

DAFTAR PUSTAKA

- [1] T. Jamil, U. Ansari, M. Najabat Ali, and M. Mir, “A Review on Biomechanical and Treatment Aspects Associated with Anterior Cruciate Ligament,” *Irbm*, vol. 38, no. 1, pp. 13–25, 2017, doi: 10.1016/j.irbm.2016.10.002.
- [2] N. Singh, “International Epidemiology of Anterior Cruciate Ligament Injuries,” *Orthop. Res. Online J.*, vol. 1, no. 5, pp. 1–4, 2018, doi: 10.31031/oproj.2018.01.000525.
- [3] I. Gans, J. S. Retzky, L. C. Jones, and M. J. Tanaka, “Epidemiology of Recurrent Anterior Cruciate Ligament Injuries in National Collegiate Athletic Association Sports: The Injury Surveillance Program, 2004-2014,” *Orthop. J. Sport. Med.*, vol. 6, no. 6, pp. 1–7, 2018, doi: 10.1177/2325967118777823.
- [4] X. He *et al.*, “Biomaterials developed for facilitating healing outcome after anterior cruciate ligament reconstruction: Efficacy, surgical protocols, and assessments using preclinical animal models,” *Biomaterials*, vol. 269, p. 120625, 2021, doi: <https://doi.org/10.1016/j.biomaterials.2020.120625>.
- [5] P. Mahapatra, S. Horriat, and B. S. Anand, “Anterior cruciate ligament repair - past, present and future.,” *J. Exp. Orthop.*, vol. 5, no. 1, p. 20, Jun. 2018, doi: 10.1186/s40634-018-0136-6.
- [6] B. U. Nwachukwu, B. H. Patel, Y. Lu, A. A. Allen, and R. J. Williams, “Anterior Cruciate Ligament Repair Outcomes: An Updated Systematic Review of Recent Literature,” *Arthrosc. J. Arthrosc. Relat. Surg.*, vol. 35, no. 7, pp. 2233–2247, 2019, doi: <https://doi.org/10.1016/j.arthro.2019.04.005>.
- [7] E. Kon *et al.*, “Biologic agents to optimize outcomes following ACL repair and reconstruction: A systematic review of clinical evidence,” *J. Orthop. Res.*, vol. 40, no. 1, pp. 10–28, Jan. 2022, doi: <https://doi.org/10.1002/jor.25011>.
- [8] C.-L. Wang, C.-K. Hsiao, A.-T. Hsu, C.-Z. Dung, and C.-H. Chang, “Biocompatibility and Mechanical Property of LARS Artificial Ligament

- with Tissue Ingrowth,” *J. Mech. Med. Biol.*, vol. 12, no. 01, p. 1250012, Mar. 2012, doi: 10.1142/S0219519411004514.
- [9] H. Li *et al.*, “Biologic failure of a ligament advanced reinforcement system artificial ligament in anterior cruciate ligament reconstruction: A report of serious knee synovitis,” *Arthrosc. - J. Arthrosc. Relat. Surg.*, vol. 28, no. 4, pp. 583–586, 2012, doi: 10.1016/j.arthro.2011.12.008.
- [10] D. Banoriya, R. Purohit, and R. K. Dwivedi, “Advanced Application of Polymer based Biomaterials,” *Mater. Today Proc.*, vol. 4, no. 2, Part A, pp. 3534–3541, 2017, doi: <https://doi.org/10.1016/j.matpr.2017.02.244>.
- [11] N. Chunshom, P. Chuysinuan, S. Techasakul, and S. Ummartyotin, “Dried-state bacterial cellulose (*Acetobacter xylinum*) and polyvinyl-alcohol-based hydrogel: An approach to a personal care material,” *J. Sci. Adv. Mater. Devices*, vol. 3, no. 3, pp. 296–302, 2018, doi: 10.1016/j.jsamd.2018.06.004.
- [12] Y. Hagiwara, A. Putra, A. Kakugo, H. Furukawa, and J. P. Gong, “Ligament-like tough double-network hydrogel based on bacterial cellulose,” *Cellulose*, vol. 17, no. 1, pp. 93–101, 2010, doi: 10.1007/s10570-009-9357-2.
- [13] M. Yang, D. Xiang, Y. Chen, Y. Cui, S. Wang, and W. Liu, “An Artificial PVA-BC Composite That Mimics the Biomechanical Properties and Structure of a Natural Intervertebral Disc,” *Materials (Basel)*, vol. 15, no. 4, 2022, doi: 10.3390/ma15041481.
- [14] C. J. Zhang, L. Wang, J. C. Zhao, and P. Zhu, “Effect of drying methods on structure and mechanical properties of bacterial cellulose films,” *Adv. Mater. Res.*, vol. 239–242, pp. 2667–2670, 2011, doi: 10.4028/www.scientific.net/AMR.239-242.2667.
- [15] L. Ritchie, “Ligament,” Physiopedia. Accessed: Nov. 26, 2024. [Online]. Available: https://www.physio-pedia.com/Ligament#/media/File:Knee_ligaments.png
- [16] InformedHealth.org, “In brief: What are ligaments?,” Cologne, Germany: Institute for Quality and Efficiency in Health Care (IQWiG). Accessed: Nov. 11, 2024. [Online]. Available: <https://www.ncbi.nlm.nih.gov/books/NBK525790/>
- [17] K. M. Quapp and J. A. Weiss, “A material characterization of human medial

