

DAFTAR PUSTAKA

- Angelov, N., Moutsopoulos, N., Jeong, M.J., Nares, S., Ashcroft, G. & Wahl, S.M. 2004. Aberrant Mucosal Wound Repair in the Absence of *Secretory Leukocyte Protease Inhibitor*. *Thromb. Haemostasis*, 92: 288–297.
- 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.
- Ashcroft, G.S., Lei, K., Jin, W., Longenecker, G., Kulkarni, A.B., Wild, G.T., Donz, H.H., Mc Gardy, G., Song, X.Y., & Wahl, S.M. 2000. Secretory Leukocyte Protease Inhibitor Mediates Non Redundant Functions Necessary for Normal Wound Healing. *J Nat Med.*, 6 (10):1147-1153.
- Baneyx, F., & Mujacic, M. 2004. Recombinant protein folding and misfolding in *Escherichia coli*. *Nature Biotechnology*, 22(11): 1399-1408.
- Berkmen, M. 2012. Production of disulfide-bonded proteins in *Escherichia coli*. *protein expression and purification*, 82 :240-251.
- Boudier, C., & Bieth, J.G. 1989. Mucus proteinase inhibitor: a fast-acting inhibitor of leucocyte elastase. *Biochim Biophys Acta*, 995:36–41.
- Canonaco, F.U., Schlattner, Pruetz, P.S., Wallimann, T., & Sauer, U. 2002. Functional expression of phosphagen kinase systems confers resistance to transient stresses in *Saccharomyces cerevisiae* by buffering the ATP pool. *J Biol Chem*, 277(35): 31303-31309.
- Celik, E., & Calık, P. 2011. Production of recombinant proteins by yeast cells. *Biotechnol Adv*, 30(5): 1108-1118.
- Cha, KH., Kim, M.D., Lee, T.H., Jung, H.K.K.H, & Seo, J.H. 2006. Coexpression of Protein Disulfide Isomerase (PDI) Enhances Production of Kringle Fragment of Human Apolipoprotein(a) in Recombinant *Saccharomyces cerevisiae*. *J. Microbiol. Biotechnol*, 16(2): 308–311.
- Chiverton, L. M. 2010. Modern challenges in therapeutic protein production. *Expert Rev Proteomics*, 7(5): 635-637.
- Chigira, Y., Oka, T., Okajima, T., & Jigami, Y. 2008. Engineering of a mammalian O-glycosylation pathway in the yeast *Saccharomyces cerevisiae*: production of O-fucosylated epidermal growth factor domains. *Glycobiology*, 18(4): 303-314.
- Ciplys, E., Zitkus, E., Leslie, I, Gold, Daubriac, J., Savvas, C, Pavlides, Hojrup, P., Houen, G., Wang, W.A., Merck, & Slibinkas, R., . 2015. High-level secretion of native recombinant human calreticulin in yeast. *Microb Cell Fact*, 2015; 14: 165.

