL, J. J. & WILEY, D. C. (1981) *Structure of the haemagglutinin membrane glycoprotein of influenza virus at 3 Å resolution*. *Nature.* **289**: 5796: 366-373.
- WIRTH, A., JUNG, M., BIES, C., FRIEN, M., TYEDMERS, J., ZIMMERMANN, R. & WAGNER, R. (2003) *The Sec61p complex is a dynamic precursor activated channel*. *Mol Cell.* **12**: 1: 261-268.
- WOLYNES, P. G. (2005) *Energy landscapes and solved protein-folding problems*. *Philos Transact A Math Phys Eng Sci.* **363**: 1827: 453-464.
- WONG, N. A., WILDING, J., BARTLETT, S., LIU, Y., WARREN, B. F., PIRIS, J., MAYNARD, N., MARSHALL, R. & BODMER, W. F. (2005) *CDX1 is an important molecular mediator of Barrett's metaplasia*. *Proc Natl Acad Sci U S A.* **102**: 21: 7565-7570.
- WOOD, Z. A., SCHRODER, E., ROBIN HARRIS, J. & POOLE, L. B. (2003) *Structure, mechanism and regulation of peroxiredoxins*. *Trends Biochem Sci.* **28**: 1: 32-40.
- WOOLHEAD, C. A., MCCORMICK, P. J. & JOHNSON, A. E. (2004) *Nascent membrane and secretory proteins differ in FRET-detected folding far inside the ribosome and in their exposure to ribosomal proteins*. *Cell.* **116**: 5: 725-736.

- WU, X., WANDERS, A., WARDEGA, P., TINGE, B., GEDDA, L., BERGSTROM, S., SOOMAN, L., GULLBO, J., BERGQVIST, M., HESSELIUS, P., LENNARTSSON, J. & EKMAN, S. (2009) *Hsp90 is expressed and represents a therapeutic target in human oesophageal cancer using the inhibitor 17-allylamino-17-demethoxygeldanamycin*. Br J Cancer. **100**: 2: 334-343.
- WYSS, D. F., CHOI, J. S., LI, J., KNOPPERS, M. H., WILLIS, K. J., ARULANANDAM, A. R., SMOLYAR, A., REINHERZ, E. L. & WAGNER, G. (1995) *Conformation and function of the N-linked glycan in the adhesion domain of human CD2*. Science. **269**: 5228: 1273-1278.
- XIE, T., YU, L., BADER, M. W., BARDWELL, J. C. & YU, C. A. (2002) *Identification of the ubiquinone-binding domain in the disulfide catalyst disulfide bond protein B*. J Biol Chem. **277**: 3: 1649-1652.
- YAMAMOTO, K., SATO, T., MATSUI, T., SATO, M., OKADA, T., YOSHIDA, H., HARADA, A. & MORI, K. (2007) *Transcriptional induction of mammalian ER quality control proteins is mediated by single or combined action of ATF6alpha and XBP1*. Dev Cell. **13**: 3: 365-376.
- YANAI, I., BENJAMIN, H., SHMOISH, M., CHALIFA-CASPI, V., SHKLAR, M., OPHIR, R., BAR-EVEN, A., HORN-SABAN, S., SAFRAN, M., DOMANY, E., LANCET, D. & SHMUELI, O. (2005) *Genome-wide midrange transcription profiles reveal expression level relationships in human tissue specification*. Bioinformatics. **21**: 5: 650-659.
- YANG, M. D., LAI, K. C., LAI, T. Y., HSU, S. C., KUO, C. L., YU, C. S., LIN, M. L., YANG, J. S., KUO, H. M., WU, S. H. & CHUNG, J. G. (2010) *Phenethyl isothiocyanate inhibits migration and invasion of human gastric cancer AGS cells through suppressing MAPK and NF-kappaB signal pathways*. Anticancer Research. **30**: 6: 2135-2143.
- YASUDA, H., HIRATA, S., INOUE, K., MASHIMA, H., OHNISHI, H. & YOSHIBA, M. (2007) *Involvement of membrane-type bile acid receptor M-BAR/TGR5 in bile acid-induced activation of epidermal growth factor receptor and mitogen-activated protein kinases in gastric carcinoma cells*. Biochem Biophys Res Commun. **354**: 1: 154-159.
- YOSHIDA, H., MATSUI, T., HOSOKAWA, N., KAUFMAN, R. J., NAGATA, K. & MORI, K. (2003) *A time-dependent phase shift in the mammalian unfolded protein response*. Dev Cell. **4**: 2: 265-271.

YOSHIDA, H., MATSUI, T., YAMAMOTO, A., OKADA, T. & MORI, K. (2001) *XBPI mRNA is induced by ATF6 and spliced by IRE1 in response to ER stress to produce a highly active transcription factor*. *Cell*. **107**: 7: 881-891.

ZAPUN, A., BARDWELL, J. C. & CREIGHTON, T. E. (1993) *The reactive and destabilizing disulfide bond of DsbA, a protein required for protein disulfide bond formation in vivo*. *Biochemistry*. **32**: 19: 5083-5092.

ZHANG, M., MONZINGO, A. F., SEGATORI, L., GEORGIU, G. & ROBERTUS, J. D. (2004) *Structure of DsbC from Haemophilus influenzae*. *Acta Crystallogr D Biol Crystallogr*. **60**: Pt 9: 1512-1518.

ZHU, Y., FILLENWARTH, M. J., CRABB, D., LUMENG, L. & LIN, R. C. (1996) *Identification of the 37-kd rat liver protein that forms an acetaldehyde adduct in vivo as delta 4-3-ketosteroid 5 beta-reductase*. *Hepatology*. **23**: 1: 115-122.

ZITO, E., CHIN, K. T., BLAIS, J., HARDING, H. P. & RON, D. (2010) *ERO1-β, a pancreas-specific disulfide oxidase, promotes insulin biogenesis and glucose homeostasis*. *The Journal of Cell Biology*. **188**: 6: 821-832.

ZONG, W. X., LI, C., HATZIVASSILIOU, G., LINDSTEN, T., YU, Q. C., YUAN, J. & THOMPSON, C. B. (2003) *Bax and Bak can localize to the endoplasmic reticulum to initiate apoptosis*. *J Cell Biol*. **162**: 1: 59-69.