

## DAFTAR PUSTAKA

- Ahmed, F.E. (2003). Genetically modified probiotics in foods. *Trends in Biotechnology*. 21(11) : 491–497.
- Ahmed T, Sun X, Udenigwe CC. (2022). Role of structural properties of bioactive peptides in their stability during simulated gastrointestinal digestion: A systematic review. *Trends in Food Science & Technology* 120: 265-273.
- Ahtesh FB, Stojanovska L, Apostolopoulos V. (2018). Anti-hypertensive peptides released from milk proteins by probiotics. *Maturitas* 115: 103–109
- Aiello G, Ferruzza S, Ranaldi G, Sambuy Y, Arnoldi A, Vistoli G, Lammi C. (2018). Behavior of three hypocholesterolemic peptides from soy protein in an intestinal model based on differentiated Caco-2 cell. *Journal of Functional Foods* 45: 363-370
- Ali, MY. Jung, HA. Choi, JS. (2016). Anti-diabetic and anti-Alzheimer's disease activities of *Angelica decursiva*. *Arch. Pharm. Res.*
- Allouche, R., Hafeez, Z., Mourrot, AD., Genay, M. & Miclo, L. (2024). *Streptococcus thermophilus*: A Source of Postbiotics Displaying Anti-Inflammatory Effects in THP 1 Macrophages. *Molecules*, 29, 1552. <https://doi.org/10.3390/molecules29071552>
- Aronson, J.K. (2016). Alpha-glucosidase inhibitors di dalam *Meyler's Side Effects of Drugs (Sixteenth Edition): The International Encyclopedia of Adverse Drug Reactions and Interactions*. 167-173. <https://doi.org/10.1016/B978-0-444-53717-1.00256-0>
- Axelsson, L. (1998). Lactic Acid Bacteria : Classification and Physiology. Edited by Salminen, S; Wright, A. Lactic Acid Bacteria : Microbiology and Function Aspect. New York, Basel : Marcel Dekker, Inc.
- Baba, W.N., Mudgil, P., Kamal, H., Kilari, B. P., Gan, C. Y. & Maqsood, S. (2021). Identification and characterization of novel  $\alpha$ -amylase and  $\alpha$ -glucosidase inhibitory peptides from camel whey proteins. *Journal of Dairy Science*, 104 (2), 1364-1377. <https://doi.org/10.3168/jds.2020-19271>

Bajpai VK, Han JH, Nam GJ, Majumder R, Park C, Lim J, Paek WK, Rather IA, & Park YH. (2016). Characterization and pharmacological potential of *Lactobacillus sakei* 11I isolated from fresh water fish *Zacco koreanus*. *DARU Journal of Pharmaceutical Sciences* 24:8.

Barker, M.K & Rose, D.R. (2013). Specificity of Processing  $\alpha$ -Glucosidase I Is Guided by the Substrate Conformation: Crystallographic and In Silico Studies. *J Biol Chem*, 288(19):13563–13574. doi: [10.1074/jbc.M113.460436](https://doi.org/10.1074/jbc.M113.460436)

Basile, E.J., Launico, M.J., Sheer, A.J. 2023. Physiology, Nutrient Absorption. *NCBI Bookshelf*. <https://www.ncbi.nlm.nih.gov/books/NBK597379/>

Behbahani, B.A., Noshad, M., Namazi, P. & Vasiee, A. 2024 . Exploring the probiotic potential of *Lactiplantibacillus pentosus* SM1: Resistance, anti-microbial activity, anti-biofilm, cytotoxic activity, and safety properties. *Food Science and Technology*, 210, 116850. <https://doi.org/10.1016/j.lwt.2024.116850>

Berlec G, Tompa N, Slapar U.P, Fonovic I, Rogelj. 2008. Optimization of fermentation conditions for the expression of sweet-tasting protein brazzein in *Lactococcus lactis*. *Letters in Applied Microbiology* 46: 227–231.

Bhuyan, P., Hazarika, J., Ganguly, M., Baruah, I., Borgohain, G. & Sarma, S. 2022. Alpha glucosidase inhibitory properties of a few bioactive compounds isolated from black rice bran: combined in vitro and in silico evidence supporting the antidiabetic effect of black rice. *Royal Society of Chemistry*, 12, 22650. <http://dx.doi.org/10.1039/D2RA04228B>

Botha SP dan Bigwood EJ. (1959). Amino-acid content of raw and heat-sterilized cow's milk. *Nutr* 13: 385-389

Bischoff, H. (1995). The mechanism of alpha-glucosidase inhibition in the management of diabetes. *Clin. Invest. Med.* 18(4): 303-311.

Cao, R., Li, W., Zhang, J., Bao, X., Feng, H., Sun, J., Liu, X. & Sun, L. (2024). Milk casein hydrolysate peptides regulate starch digestion through inhibition of  $\alpha$ -glucosidase: An insight into the active oligopeptide screening, enzyme inhibition behaviors, and oligopeptide-enzyme binding interactions. *Food Hydrocolloids*, 152. <https://doi.org/10.1016/j.foodhyd.2024.109926>.