- collateral ligament,” *Am. Soc. Mech. Eng. Bioeng. Div. BED*, vol. 36, no. December 1998, pp. 191–192, 1997.
- [18] G. J. Rogers, B. K. Milthorpe, A. Muratore, and K. Schindhelm, “Measurement of the mechanical properties of the ovine anterior cruciate ligament bone-ligament-bone complex: a basis for prosthetic evaluation,” *Biomaterials*, vol. 11, no. 2, pp. 89–96, 1990, doi: 10.1016/0142-9612(90)90122-7.
- [19] T. Chen, J. Jiang, and S. Chen, “Status and headway of the clinical application of artificial ligaments,” *Asia-Pacific J. Sport. Med. Arthrosc. Rehabil. Technol.*, vol. 2, no. 1, pp. 15–26, 2015, doi: <https://doi.org/10.1016/j.asmart.2014.11.001>.
- [20] N. Davarinos, B. J. O’Neill, and W. Curtin, “A Brief History of Anterior Cruciate Ligament Reconstruction,” *Adv. Orthop. Surg.*, vol. 2014, pp. 1–6, 2014, doi: 10.1155/2014/706042.
- [21] M. Cuppone and B. B. Seedhom, “Effect of implant lengthening and mode of fixation on knee laxity after ACL reconstruction with an artificial ligament: a cadaveric study,” *J. Orthop. Sci.*, vol. 6, no. 3, pp. 253–261, 2001, doi: <https://doi.org/10.1007/s007760100044>.
- [22] X. M. Wang, G. Ji, X. M. Wang, H. J. Kang, and F. Wang, “Biological and Biomechanical Evaluation of Autologous Tendon Combined with Ligament Advanced Reinforcement System Artificial Ligament in a Rabbit Model of Anterior Cruciate Ligament Reconstruction,” *Orthop. Surg.*, vol. 10, no. 2, pp. 144–151, 2018, doi: 10.1111/os.12370.
- [23] D. P. Iliadis, D. N. Bourlos, D. S. Mastrokalos, E. Chronopoulos, and G. C. Babis, “LARS Artificial Ligament Versus ABC Purely Polyester Ligament for Anterior Cruciate Ligament Reconstruction,” *Orthop. J. Sport. Med.*, vol. 4, no. 6, pp. 1–10, 2016, doi: 10.1177/2325967116653359.
- [24] Z. Y. Jia *et al.*, “Comparison of artificial graft versus autograft in anterior cruciate ligament reconstruction: A meta-analysis,” *BMC Musculoskelet. Disord.*, vol. 18, no. 1, pp. 1–10, 2017, doi: 10.1186/s12891-017-1672-4.
- [25] C. Legnani, A. Ventura, C. Terzaghi, E. Borgo, and W. Albisetti, “Anterior cruciate ligament reconstruction with synthetic grafts. A review of