- Cline, J., Braman, J.C., & Hogrefe, H.H. 1996. PCR fidelity of pfu DNA polymerase and other thermostable DNA polymerases. *Nucleic Acids Res*, 24(18): 3546–3551.
- Clare J.J., Romanos, M.A., Rayment, F.B., Rowedder, J.E., Smith, M.A., Payne, M., Sreerishna, K., Henwood, C.A. 1991. Production of mouse epidermal growth factor in yeast: high-level secretion using *Pichia pastoris* strains containing multiple gene copies. *Gene*, 15; 105(2):205-212.
- Da Silva & Srikrishnan S, 2012. Introduction and expression of genes for metabolic engineering applications in *Saccharomyces cerevisiae*. *FEMS Yeast Res*, 12 : 197–214
- Doumas, S., Kolokotronis, A., Stefanopoulos, P., 2005. Anti-inflammatory and Antimicrobial Roles of Secretory Leukocyte Inhibitor. *Infection and Immunity*, 73(3) : 1271-1274.
- Eiden, P. A, Zagorc, T., Heintel, T., Carius, Y., Breinig, F., & Schmitt, M.J. 2004. Viral prepro toxin signal sequence allows efficient secretion of green fluorescent protein by *Candida glabrata*, *Pichia pastoris*, *Saccharomyces cerevisiae*, and *Schizosaccharomyces pombe*. *Appl Environ Microbiol*, 70(2):961-6.
- Ellgard, L. & Ruddock, L. 2005. The human protein disulphide isomerase family : Substrate interactions and functional properties. *EMBO report*, 6(1): 28-32
- Elliot, W.H & Elliot, D.C. 2009. Biochemistry and Molecular Biology. Oxford University Press: 414-415
- Ernst, J. F. 1986. Improved secretion of heterologous proteins by *Saccharomyces cerevisiae*: Effects of promoter substitution in alpha-factor fusions. *DNA*, 5(6): 483-491.
- Fairbairn, N.G., Randolp, M.A., & Redmond, R.W. 2014. The Clinical Application of Human Amnion in Plastic Surgery. *Journal of Plastic, Reconstructive and Aesthetic Surgery*, 67: 662-675.
- Farquhar, R., Honey, N., Murant, S.J., Bosier, P., Schultz, L., Montgomery, D., Ellis, R.W., Freedman, R.B., & Tuite, M.F. 1991. Protein disulfide isomerase is essential for viability in *S. cerevisiae*. *Gene*, 108:81-89.
- Feldmann, H. 2012. *Yeast Molecular Biology*, 2th Ed, Wiley- Backwell : 59-65
- Fewell, S.W., & Brodsky, J.L. 2000 Entry into the Endoplasmic Reticulum: Protein Translocation, Folding and Quality Control. In: *Madame Curie Bioscience Database* [Internet]. Austin (TX): Landes Bioscience

- Finnis, C.G.S., Sleep, D. 2005. High-level secretion of recombinant proteins from *S. cerevisiae* by co-expression of genes from 2um vectors. *XXII International Conference on Yeast Genetics & Molecular Biology*
- Finnis CJ, Payne T, Hay J *et al.* 2010. High-level production of animal-free recombinant transferrin from *Saccharomyces cerevisiae*. *Microb. Cell Fact.* 9: 87.
- Fitriani, D., Cahyati, M., Prasetyaningrum, N., Budhy, T.I., & Munadzirah E. 2018. Acceleration of wound healing with use of secretory leukocyte protease inhibitor could be seen by osteopontin expression in *Rattus norvegicus* post tooth extraction, *Journal of Physics: Conference Series*, 1073, 032033.
- Fukushima, K., Kamimura, T., & Takimoto-Kamimura, M. 2013 Structure basis 1/2SLPI and porcine pancreas trypsin interaction. *J. Synchrotron Rad*, 20: 943–947.
- Glick, B.R., Pastenak, J.J., Patten, C.L. 2010. *Molecular biotechnology : principles and applications of recombinant DNA*, 4th Ed, ASM Press : 240-253.
- Gorgens, J.F., van Zyl, W.H., Knoetze, J.H., Hahn-Hagerdal, B. 2005. Amino acid supplementation improves heterologous protein production by *Saccharomyces cerevisiae* in defined medium. *Appl Microbiol Biotechnol*, 67(5): 684-691.
- Grutter, M. G., Frendrich, G., Huber, R., & Bode, W. 1988. The 2.5 Å X-ray crystal structure of the acid-stable proteinase inhibitor from human mucous secretions analysed in its complex with bovine alpha-chymotrypsin. *EMBO J*, 7:345–351.
- Gustafsson, C., Minshull, J., Govindarajan, S., Ness, J., Villalobos, A., & Welch, M. 2012. Engineering genes for predictable protein expression. *Protein Expr Purif*, 83:37–46.
- Hahm, M.S., & Chung, B.Y. 2001. Secretory expression of human growth hormone in *Saccharomyces cerevisiae* using three different leader sequence. *Biotechnology and Bioprocess Enginerreing*, 6(4):306-309.
- Hajjar, E., Broemstrup, T., Kantari, C., Sarsat, V.W, & Reuter, N. 2010. Structures of human proteinase 3 and neutrophil elastase so similar yet so different. *FEBS Journal*, 277 : 2238–2254
- He, S. H., Chen, P., & Chen, H.Q. 2003. Modulation of enzymatic activity of human mast cell tryptase and chymase by protease inhibitors. *Acta Pharm. Sin*, 24:923–929.
- Hocini, H., Becquart, P., Bouhlal, H., Adle-Biassette, H., Kazatchkine, M.D., & Belec, L. 2000. Secretory leukocyte protease inhibitor inhibits infection of monocytes and lymphocytes with human immunodeficiency virus type 1 but does not

interfere with transcytosis of cell-associated virus across tight epithelial barriers. *Clin. Diagn. Lab. Immunol*, 7: 515–518.