- Casarotti, S. N., & Penna, A. L. B. (2015). Acidification profile, probiotic in vitro gastrointestinal tolerance and viability in fermented milk with fruit flours. *International Dairy Journal*, 41, 1–6.
- Chen P, Zhang Q, Dang H, Liu X, Tian F, Zhao J, Chen Y, Zhang H, Chen W. 2014. Screening for potential new probiotic based on probiotic properties and  $\alpha$ -glucosidase inhibitory activity. *Food Control* 35: 65-72.
- Chiba, S. (1997). Review: molecular mechanism in  $\alpha$ -glucosidase and glucoamylase. *Biosci. Biotech. Biochem.* 61(8): 1233-1239.
- Darmastuti, A., Hasan, PN., Wikandari, R., Utami, T., Rahayu, ES. & Suroto, DA. (2021) Adhesion Properties of *Lactobacillus plantarum* Dad-13 and *Lactobacillus plantarum* Mut-7 on Sprague Dawley Rat Intestine. *Microorganisms*, 9, 2336. <https://doi.org/10.3390/microorganisms9112336>
- Dean, W.M.D. 2017. **Acarbose: Anti-diabetic, Cardio-protective, Weight loss, and Potential Anti-aging agent.** *Magazine life enhancement*- February.
- De Giori, G.S., De Valdez, G.F., De Ruiz Holgado, A.P. & Oliver, G. (1985). Effect of pH and temperature on the proteolytic activity of lactic acid bacteria. *J. Dairy Science*, 68:2160.
- Delcour, J., Ferain, T., Deghorain, M., Palumbo, E. & Hols, P. (1999). The biosynthesis and functionality of the cell wall of lactic acid bacteria. *Antonie van Leeuwenhoek*. 76: 159-184.
- Deng, F., Liang, Y., Lei, Y., Xiong, S., Rong, J. & Hu, Y. 2023. Development and identification of novel-glucosidase inhibitory peptides from mulberry leaves. *Foods*, 12, 3917. <https://doi.org/10.3390/foods12213917>
- Di Stefano E, Oliviero T, Udenigwe CC. 2018. Functional significance and structure–activity relationship of food-derived  $\alpha$ -glucosidase inhibitors. *Current Opinion in Food Science* 20: 7–12.
- Echegaray, N., Yilmaz, B., Sharma, H., Kumar, M., Pateiro, M., Ozogul, F. & Lorenzo, J.M. (2023). A novel approach to *Lactiplantibacillus plantarum*: from probiotic properties to the omics insights. *Microbiological Research Volume*, 268, 127289. <https://doi.org/10.1016/j.micres.2022.127289>

- Ercan P, El SN. (2016). Inhibitory effects of chickpea and *Tribulus terrestris* on lipase,  $\alpha$ -amylase and  $\alpha$ -glucosidase. *Food Chemistry Volume 205*: 163-169.
- Febrinda AE, Astawan M, Wresdiyati T, Yuliana ND. (2013). Kapasitas antioksidan dan inhibitor  $\alpha$  glukosidase ekstrak umbi bawang Dayak. *J. Teknol dan Industri Pangan* 24:02
- Feher JJ. (2017). *Quantitative Human Physiology: An Introduction*. Academic Press: Cambridge
- Gao H, Huang Y, Xu PY, Kawabata J. (2007). Inhibitory effect on  $\alpha$ -glucosidase by the fruits of *Terminalia chebula* retz. *Food Chemistry*. 105(2):628-634.
- Guoa, W., Xiaoa, Y., Fua, X., Long, Z., Wu, Y., Lina, Q., Rena, K. & Jiang, L. (2023). Identification of novel  $\alpha$ -glucosidase and ACE inhibitory peptides from Douchi using peptidomics approach and molecular docking. *Food Chemistry: X* 19, 100779
- Guo, W., Xiao, Y., Fua, X., Long, Z., Wua, Y., Lin, Q., Rena, K. & Jiang, L. (2023). Identification of novel  $\alpha$ -glucosidase and ACE inhibitory peptides from Douchi using peptidomics approach and molecular docking. *Food Chemistry*, 19, 100779. <https://doi.org/10.1016/j.fochx.2023.100779>
- Ha, T. J., Park, J. E., Kang, B. K., Kim, H. S., Shin, S. O., Seo, J. H., Oh, E., Kim, S. & Kwak, D. (2019).  $\alpha$ -Glucosidase Inhibitory Activity of Isoflavones and Saponins from Soybean (*Glycine max* L.) and Comparisons of Their Constituents during Heat Treatments. *Journal of the Korean Society of Food Science and Nutrition*, 48(9), 953-960. <https://doi.org/10.3746/jkfn.2019.48.9.953>
- Harahap, A., Mariyatun, M., Hasan, P.N., Pamungkaningtyas, F.H., Widada, J., Utami, T., Cahyanto, M.N., Juffrie, M., Dinoto, A., Nurfiani, S., Zulaichah, E., Sujaya, I.N. & Rahayu, ES. (2021). Recovery of Indigenous probiotic *Lactobacillus plantarum* Mut-7 on healthy Indonesian adults after consumption of fermented milk containing these bacteria I. *J Food Sci Technol*. 58(9):3525–3532 <https://doi.org/10.1007/s13197-021-05046-z>

- Hermans MMP, Kroos MA, Beeurnens JV, Oostra BAS, dan Reuser AJJ. (1991). Human Lysosomal  $\alpha$ -Glucosidase: Characterization of the Catalytic Site. *The Journal of Biological Chemistry* 266: 13507-13512.
- Hidayatulloh, A., Gumilar, J. & Harlia, E. (2019). Potensi senyawa metabolit yang dihasilkan *Lactobacillus plantarum* ATCC 8014 sebagai bahan biopreservasi dan anti bakteri pada bahan pangan asal hewan. *JITP*, Vol. 7 No. 2.
- Holzapfel, W.H. & Wood, B.J.B. (1995). *The Genera of Lactic Acid Bacteria : Lactic acid bacteria in contemporary perspective*. Springer Science and Business Media Dordrecht. US. pp: 1-6.
- Holzapfel, W. H., and B. J. B. Wood, ed. (2014). *Lactic Acid Bacteria: Biodiversity and Taxonomy*. John Wiley & Sons.
- Hu,S.F.; Fan, X.D.; Qi, P.; Zhang, X.W. (2019). Identification of anti-diabetes peptides from spirulina platensis. *J. Funct. Foods*, 56, 333–341
- Hu,J.F.; Lai, X.H.; Wu, X.D.; Wang, H.Y.; Weng, N.H.; Lu, J.; Lyu, M.; Wang, S.J. (2023). Isolation of a novel anti-diabetic-glucosidase oligo-peptide inhibitor from fermented rice bran. *Foods*, 12, 183
- Ibrahim MA, Bester MJ, Neitz AWH, Gaspar ARM. (2018). Structural properties of bioactive peptides with  $\alpha$ -glucosidase inhibitory activity. *Chem Biol Drug Des.* 91(2):370-379.
- IDF (International Diabetic Federation). (2022). Diabetes around the world in 2021. <https://diabetesatlas.org>. Diakses 20 Juli 2024.
- Ikhsani, AY., Riftyan, E., Safitri, RA., Marsono, Y., Utami, T., Widada, J. & Rahayu, ES. (2020) Safety Assessment of Indigenous Probiotic Strain *Lactobacillus plantarum* Mut-7 Using Sprague Dawley Rats as a Model. *American Journal of Pharmacology and Toxicology.*, Volume 15, 7.16. DOI: 10.3844/ajptsp.2020.7.16
- Indrianingsih AW, Tachibana S. (2016). Bioactive constituents from the leaves of *Quercus phillyraeoides* A. Gray for  $\alpha$ -glucosidase inhibitor activity with concurrent antioxidant activity. *Food Science and Human Wellness* 5: 85–94.