- literature,” *Int. Orthop.*, vol. 34, no. 4, pp. 465–471, 2010, doi: 10.1007/s00264-010-0963-2.
- [26] H. Li and S. Chen, “Biomedical coatings on polyethylene terephthalate artificial ligaments,” *J. Biomed. Mater. Res. Part A*, vol. 103, no. 2, pp. 839–845, Feb. 2015, doi: <https://doi.org/10.1002/jbm.a.35218>.
- [27] Z. T. Liu, X. L. Zhang, Y. Jiang, and B. F. Zeng, “Four-strand hamstring tendon autograft versus LARS artificial ligament for anterior cruciate ligament reconstruction,” *Int. Orthop.*, vol. 34, no. 1, pp. 45–49, 2010, doi: 10.1007/s00264-009-0768-3.
- [28] T. Nau, P. Lavoie, and N. Duval, “A new generation of artificial ligaments in reconstruction of the anterior cruciate ligament,” *J. Bone Jt. Surg. Br. Vol.*, vol. 84-B, no. 3, pp. 356–360, 2002, doi: doi:10.1302/0301-620X.84B3.0840356.
- [29] K. Chung, *Grabb and Smith’s Plastic Surgery*. Wolters Kluwer Health, 2019. [Online]. Available: <https://books.google.co.id/books?id=4SaWDwAAQBAJ>
- [30] U. Meyer, “The History of Tissue Engineering and Regenerative Medicine in Perspective BT - Fundamentals of Tissue Engineering and Regenerative Medicine,” U. Meyer, J. Handschel, H. P. Wiesmann, and T. Meyer, Eds., Berlin, Heidelberg: Springer Berlin Heidelberg, 2009, pp. 5–12. doi: 10.1007/978-3-540-77755-7_1.
- [31] V. W. Wong, K. C. Rustad, M. T. Longaker, and G. C. Gurtner, “Tissue engineering in plastic surgery: a review,” *Plast. Reconstr. Surg.*, vol. 126, no. 3, pp. 858–868, Sep. 2010, doi: 10.1097/PRS.0b013e3181e3b3a3.
- [32] P. Zhou *et al.*, “Mechanical Stimulation and Diameter of Fiber Scaffolds Affect the Differentiation of Rabbit Annulus Fibrous Stem Cells,” *Tissue Eng. Regen. Med.*, vol. 18, no. 1, pp. 49–60, 2021, doi: 10.1007/s13770-020-00305-0.
- [33] G. Vunjak-Novakovic, G. Altman, R. Horan, and D. L. Kaplan, “Tissue engineering of ligaments,” *Annu. Rev. Biomed. Eng.*, vol. 6, pp. 131–156, 2004, doi: 10.1146/annurev.bioeng.6.040803.140037.
- [34] P. P. Weitzel, J. C. Richmond, G. H. Altman, T. Calabro, and D. L. Kaplan,