- Hong, S.J., Kim, H.J., Kim, J.W., Lee, D.H., & Seo, J.H. 2015. Optimizing promoters and secretory signal sequences for producing ethanol from inulin by recombinant *Saccharomyces cerevisiae* carrying *Kluyveromyces marxianus* inulinase. *Bioprocess Biosyst Eng*, 38(2):263-72. .
- Huang, D., & Shusta, E.V. .2005. Secretion and surface display of green fluorescent protein using the yeast *Saccharomyces cerevisiae*. *Biotechnol Prog*, 21: 349–357.
- Huo, X., Liu, Y. Wang, X., Ouyang, P., Niu, Z., Shi, Y., & Qiu, B. 2007. Co-expression of human protein disulfide isomerase (hPDI) enhances secretion of bovine follicle-stimulating hormone (bFSH) in *Pichia pastoris*. *Protein Expr Purif*, (2):234-239.
- Inaba, K. 2010. Structural Basis of protein disulfide bond generation in the cell, *Gene to Cells*, 15: 935-946.
- Inan, M., Aryasomayajula, D., Sinha, J., Meagher, M.M. 2006. Enhancement of protein secretion in *Pichia pastoris* by overexpression of protein disulfide isomerase. *Biotechnol Bioeng.*, 93(4):771-778.
- Ishii, J., Kondo, T., Makino, H., Ogura, A., Matsuda, F., & Kondo, A. 2104. Three gene expression vector sets for concurrently expressing multiple genes in *Saccharomyces cerevisiae*. *FEMS Yeast Res*, 14 : 399–341.
- Jajesniak, P., & Wong, T.S. 2015. QuickStep-Cloning: a sequence-independent, ligation-free method for rapid construction of recombinant plasmids. *Journal of Biological Engineering* , 9(15): 1-10.
- Johnson, Powis, K, & High, S. 2013. Post-translational translocation into the endoplasmic reticulum. *Biochimica et Biophysica Acta (BBA) - Molecular Cell Research*, 1833(11): 2403-2409.
- Kajino, T., Ohto, C., Muramatsu, M., Obata, S., Udaka, S., Yamada, Y., & Takahashi, H., 2000. A protein disulfide isomerase gene fusion expression system that increases the extracellular productivity of *Bacillus brevis*. *Appl. Environ. Microbiol*, 66 (2) : 638–642.
- Kawasaki, G. 1999. Stable DNA constructs. US Patent 05871957A.
- Kazemi, Seresht, A., Norgaard, P., Palmqvist, E.A., Andersen, A.S, & Olsson, L.2013. Modulating heterologous protein production in yeast: the applicability of truncated auxotrophic markers. *Appl Microbiol Biotechnol*, 97(9):3939-3948