- Jiang, M.Z.; Yan, H.; He, R.H.; Ma, Y.K. (2018). Purification and a molecular docking study of-glucosidase-inhibitory peptides from a soybean protein hydrolysate with ultrasonic pretreatment. *Eur. Food Res. Technol.*, 244, 1995–2005.
- Kadouh HC, Sun S, Zhu W, Zhou K. (2016).  $\alpha$ -Glucosidase inhibiting activity and bioactive compounds of six red wine grape pomace extracts. *Journal of Functional Foods* 26: 577–584.
- Kalra, S. (2014). Alpha glucosidase inhibitors. *J. Pak. Med. Assac.* 64: 474-476.
- Kandler, O. (1983). Carbohydrate Metabolism In Lactic Acid Bacteria. *Antonie van Leeuwenhoek* 49 : 209-224.
- Karyantina, M., Anggrahini, S., Utami, T. & Rahayu, E.S. (2020) Moderate halophilic lactic acid bacteria from jambalroti: a traditional fermented fish of Central Java, Indonesia. *Journal of Aquatic Food Product Technology*. doi: 10.1080/10498850.2020.1827112
- Kementerian kesehatan RI. (2014). Situasi dan analisis diabetes. *Infodatin*. Kementerian kesehatan RI, Jakarta.
- Kemenkes. (2018). Laporan Nasional Riskesdas 2018. <https://layanandata.kemkes.go.id/katalog-data/riskesdas/ketersediaan-data/riskesdas-2018> (diakses 20 Juli 2024)
- Kemenkes. (2023). Survei Kesehatan Indonesia Tahun 2023: dalam angka. <https://layanandata.kemkes.go.id/katalog-data/ski/ketersediaan-data/ski-2023> (diakses 20 Juli 2024)
- Keska, P., Stadnik, J. Łupawka, A. & Michalska, A. (2023). Novel-glucosidase inhibitory peptides identified in silico from dry-cured pork loins with probiotics through peptidomic and molecular docking analysis. *Nutrients*, 15, 3539. <https://doi.org/10.3390/nu15163539>
- Kim, J. H., C. W. Cho H. Y. Kim, K. T. Kim, G. Choi, H. Kim, I. Cho, S. J. Kwon, S. Choi, and J. Yoon. (2017).  $\alpha$ -Glucosidase inhibition by prenylated and lavandulyl compounds from *Sophora flavescens* roots and in silico analysis. *International Journal of Biological Macromolecules*. 102: 960-969.

- Kirilov N, Petkova T, Atanasova J, Danova sv, Iliev I, Popov Y, Haertle Y & Ivanova IV. (2014). Proteolytic Activity in Lactic Acid Bacteria from Iraq, Armenia and Bulgaria. *Biotechnology & Biotechnological Equipment* .
- Komorowski ES. 2011. *Reducing saturated fats in foods*. Woodhead Publishing Series in Food Science, Technology and Nutrition: Cambridge.
- Konrad B, Anna DB, Marek S, Marta P, Aleksandra Z, Jo´zefa C. 2014. The Evaluation of Dipeptidyl Peptidase (DPP)-IV,  $\alpha$ -Glucosidase and Angiotensin Converting Enzyme (ACE) Inhibitory Activities of Whey Proteins Hydrolyzed with Serine Protease Isolated from Asian Pumpkin (*Cucurbita ficifolia*). *Int J Pept Res Ther* 20:483–491.
- Korhonen, H., & Pihlanto, A. (2006). Bioactive peptides: Production and functionality. *International Dairy Journal*, 16(9), 945-960.
- Kuerman, M., Shi, R., Zhang, Y, Liu, Y., Hou, B., Li, B., Yi, H, Zhang, L. & Liu, T. (2024). *Lactiplantibacillus plantarum* strains with proteolytic abilities showed diverse effects on casein gel formation during fermentation. *Food Hydrocolloids*, 148. <https://doi.org/10.1016/j.foodhyd.2023.109406>
- Kumari, S. Puniya, A.K & Tomar, S.K. (2020). Alpha-Glucosidase Inhibitory Functional Fermented Milk Products (Product A & Product B) Developed Using Proteolytic Lactobacilli Cultures with Supplementation of Whey Protein Powder S(WPC-70). *International Journal of Current Microbiology and Applied Sciences*, 9(5), 3602-3613. <https://doi.org/10.20546/ijcmas.2020.905.428>
- Lasik A, Pikul J, Danków R, Sokolińska DS. (2011). The fermentation dynamics of sheep milk with increased proportion of whey proteins. *Acta Sci. Pol.* 10(2): 155-163.
- Lee, N.Y., Cheng, J.T., Enomoto, T. & Nakano, Y. (2006). One Peptide Derived from Hen Ovotransferrin as Pro-drug to Inhibit Angiotensin Converting Enzyme. *Journal of Food and Drug Analysis*: 14,1, 31-35. <https://doi.org/10.38212/2224-6614.2505>
- Leverrier, P., Dimova, D., Pichereau, V., Auffray, Y., Boyaval, P., & Jan, G. (2003). Susceptibility and adaptive response to bile salts in propionibacterium