- “Future direction of the treatment of ACL ruptures.,” *Orthop. Clin. North Am.*, vol. 33, no. 4, pp. 653–661, Oct. 2002, doi: 10.1016/s0030-5898(02)00017-2.
- [35] J. M. Van Bemmelen, “Das hydrogel und das krystallinische hydrat des kupferoxyds,” *Zeitschrift für Anorg. Chemie*, vol. 5, no. 1, pp. 466–483, 1894.
- [36] E. M. Ahmed, “Hydrogel: Preparation, characterization, and applications: A review,” *J. Adv. Res.*, vol. 6, no. 2, pp. 105–121, 2015, doi: 10.1016/j.jare.2013.07.006.
- [37] E. M. Ahmed, F. S. Aggor, A. M. Awad, and A. T. El-Aref, “An innovative method for preparation of nanometal hydroxide superabsorbent hydrogel,” *Carbohydr. Polym.*, vol. 91, no. 2, pp. 693–698, 2013, doi: <https://doi.org/10.1016/j.carbpol.2012.08.056>.
- [38] K. Zöller, D. To, and A. Bernkop-Schnürch, “Biomedical applications of functional hydrogels: Innovative developments, relevant clinical trials and advanced products,” *Biomaterials*, vol. 312, no. July 2024, 2025, doi: 10.1016/j.biomaterials.2024.122718.
- [39] S. S. Silva *et al.*, “2.11 Polymers of Biological Origin☆,” P. B. T.-C. B. I. I. Ducheyne, Ed., Oxford: Elsevier, 2017, pp. 228–252. doi: <https://doi.org/10.1016/B978-0-12-803581-8.10134-1>.
- [40] V. D. Girard, J. Chaussé, and P. Vermette, “Bacterial cellulose: A comprehensive review,” *J. Appl. Polym. Sci.*, vol. 141, no. 15, pp. 1–35, 2024, doi: 10.1002/app.55163.
- [41] J. Wang, J. Tavakoli, and Y. Tang, “Bacterial cellulose production, properties and applications with different culture methods – A review,” *Carbohydr. Polym.*, vol. 219, no. February, pp. 63–76, 2019, doi: 10.1016/j.carbpol.2019.05.008.
- [42] R. Portela, C. R. Leal, P. L. Almeida, and R. G. Sobral, “Bacterial cellulose: a versatile biopolymer for wound dressing applications,” *Microb. Biotechnol.*, vol. 12, no. 4, pp. 586–610, 2019, doi: 10.1111/1751-7915.13392.
- [43] S. Gea *et al.*, “Investigation into the structural, morphological, mechanical

- and thermal behaviour of bacterial cellulose after a two-step purification process,” *Bioresour. Technol.*, vol. 102, no. 19, pp. 9105–9110, Oct. 2011, doi: 10.1016/j.biortech.2011.04.077.
- [44] Z. Pourramezan, A. Roayaei, and G. Ghezelbash, “Optimization of Culture Conditions for Bacterial Cellulose Production by *Acetobacter* sp. 4B-2,” *Biotechnology*, vol. 8, pp. 151–154, Jan. 2009, doi: 10.3923/biotech.2009.150.154.
- [45] X. Zeng, D. P. Small, and W. Wan, “Statistical optimization of culture conditions for bacterial cellulose production by *Acetobacter xylinum* BPR 2001 from maple syrup,” *Carbohydr. Polym.*, vol. 85, no. 3, pp. 506–513, 2011, doi: <https://doi.org/10.1016/j.carbpol.2011.02.034>.
- [46] S. Mohainin Mohammad, N. Abd Rahman, M. Sahaid Khalil, and S. Rozaimah Sheikh Abdullah, “An Overview of Biocellulose Production Using *Acetobacter xylinum* Culture,” *Adv. Biol. Res. (Rennes)*, vol. 8, no. 6, pp. 307–313, 2014, doi: 10.5829/idosi.abr.2014.8.6.1215.
- [47] E. J. Vandamme, S. De Baets, A. Vanbaelen, K. Joris, and P. De Wulf, “Improved production of bacterial cellulose and its application potential,” *Polym. Degrad. Stab.*, vol. 59, no. 1, pp. 93–99, 1998, doi: [https://doi.org/10.1016/S0141-3910\(97\)00185-7](https://doi.org/10.1016/S0141-3910(97)00185-7).
- [48] R. Pambayun, “Teknologi Pengolahan Nata De Coco,” 2002. [Online]. Available: <https://api.semanticscholar.org/CorpusID:238539553>
- [49] S. . Saxena, “Polyvinyl Alcohol (PVA) Chemical and Technical Assessment (CTA),” *61st JECFA*, 2004, [Online]. Available: <https://www.fao.org/fileadmin/templates/agns/pdf/jecfa/cta/61/PVA.pdf>
- [50] H. E. Jazayeri *et al.*, “A current overview of materials and strategies for potential use in maxillofacial tissue regeneration,” *Mater. Sci. Eng. C*, vol. 70, pp. 913–929, 2017, doi: 10.1016/j.msec.2016.08.055.
- [51] M. I. Baker, S. P. Walsh, Z. Schwartz, and B. D. Boyan, “A review of polyvinyl alcohol and its uses in cartilage and orthopedic applications,” *J. Biomed. Mater. Res. - Part B Appl. Biomater.*, vol. 100 B, no. 5, pp. 1451–1457, 2012, doi: 10.1002/jbm.b.32694.
- [52] H. Li, C. Wu, X. Yu, and W. Zhang, “Recent advances of PVA-based