- Kernain, D., Samad, M.A., & Shamsuddin S. 2017. Rare codon content of boris affects the recombinant proteins expression in a codon bias-adjusted *Escherichia coli* strains. *Int Med J*, 24:451–454.
- Kim, M.D, Park EH, Cho JW. 2007. Enhanced production of antithrombotic hirudin by coexpression of Pdi1 and Ero1 in recombinant *Saccharomyces cerevisiae*. *J. Biotechnol.* 131(2): 147.
- Kim, E.J, Park, Y.K., Lim, H.K., Park, Y.C., & Seo, J.H. 2009. Expression of hepatitis B surface antigen S domain in recombinant *Saccharomyces cerevisiae* using *GAL1* promoter. *J.Biotechnol*, 141(3-4):155–159.
- Kjeldsen, T. 2000. Yeast secretory expression of insulin precursors. *Appl Microbiol Biotechnol*, 54(3): 277-286.
- Koizumi, M., Fujino, A., Fukushima, K., Kamimura, T. & Kamimura, M.T. 2008. Complex of human neutrophil elastase with 1/2SLPI. *J. Synchrotron Rad*, 15: 308–311.
- Li, J., H. Xu, W. E. Bentley, & Rao, G. 2002. Impediments to secretion of green fluorescent protein and its fusion from *Saccharomyces cerevisiae*. *Biotechnol. Prog.* 18:831-838
- Li, Z., Moy, Gomez, S.R., Franz, A.H., Lincereghino, J., Lincereghino, G.P. 2010. An Improved Method for Enhanced Production and Biological Activity of Human Secretory Leukocyte Protease Inhibitor (SLPI) in *Pichia pastoris*. *Biochem and Biophys Res Com*, 402 : 519-524.
- Liu, Z., Tyo, K.E.J., Martinez, J.L., Petranovic, D, Nielsen, J. 2012. Different Expression Systems for Production of Recombinant Proteins in *Saccharomyces cerevisiae*. *Biotechnol Bioeng*, 109(5): 1259-1268.
- Livi, G.P, Ferrara, A.A, Roskin R, Simon, P.L., & Young P,R, 1990. Secretion of N-glycosylated human recombinant interleukin-1 alpha in *Saccharomyces cerevisiae*. *Gene*, 88: 297–301.
- Ma, G., Greenwell-Wild, T., & Lei, K. 2004. Secretory leukocyte protease inhibitor binds to annexin II, a cofactor for macrophage HIV-1 infection. *J. Exp. Med*, 200 : 1337–1346
- Majchrzak-Gorecka, M., Majewski, P., Grygier, B., Murzyn, K., & Cichy, J. 2015. Secretory leukocyte protease inhibitor (SLPI), a multifunctional protein in the host defense response. *Cytokine Growth Factor Rev.* 28: 79–93.
- Meyer-Hoffert, U., Wichmann, N., Schwichtenberg, L., White, P.C., & Wiedow O. 2003. Supernatants of *Pseudomonas aeruginosa* induce the *Pseudomonas*-specific antibiotic elafin in human keratinocytes. *Exp Dermatol*, 12:418–425.

- Moreau, T., Baranger, L., Dade, S., Choisy, S.D., Guyot, N., Zani, M. 2007. Multifaced Roles Of Human Elafin And Secretory Leukocyte Protease Inhibitor (SLPI), Two Serine Protease Inhibitor of The Chelonianin Family, *Biochimie*, 90: 284-295.
- Munadziroh, E., 2008, Karakterisasi, Ekspresi dan Kloning Gen Penyandi Secretory Leukocyte Protease Inhibitor Membran Amnion Sebagai Kandidat Biomaterial Untuk Mempercepat Penyembuhan Luka Ginggiva, *Disertasi*, Universitas Airlangga Surabaya
- Munadziroh, E., Purnamasari, S., Puspaningsih, N.N.T., Sutjipto, Rubianto, M., & Ismaya, W.T. 2017. Generation of a soluble and active recombinant human secretory leukocyte protease inhibitor. *Biotechnologia Aplicada*. 34:2231-2234.
- Niebauer, R.T, & Robinson, A.S. .2005. *Saccharomyces. cerevisiae* protein expression: from protein production to protein engineering. In: Baneyx F (ed) *Protein expression technologies*. Horizon, Norwich : 253–296
- Oka, OBV., Bulleid, N. 2013. Forming disulfides in the endoplasmic reticulum, *Biochimia at Biophysica Acta*, 1833: 2425-2429
- Owji, H., Nezafat, N., Negahdaripour, M., Hajiebrahimi, A., Ghasemi, Y. 2018. A Comprehensive Review of Signal Peptides: Structure, Roles, and Applications, *European Journal of Cell Biology*.
- Park., S.H., Crocket, E., Mei, C., Nguyen, T., Alameldin, HF., & Sticklen, M. 2014. Production of Biologically Active Human Secretory Leukocyte Protease Inhibitor in Plants : A protein Wit Anti-viral Including Anti HIV, Anti-Bacterial, Anti-Inflammatory and Wound Healing Properties, *European Journal of Biomedical and Pharmaceutical Sciences*. 1(3) : 367-385.
- Parekh, R. N. & Wittrup, K.D. 1997. Expression level tuning for optimal heterologous protein secretion in *Saccharomyces. cerevisiae*. *Biotechnol Prog*, 13(2): 117-122.
- Patil, N.A, Tailhades J., Hughes, R.A., Separovic, F., Wade, J.D., Hossain, M.A. 2015. Cellular Disulfide Bond Formation in Bioactive Peptides and Proteins, *Int.J. Mol. Sci*, 16: 1791-1805.
- Powers S L & Robinson AS. 2007. PDI improves secretion of redoxinactive b-glucosidase. *Biotechnol Prog* 23:364-269.
- Porro, D., Sauer, M., Branduardi, P., Mattanovich, D. 2005. Recombinant Protein Production in Yeasts, *Mol Biotechnol*, 31(3) : 245-259.
- Purkan, Savalas, R., Sindumarta, M., Natalia, D. 2009. The b'x Region of Yeast Protein Disulfide Isomerase is Not Essential for *SaccharomyceS. Cerevisiae* Viability at 30 °C. *Microbiol Indones*, 3(1) : 27-32