- freudenreichii: Physiological and proteomic analysis. *Applied and Environmental Microbiology*, 69(7), 3809–3818.
- Li D, Li J, Zhao F, Wang G, Qin Q, Hao Y. (2016). The influence of fermentation condition on production and molecular mass of EPS produced by *Streptococcus thermophilus* 05-34 in milk based medium. *Food Chemistry* 197: 367–372.
- Lin, A. H. M., B. H. Lee, and W. J. Chang. (2016). Small intestine mucosal  $\alpha$ -glucosidase: A missing feature of in vitro starch digestibility. *Food Hydrocolloids*. 53: 163-171.
- Liu<sup>a</sup>, B. Kongstad, KT. Wiese, S. Jäger, AK. Staerk, D. (2016). Edible seaweed as future functional food: Identification of  $\alpha$ -glucosidase inhibitors by combined use of high-resolution  $\alpha$  glucosidase inhibition profiling and HPLC–HRMS–SPE–NMR. *Food Chemistry* 203:16–22.
- Liu<sup>b</sup>, M., Wang, Y., Liu, Y. & Ruan R. (2016). Bioactive peptides derived from traditional Chinese medicine and traditional Chinese food: A review. *Food Research International* 89: 63–73.
- Liu, R., & Pischetsrieder, M. (2016). Stability of bioactive peptides during gastrointestinal digestion: A review. *Trends in Food Science & Technology*, 54, 1-6.
- Liu, W., Li, H., Wen, Y., Liu, Y., Wang, J. & Sun, B. (2021). Molecular mechanism for the  $\alpha$ -glucosidase inhibitory effect of wheat germ peptides. *Journal of Agricultural and Food Chemistry*, 69, 15231–15239. <https://doi.org/10.1021/acs.jafc.1c06098>.
- Liu Y dan Pischetsrieder M. (2017). Identification and Relative Quantification of Bioactive Peptides Sequentially Released during Simulated Gastrointestinal Digestion of Commercial Kefir. *Journal of Agricultural and Food Chemistry* 65: 1865–1873.
- Li, W., Fu, X., Zhang, T., Li, H., Chen, T. & Liu, X. (2023). Isolation and identification of an  $\alpha$ -glucosidase inhibitory peptide from extruded soybean protein and its hypoglycemic activity in T2DM mice. *Food and Function*, 14 (9), 4288-4301. <https://doi.org/10.1039/d3fo00580a>



- Li, Z., Zhang, S., Meng, W., Zhang, J. & Zhang, D. (2023). Screening and activity analysis of-glucosidase inhibitory peptides derived from coix seed prolamins using bioinformatics and molecular docking foods. *Foods*, 12, 3970. <https://doi.org/10.3390/foods12213970>
- Lu, H., Xie, T., Wu, O., Hu, Z., Luo, Y. & Luo, F. (2023). Alpha-glucosidase inhibitory peptides: sources, preparations, identifications, and action mechanisms. *Nutrients*, 15, 4267. <https://doi.org/10.3390/nu15194267>.
- Luwidharto, JCN., Rahayu, ES., Suroto, DA., Wikandari, R., Ulfah, A. & Utami, T. (2022). Effects of *Spirulina platensis* Addition on Growth of *Lactobacillus plantarum* Dad 13 and *Streptococcus thermophilus* Dad 11 in Fermented Milk and Physicochemical Characteristics of the Product. *Applied Food Biotechnology* , 9 (3):205-216. <https://doi.org/10.22037/afb.v9i3.37013>
- Madigan, M.T., J.M. Martinko, D. Stahl, & D.P. Clark. (2012). *Brock Biology for Microorganisms*. 13th Edition. Benjamin Cummings. San Fransisco.
- Mardalena, M. (2016). Fase Pertumbuhan Isolat Bakteri Asam Laktat (BAL) Tempoyak Asal Jambi yang Disimpan Pada Suhu Kamar. *Jurnal Sain Peternakan Indonesia*, 11(1), 58–66. <https://ejournal.unib.ac.id/jspi/article/view/863>
- Matti, A., Utami, T., Hidayat, C. & Rahayu, E. S. (2019). Isolation, screening and identification of proteolytic lactic acid bacteria from indigenous chao product. *J Aquat Food Prod Technol*. doi:10.1080/10498850.2019.1639872
- Meneses MJ, Silva BM, Sousa M, Sá R, Oliveira PF and Alves MG. (2015). Antidiabetic Drugs: Mechanisms of Action and Potential Outcomes on Cellular Metabolism. *Current Pharmaceutical Design* 21: 3606-3620.
- McIver, LA., Preuss, CV. & Trip, J. (2024). Acarbose. *National Libabry of Medicine*. [https://www.ncbi.nlm.nih.gov/books/NBK493214/?utm\\_source=chatgpt.com](https://www.ncbi.nlm.nih.gov/books/NBK493214/?utm_source=chatgpt.com) diakses pada 20 Januari 2025
- Moayer AF dan Scaman CH. (2005). Binding residues and catalytic domain of soluble *Saccharomyces cerevisiae* processing alpha-glucosidase I. *Glycobiology* 15: 1341–1348.

- Mohanty DP, Mohapatra S, Misra S, Sahu PS. (2016). Milk derived bioactive peptides and their impact on human health – A review. *Saudi Journal of Biological Sciences* 23: 577–583.
- Moorthy NSHN, Ramos MJ dan Fernandes PA. (2012). Structural analysis of structurally diverse  $\alpha$ -glucosidase inhibitors for active site feature analysis. *Journal of Enzyme Inhibition and Medicinal Chemistry* 27(5): 649–657.
- Mudgil, P., Kamal, H., Kilari, B.P., Salim, M.A.S.M., Gan, C.Y., Maqsood, S. (2021). Simulated gastrointestinal digestion of camel and bovine casein hydrolysates: Identification and characterization of novel anti-diabetic bioactive peptides. *Food Chem*, 353, 129374
- Muganga L, Liu X, Tian F, Zhao J, Zhang H, Chen W. (2015). Screening for lactic acid bacteria based on antihyperglycaemic and probiotic potential and application in synbiotic set yoghurt. *Journal of Functional Foods* 16: 125–136.
- Naim HY, Sterchi EE dan Lentze MJ. (1988). Biosynthesis of the Human Sucrase-Isomaltase Complex. *The Journal of Biological Chemistry* 263: 7242-7253
- Nakamura S, Takahira K, Tanabe G, Muraoka O, Nakanishi I. (2012). Homology Modeling of Human Alpha-Glucosidase Catalytic Domains and SAR Study of Salacinol Derivatives. *Open Journal of Medicinal Chemistry* 2: 50-60.
- NCBI. (2024). National Center for Biotechnology. Information <https://www.ncbi.nlm.nih.gov/>. Diakses pada 01 November 2024.
- Ojewumi, M.E., Omoleye, J.A. & Ajay, A.A. (2017). Optimization of fermentation conditions for the production of protein composition in *Parkia biglobosa* seeds using response surface methodology. *International Journal of Applied Engineering Research* 12(22): 12852-12859.
- Olivares, L.G.G., Morga, J.A., Ovando, A.C., López, E.C. & Ordaz, J.J. (2014). Peptide separation of commercial fermented milk during refrigerated storage. *Food Science and Technology*, Campinas, 34(4): 674-679. <http://dx.doi.org/10.1590/1678-457X.6415>

- Omar, B. & Ahrén, B. (2014). Pleiotropic Mechanisms for the Glucose-Lowering Action of DPP-4 Inhibitors. *Diabetes*, 63(7):2196–2202. <https://doi.org/10.2337/db14-0052>.
- Otín, CL. & Bond, JS. (2008). Proteases: Multifunctional Enzymes in Life and Disease. *Journal of biological chemistry*, 283:45, pp. 30433–30437. DOI 10.1074/jbc.R800035200
- Paludetti LF, Jordan K , Kelly AL , Gleeson D. (2018). Evaluating the effect of storage conditions on milk microbiological quality and composition. *Irish Journal of Agricultural and Food Research* 57: 52-62.
- Pangestu, AD., Kurniawan & Supriyadi. (2021). Pengaruh variasi suhu dan lama penyimpanan terhadap viabilitas bakteri asam laktat (BAL) dan nilai pH yoghurt. *Borneo Journal Of Medical Laboratory Technology*, 3:2, 231 – 236
- Panwar H, Calderwood D, Grant IR, Grover S, Green BD. (2014). *Lactobacillus* strains isolated from infant faeces possess potent inhibitory activity against intestinal alpha and beta glucosidases suggesting anti-diabetic potential. *European Journal of Nutrition* 53: 1465–1474.
- Patricia; J.J. & Dhamoon, A.S. (2022). Physiology, Digestion. *StatPearls: National Library of Medicine*. Diakses pada 10 Desember 2024
- Pereira B dan Sivakami S. (1991). A comparison of the active site of maltaseglucoamylase from the brush border of rabbit small intestine and kidney by chemical modification studies. *Biochem. J.* 274: 349-35.
- Pohl T. (1990). Concentration of Proteins and Removal of Solutes in Methods in Enzymology Vol 182. Academic Press: Cambridge.
- Pongoh, E.J., Rumampuk, R.J., Lukum, A. & Kapahang, A. (2021).  $\alpha$ -Glucosidase inhibitor activity of some Indonesian syzygium extracts jamb. *J.Chem.*, 3 (2), 99-104.
- Putri, CM., Rustama, MM. & Putranto, WS. (2024). Skrining bakteri asam laktat dan khamir potensial proteolitik ekstraseluler dan milk clotting activity dari ekstrak dan fresh cheese stroberi (*Fragaria x ananassa Duch.*). *Jurnal Teknologi Hasil Peternakan*, 5(1):61-82. DOI: 10.24198/jthp.v5i1.49925

- Puspitojati E, Cahyanto MN, Marsono Y, Indrati R. (2019). Changes in amino acid composition during fermentation and its effects on the inhibitory activity of angiotensin-I-converting enzyme of jack bean tempe following in vitro gastrointestinal digestion *Journal of Food and Nutrition Research* 58: 319-327
- Qiao, Y.N., Wittouck, S., Mattarelli, P., Zheng, J. Lebeer, S., Felis, G.E. & Gänzle, M.G. (2022). After the storm—Perspectives on the taxonomy of *Lactobacillaceae*, *Symposium Review Future of Probiotics Webinar*, 3:222–227. <https://doi.org/10.3168/jdsc.2021-0183>
- Rai AK, Sanjukta S, Chourasia R, Bhat I, Bhardwaj PK, Sahoo D. (2017). Production of bioactive hydrolysate using protease, b-glucosidase and a-amylase of *Bacillus* spp. isolated from kinema. *Bioresource Technology* 235: 358–365.
- Rahayu, E.S; dan Margino, S. (1997). Materi workshop : Bakteri Asam Laktat, Isolasi dan Identifikasi. PAU Pangan dan Gizi, Universitas Gadjah Mada Yogyakarta 13 dan 14 Juni 1997.
- Rahayu ES, Aini NN, Mariyatun, Utami T. (2021). Current Taxonomic Name of Indigenous Probiotic Strains. Poster presented in 6<sup>th</sup> International Conference of Indonesian Society for Lactic Acid Bacteria and Gut Microbiota
- Rahayu<sup>b</sup>, ES., Mariyatun, M., Manurung, NEP., Hasan, PN., Therdtatha, P., Mishima, R., Komalasari, H., Mahfuzah, NA., Pamungkaningtyas, FH., Yoga, WK., Nurfiana, DA., Liwan, SY., Juffrie, M., Nugroho, AE. & Utami, T. (2021). Effect of probiotic *Lactobacillus plantarum* Dad-13 powder consumption on the gut microbiota and intestinal health of overweight adults. *World Journal of Gastroenterol*, 7, 27(1): 107-128. DOI: 10.3748/wjg.v27.i1.107.
- Rahayu<sup>a</sup>, ES., Suroto, DA., Mariyatun, M. & Pramesi, PC. (2024). Complete genome sequence of Indonesian probiotic strain *Lactiplantibacillus plantarum* subsp. *plantarum* Dad-13. *Microbiology Resource Announcements*, Vol. 13, No. 7. <https://doi.org/10.1128/mra.00118-24>
- Rahayu<sup>b</sup>, ES., Yoga, WK., Komalasari, H., Mariyatun, M., Yuda, W.A., Manurung, NEP., Hasan, PN., Suharman, S., Pamungkaningtyas, FH., Nurfiana, DA., Pramesi, PC., Gatya, M., Therdtatha, P., Nakayama, J., Juffrie, M., Djaafar, TF., Marwati, T. & Utami, T. (2024). Probiotic Chocolate Containing *Lactobacillus plantarum* Dad-13 Alters the Gut Microbiota Composition of