- Purnamasari, S., 2011, Analisis Inhibisi *Secretory Leukocyte Protease Inhibitor* (SLPI) Rekombinan Asal Membran Amnion Manusia Terhadap Aktivitas Enzim Porcine Pancreatic Elastase (PPE), *Tesis*, Program S2 Kimia, Fakultas Sains dan Teknologi, Universitas Airlangga, Surabaya
- Rai, M., Padh, H. 2001. Expression systems for production of heterologous proteins. *Current Science*, 80(9): 1121-1128.
- Robinson, A. S., Hines, V., Wittrup, K. D. 1994. Protein disulphide isomerase overexpression increases secretion of foreign proteins in *Saccharomyces cerevisiae*. *Bio/Technology*. 12 : 381-384.
- Rosano, G.L., & Ceccarelli, E.A. 2009. Rare codon content affect the solubility of recombinant proteins expression in a codon bias-adjusted *Escherichia coli* strains. *Int. Med. J.*, 8, 41: 1-9.
- Sagt, C.M.J., Kleizen, B., Verwaal, R., De Jong, M.D.M., Muller, W.H., Smits, A., Visser, C., Boonstra, J., Velkleij, A.J., & Verrips., CT. 2000. Introduction of an N-glycosylation site increases secretion of heterologous proteins in yeasts. *Appl Environ Microbiol*, 66: 4940–4944.
- Schmidt, F.R. 2004. Recombinant expression systems in the pharmaceutical industry, *Appl. Microbiol Biotechnol*, 65: 363–372.
- Schultz, L. D., Markus, H. Z., Hofmann, K. J., Montgomery, D. L., Dunwiddier, C. T., Kniskern, P. J., Freedman, R. B., Ellis, R. W., & Tuite, M. F. 1994. Using molecular genetic to improve the production of recombinant proteins by the yeast *Saccharomyces cerevisiae*. *Ann. N. Y. Acad. Sci.* 721 : 148-157.
- Seresht, A. K., Palmqvist, E.A., & Olsson, L. 2011. The impact of phosphate scarcity on pharmaceutical protein production in *S. cerevisiae*: linking transcriptomic insights to phenotypic responses. *Microb Cell Fact*, 10(1): 104.
- Shi-Hwei, L., Wei-I, C., Chia-Chin, S., & Margaret Dah-Tsyr, C. 2005. Improved secretory production of glucoamylase in *Pichia pastoris* by combination of genetic manipulation. *Biochem. Biophys. Res. Comm.* 326 : 817-824.
- Shusta, E. V., Holler, P.D., Kieke, M.C., Kranz, D.M., & Wittrup, K.D. 2000. Directed evolution of a stable scaffold for T-cell receptor engineering. *Nat. Biotechnol.* 18:754-759.
- Stetler, G.I., Gleason, F.T., Wilson J., Thompson R.C. 1989. Secretion of Active, Full-and Half Length Human Secretory Leukocyte Protease Inhibitor By *Saccharomyces cerevisiae*, *Biotechnol*, 7: 55-61
- Steube, K., Chaudhuri, B., Märki, W., Merryweather, J.P., & Heim, J. 1991. α -factor-leader-directed secretion of recombinant human-insulin-like growth factor I