Undernourished Children in Lombok: A Randomized Double-Blind Trial.  
*International Journal of Food Science* Volume.  
<https://doi.org/10.1155/2024/9493797>

Ramchandran L and Shah NP. (2008). Proteolytic Profiles and Angiotensin-I Converting Enzyme and  $\alpha$ -Glucosidase Inhibitory Activities of Selected Lactic Acid Bacteria. *Journal of Food Science* 73 Nr. 2.

Ramchandran L and Shah NP. (2009). Effect of exopolysaccharides and inulin on the proteolytic, angiotensin-I-converting enzyme- and  $\alpha$ -glucosidase-inhibitory activities as well as on textural and rheological properties of low-fat yogurt during refrigerated storage. *Dairy Sci. Technol.* 89: 583–600.

Ramchandran L dan Shah NP. (2010). Influence of addition of Raftiline HP on the growth, proteolytic, ACE- and  $\alpha$ -glucosidase inhibitory activities of selected lactic acid bacteria and Bifidobacterium. *LWT - Food Science and Technology* 43: 146–152.

Rautio, J., Kumpulainen, H., Heimbach, T., Oliyai, R., Oh, D., Jarvinen, T. & Savolainen, J. (2008). Prodrugs: design and clinical applications (Review Article). *Nature Reviews Drug Discovery*, 7, 255–270.  
<https://www.nature.com/articles/nrd2468#citeas>

Ren Y, Liang K, Jin Y, Zhang M, Chen Y, Wu H, Lai F. (2016). Identification and characterization of two novel  $\alpha$ -glucosidase inhibitory oligopeptides from hemp (*Cannabis sativa* L.) seed protein. *Journal of Functional Foods* 26: 439–450.

Ren, F., Ji, N. & Zhu, Y. (2023). Review Research Progress of  $\alpha$ -Glucosidase Inhibitors Produced by Microorganisms and Their Applications. *Foods*, 12, 3344.  
<https://doi.org/10.3390/foods12183344>

Riastawaty, D., Girsang, E., Fachrial, E., Ginting, C.N., Piska, F. & Nasution, A.N. (2023). The Activity of  $\alpha$ -glucosidase Inhibition of *Pediococcus Acidilactici* BAMA 4 Isolated from “Naniura” Traditional Foods from North Sumatera, Indonesia. *The Open Biochemistry Journal*, 17(1). doi: 10.2174/1874091x-v17-230921-2023-

- Rosa, L.S., Santos, M.L., Abreu, J.P., Rocha, R.S., Esmerino, E.A., Freitas, M.Q. Mársico, E.T., Campelo, P.H., Pimentel, T.C., Silva, M.C., Souza, A.A., Nogueira, F.C.S., Cruz, A.G. & Teodoro, A.J. (2023). Probiotic fermented whey-milk beverages: Effect of different probiotic strains on the physicochemical characteristics, biological activity, and bioactive peptides. *Food Research International*, 164, 112396. <https://doi.org/10.1016/j.foodres.2022.112396>
- Rustanti, N. Murdiati, A., Juffrie, M. & Rahayu, ES. (2022). Effect of Probiotic *Lactobacillus plantarum* Dad-13 on Metabolic Profiles and Gut Microbiota in Type 2 Diabetic Women: A Randomized Double-Blind Controlled Trial 1. *Microorganisms*, 10, 1806. <https://doi.org/10.3390/microorganisms10091806>
- Rusydan, AM. & Zulfaidah, NT. (2024). Peptida bioaktif: menjelajahi potensi dan tantangan menuju pangan masa depan. *Jurnal Farmasi SYIFA*, 2:2, 56-67
- Sa'adah, A. & Muhtadi. (2022). Inhibitory Activity of the  $\alpha$ -Glucosidase Enzyme by Albumin Isolated from Giant Gourami (*Osphronemus Goramy*), Rice Eel (*Monopterus albus*), and Mackerel Tuna (*Euthynnus affinis*). Proceedings of the 4<sup>th</sup> International Conference Current Breakthrough in Pharmacy (ICB-Pharma 2022). [https://doi.org/10.2991/978-94-6463-050-3\\_15](https://doi.org/10.2991/978-94-6463-050-3_15)
- Salar, U., M. Taha, K. M. Khan, N. H. Ismail, S. Imran, S. Peraan, S. Gul, and A. Wadood. (2016). *European Journal of Medicinal Chemistry*. 122: 196-204.
- Samodra, EMA., Suroto, DA. & Rahayu, ES. (2021). Cold Stress Response Gene of *Lactobacillus plantarum* Mut-3 and *Lactobacillus plantarum* Mut-7 supports their ability to survive in freezing condition. Poster presented in 6<sup>th</sup> International Conference of Indonesian Society for Lactic Acid Bacteria and Gut Microbiota
- Sasikumar K, Vaikkath DK, Devendra L, Nampoothiri KM. (2017). An exopolysaccharide (EPS) from a *Lactobacillus plantarum* BR2 with potential benefits for making functional foods. *Bioresource Technology* 241:1152–1156.
- Savijoki, K. Ingmer, H. Varmanen, P. (2006). Proteolytic systems of lactic acid bacteria. *Appl Microbiol Biotechnol*. 71: 394–406.