- from *Saccharomyces cerevisiae*: precursor formation and processing in the yeast secretory pathway. *Eur J Biochem* 198(3): 651-657.
- Thompson, Robert, C., & Ohlsson, K.. 1986. Isolation, Properties, and Complete Amino Acid Sequence of Human Secretory Leukocyte Protease Inhibitor, a Potent Inhibitor of Leukocyte Elastase, *Proc. Natl. Acad. Sci.* 83: 6692-6696
- 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* 124:61-73.
- Tokmakov, A.A., Kurotani, A., Takagi, K., Toyama, M, Shirouzu, M, Fukami, Y.Yokoyama, S. 2012. Multiple post-translational modifications bear upon heterologous protein synthesis. *J Biol Chem*, 287: 27106-27116.
- Tsai, C.W., Duggan, P.F., Richard, L., Shimp Jr, Miller, LH, & Narum DL. 2006. Overproduction of *Pichia pastoris* or *Plasmodium falciparum* protein disulfide isomerase affects expression, folding and O-linked glycosylation of a malaria vaccine candidate expressed in *P. pastoris*. *Journal of Biotechnology* 121: 458–470.
- Tutar, L., & Tutar, Y. 2010. Heat shock proteins; an overview. *Curr Pharm Biotechnol*, 11(2):216–222.
- Wang, C.C, & Tsou, C.L. 2003. Protein disulfide isomerase is both an enzyme and a chaperone. *FASEB J* , 7:1515-1517.
- Weinhandl, K. Margit, W., Glieder, A. & Camattari, A. 2014. Carbon source dependent promoters in yeasts. *Microbial Cell Factories*. 13:5.
- White, M. A., Clark, K.M., Grayhack, E.J, & Dumont M.E. 2007. Characteristics affecting expression and solubilization of yeast membrane proteins, *J Mol Biol* , 365(3): 621-636.
- Whitford, D. 2005. *Proteins: Structure and Function*,. John Wiley & Sons Ltd, England. 247-302.
- Wilgus, T.A., Roy S., & Mc Daniel, J. 2013. Neutrophils and Wound Repair: Positive Actions and Negative Reactions. *Advanced in Wound Care (New Rochelle)*, 2(7): 379–88.
- Wilkinson, B., & Gilbert, H.F. 2004. Protein disulfide isomerase, *Biochimia et biophysics Acta*, 1699: 35-44
- Wirajana, I.N., Kimura, T. Sakka, K., Bagus, E. 2016. Secretion of *Geobacillus thermoleovorans* IT-08 α -L-Arabinofuranosidase (AbfA) in *Saccharomyces cerevisiae* by Fusion with HM-1 Signal Peptide, *Procedia Chem.*, 18: 69–74.

- Yang, J., Zhu, J., Sun, D., & Ding, A. 2005. Suppression of Macrophage Responses to Bacterial Lipopolysaccharide (LPS) by Secretory Leukocyte Protease Inhibitor (SLPI) is Independent of Its Anti-protease Function, *Biochemica et Biophysica Acta*, 1745: 310-317.
- Yarimizu, T., Nakamura, M., Hoshida, H., & Akada, R. 2015 Synthetic signal sequences that enable efficient secretory protein production in the yeast *Kluyveromyces marxianus*. 1–14.
- Zhang, Q., Shimoya, K., Moriyama, A., Yamanaka, K., Nakajima, A., Nobugana, T., Koyama, M., Azuma, C., & Murata, Y. 2001. Production of secretory leukocyte protease inhibitor by human amniotic membranes and regulation of its concentration in amniotic fluid, *Molecular Human Reproduction*, 7(6): 573-579.
- Zhang, D., Rosalina CM., Simmen, Frank J Michel., Dustin Vale Cruz, & Frank A Simmen. 2002. Secretory Leukocyte Protease Inhibitor Mediates Proliferation of Human Endometrial Epthelial Cells by Positive and Negative Regulation of Growth Associated Genes, *Journal of Biological Chemistry.*, 277 (33).
- Zhu, J., Sim, D., Ashcroft, G., & Wright, C., 2002. Conversion of proepithelin to ephitelins: Roles of SLPI and Elastase in host defense and wound repair. *Cell*, 11: 867-878.