- Schillinger U, Holzapfel WH, Björkroth KJ. (2006). *Food spoilage microorganisms: Lactic Acid Bacteria*. Institute of Hygiene and Toxicology, Federal Research Centre for Nutrition and Food: Karlsruhe, Germany. 541-578
- Sharmila U.V., Sharma, A.K. & Sharma, G. (2015). Modeling and Docking Studies of Sesamin Derivatives with Alpha Glucosidase Involved in Type 2 Diabetes. *International Journal of Applied Biology and Pharmaceutical Technology*.
- Shayegan, N., Haghipour, S., Tanideh, N., Moazzam, A., Mojtabavi, S., Faramarzi, M.A., Irajie, C., Pariza, S., Ansari, S., Larijani, B., Hosseini, S. Iraj, A. & Mahdavi, M. (2023). Synthesis, in vitro  $\alpha$ -glucosidase inhibitory activities, and molecular dynamic simulations of novel 4-hydroxyquinolinone-hydrazones as potential antidiabetic agents. *Nature Scientific Reports*, 13:6304. <https://doi.org/10.1038/s41598-023-32889-7>
- Singleton, P., & Sainsbury, D. 2006. *Dictionary of Microbiology and Molecular Biology*. 3rd Edition. John Wiley & Sons. England. 424-425.
- Sivasothy Y, Yong LK, Hoong LK, Litaudon M, Awang K. 2015. A potent alpha-glucosidase inhibitor from *Myristica cinnamomea* King. *Phytochemistry*.
- Sohrabi, M., Binaeizadeh, M.R., Saeedi, M. & Mahdavi, M. (2022). A review on  $\alpha$ -glucosidase inhibitory activity of first row transition metal complexes: a futuristic strategy for treatment of type 2 diabetes. *Royal Society of Chemistry*, 12, 12011–12052. DOI: 10.1039/d2ra00067a
- Suhartatik, N., Cahyanto, M. N., Rahardjo, S., Miyashita, M. & Rahayu, E. S. (2014). Isolation and Identification of lactic acid bacteria producing  $\beta$  glucosidase from indonesian fermented foods. *International Food Research Journal*, 21(3), 973–78. [http://www.ifrj.upm.edu.my/21%20\(03\)%202014/19%20IFRJ%2021%20\(03\)%202014%20Suhartik%20376.pdf](http://www.ifrj.upm.edu.my/21%20(03)%202014/19%20IFRJ%2021%20(03)%202014%20Suhartik%20376.pdf)
- Sun, H., Saeedi, P., Karuranga, S., Pinkepank, M., Ogurtsova, K., Duncan, B., Stein, C., Basit, A., Chan, J. C. N., Mbanya, J. C., Pavkov, M. E., Ramachandaran, A., Wild, S. H., James, S., Herman, W. H., Zhang, P., Bommer, C., Kuo, S., Boyko, E. J., & Magliano, D. J. (2022). IDF Diabetes Atlas: Global, regional and country-level diabetes prevalence estimates for 2021 and projections for 2045. *Diabetes research and clinical practice*, 183. <https://doi.org/10.1016/j.diabres.2021.109119>



- Utami, T., Cindarbhum, A., Khuangga, M.C. Rahayu, E.S. Cahyanto, M.N. Nurfiyanti, S.& Zulaichah, E. (2020). Preparation of Indigenous Lactic Acid Bacteria Starter Cultures for Large Scale Production of Fermented Milk. Digital Press Life Sciences 2: 00010 .10th Asian Conference of Lactic Acid Bacteria. <https://doi.org/10.29037/digitalpress.22327>
- Vander, A., Sherman, J., Luciano, D. (2001). *Human Physiology: The Mechanism of Body*. 8th Edition. The McGraw-Hill Companies. Boston. pp: 556-580.
- Vaningelgem F, Zamfir M, Adriany T, De Vuyst L. (2004). Fermentation conditions affecting the bacterial growth and exopolysaccharide production by *Streptococcus thermophilus* ST 111 in milk-based medium. *Journal of Applied Microbiology* 97: 1257–1273.
- Vilcacundo, R., Villaluenga, C.M. & Ledesma, B.H. (2017). Release of dipeptidyl peptidase IV,  $\alpha$ -amylase and  $\alpha$ -glucosidase inhibitory peptides from quinoa (*Chenopodium quinoa* Willd.) during in vitro simulated gastrointestinal digestion. *Journal of Functional Foods* 35: 531–539.
- Yin, Z . Zhang, W. Feng, F. Zhang, Y. Kang, W. (2014).  $\alpha$ -Glucosidase inhibitors isolated from medicinal plants. *Food Science and Human Wellness* 3: 136–174.
- Yogeswara, IBA., Mariyatun, M., Pramesi, PC. & Rahayu, ES. (2023) Whole-Genome Sequence of *Lactiplantibacillus plantarum* Mut-3, Isolated from Indonesian Fermented Soybean (Tempeh). *Microbiology Resource Announcement*, 12,3. <https://doi.org/10.1128/mra.00513-22>
- Yuliana, T., Pratiwi, A.R., Zahratunnisa, S., Rialita, T., Cahyana, Y., Harlina, P.W. & Marta, H. (2023). Purification and partial characterization of a bacteriocin produced by *Lactobacillus pentosus* 124-2 Isolated from Dadih. *Applied Sciences*, 13, 4277. <https://doi.org/10.3390/app13074277>.
- Wang, F., Zhang, Y., Yua, T., Hea, J., Cuia, J., Wang, J., Cheng, X. & Fana, J. (2018). Oat globulin peptides regulate antidiabetic drug targets and glucose transporters in Caco-2 cells. *Journal of Functional Foods*, 42, 12-20. <https://doi.org/10.1016/j.jff.2017.12.061>
- Wang X, Dejun Y, Zhang Y, Zhang C, Liu L, Liu Y, Jiang J, Xie P, Huang L. (2023). Screening and Evaluation of Novel  $\alpha$ -Glucosidase Inhibitory Peptides from

- Ginkgo biloba Seed Cake Based on Molecular Docking Combined with Molecular Dynamics Simulation. *J. Agric. Food Chem*, 71, 10326–10337.
- Wan Y, Dou X, Ma Y, Zhu X, Yang J. (2015). Optimization research of fermentation conditions of purple potato liquor. *Advances in Applied Science Research* 6(5):122-129.
- Wardani, S. K., Cahyanto, M. N., Rahayu, E. S., & Utami, T. (2017). The effect of inoculum size and incubation temperature on cell growth, acid production and curd formation during milk fermentation by *Lactobacillus plantarum* Dad 13. *International Food Research Journal*, 24(3): 921-926.
- Wattimury, A. Rahayu, ES & Dian A Suroto. (2021). In Silico Analysis of Antibiotic Resistance Genes in *Lactobacillus plantarum* T3 poster presented in The 6th International Conference of Indonesian Society for Lactic Acid Bacteria and Gut Microbiota (6th ISLAB) on 13th August 2021
- Wei R.T., Lin L.K., Li T.T., Li C., Chen B., Shen Y.H. (2022). Separation, identification, and design of  $\alpha$ -glucosidase inhibitory peptides based on the molecular mechanism from *Paeonia ostii* ‘Feng Dan’ seed protein. *J. Food Sci*, 87:4892–4904. doi: 10.1111/1750-3841.16340
- WHO. 2023. *Diabetes*. <https://www.who.int/news-room/fact-sheets/detail/diabetes>. Diakses pada 18 Juni 2023.
- Wu, Y., Zhang, J., Zhu, R., Zhang, H., Li, D., Li, H., Tang, H., Chen, L., Peng, X., Xu, X. & Zhao, K. (2024). Mechanistic Study of Novel Dipeptidyl Peptidase IV Inhibitory Peptides from Goat’s Milk Based on Peptidomics and In Silico Analysis. *Foods*, 13, 1194. <https://doi.org/10.3390/foods13081194>
- Yang, X., Wang, D., Dai, Y., Zhao, L., Wang, W. & Ding, X. (2023). Identification and molecular binding mechanism of novel-glucosidase inhibitory peptides from hot-pressed peanut meal protein hydrolysates. *Foods*, 12, 663. <https://doi.org/10.3390/foods12030663>
- Yu Z, Yin Y, Zhao W, Yu Y, Liu B, Liu J, Chen F. (2011). Novel peptides derived from egg white protein inhibiting alpha-glucosidase. *Food Chemistry* 129: 1376–1382.

- Yu Z, Yin Y, Zhao W, Liu J, Chen F. (2012). Anti-diabetic activity peptides from albumin against  $\alpha$ -glucosidase and  $\alpha$ -amylase. *Food Chemistry* 135: 2078–2085.
- Zeng Z, Luo J, Zuo F, Zhang Y, Ma H, Chen S. (2016). Screening for potential novel probiotic *Lactobacillus* strains based on high dipeptidyl peptidase IV and  $\alpha$ -glucosidase inhibitory activity. *Journal of Functional Foods* 20: 486–495.
- Zhai, X., Wu, K., Ji, R., Zhao, Y., Lu, J., Yu, Z., Xu, X. & Huang, J. (2022). Structure and Function Insight of the  $\alpha$ -Glucosidase QsGH13 from *Qipengyuania seohaensis* sp. SW-135. *Front. Microbiol.* 13. <https://doi.org/10.3389/fmicb.2022.849585>.
- Zhang Y, Wang N, Wang W, Wanga J, Zhua Z, Li X. (2016). Molecular mechanisms of novel peptides from silkworm pupae that inhibit  $\alpha$ -glucosidase. *Peptides* 76: 45–50.
- Zhang, Y.P.; Wu, F.H.; He, Z.P.; Fang, X.Z.; Liu, X.Q. (2023). Optimization and molecular mechanism of novel-glucosidase inhibitory peptides derived from camellia seed cake through enzymatic hydrolysis. *Foods*, 12, 393.
- Zheng, J., L. Ruan, M. Sun, and M. G. Gänzle. (2015). A genomic view of lacto bacilli and pediococci demonstrates that phylogeny matches ecology and physiology. *Appl. Environ. Microbiol.* 81:7233–7243. <https://doi.org/10.1128/AEM.02116-15>.
- Zheng, J., Wittouck, S., Salvetti, E., Franz, C.M.A.P., Harris, H.M.B., Mattarelli, P. O'Toole, P.W., Pot, B., Vandamme, P., Walter, J., Watanabe, K. Wuyts, S., Felis, G.E, Gänzle, M.G.& Lebeer, S. (2020). A taxonomic note on the genus *Lactobacillus*: Description of 23 novel genera, emended description of the genus *Lactobacillus* Beijerinck 1901, and union of Lactobacillaceae and Leuconostocaceae. *Int. J. Syst. Evol. Microbiol.* 70:2782–2858. <https://doi.org/10.1099/ijsem.0.004107>