- hydrogels in cartilage repair application,” *J. Mater. Res. Technol.*, vol. 24, no. March, pp. 2279–2298, 2023, doi: 10.1016/j.jmrt.2023.03.130.
- [53] Kementerian Kesehatan RI, *Farmakope Indonesia Edisi V*. Jakarta, 2014.
- [54] H. Zhang and M. W. Grinstaff, “Recent advances in glycerol polymers: Chemistry and biomedical applications,” *Macromol. Rapid Commun.*, vol. 35, no. 22, pp. 1906–1924, 2014, doi: 10.1002/marc.201400389.
- [55] A. R. Jamali, A. A. Shaikh, and A. D. Chandio, “Enhancing the Flexibility of PVA Membrane through Glycerol Addition,” *Preprints*, 2023, doi: 10.20944/preprints202307.0618.v1.
- [56] I. M. Bodea *et al.*, “Optimization of moist and oven-dried bacterial cellulose production for functional properties,” *Polymers (Basel)*, vol. 13, no. 13, pp. 1–25, 2021, doi: 10.3390/polym13132088.
- [57] V. D. Panjaitan, Iriany, and L. Sukeksi, “Karakterisasi Biofilm Selulosa Bakteri dengan Modifikasi Gliserol secara Ex Situ,” *J. Tek. Kim. USU*, vol. 13, no. 1, pp. 17–23, 2024.
- [58] C. Ratti, *Advances in Food Dehydration*. in Contemporary Food Engineering. CRC Press, 2008. [Online]. Available: <https://books.google.co.id/books?id=yq3snHZu5coC>
- [59] P. J. Fellows, *Food Processing Technology: Principles and Practice*. in Woodhead Publishing Series in Food Science, Technology and Nutrition. Woodhead Publishing, 2016. [Online]. Available: <https://books.google.co.id/books?id=pCilCgAAQBAJ>
- [60] C. Berthomieu and R. Hienerwadel, “Fourier transform infrared (FTIR) spectroscopy,” *Photosynth. Res.*, vol. 101, no. 2–3, pp. 157–170, 2009, doi: 10.1007/s11120-009-9439-x.
- [61] A. W. Paramadini, P. Widiyanti, and D. I. Rudyardjo, “Effects of collagen concentration variation toward characteristics of bacterial cellulose-collagen biocomposites as candidate of artificial dura mater,” *J. Biomimetics, Biomater. Biomed. Eng.*, vol. 33, pp. 80–87, 2017, doi: 10.4028/www.scientific.net/JBBBE.33.80.
- [62] M. Al-Kelani and N. Buthelezi, “Advancements in medical research: Exploring Fourier Transform Infrared (FTIR) spectroscopy for tissue, cell,

- and hair sample analysis,” *Ski. Res. Technol.*, vol. 30, no. 6, pp. 1–13, 2024, doi: 10.1111/srt.13733.
- [63] J. R. Davis, *Tensile Testing, 2nd Edition*. ASM International, 2004. [Online]. Available: <https://books.google.co.id/books?id=5uRIb3emLY8C>
- [64] R. S. Angtika, P. Widiyanti, and Aminatun, “Bacterial cellulose-chitosan-glycerol biocomposite as artificial dura mater candidates for head trauma,” *J. Biomimetics, Biomater. Biomed. Eng.*, vol. 36, pp. 7–16, 2018, doi: 10.4028/www.scientific.net/JBBBE.36.7.
- [65] L. Indrarti, Indriyati, A. Syampurwadi, and S. Pujiastuti, “Physical and mechanical properties of modified bacterial cellulose composite films,” *AIP Conf. Proc.*, vol. 1711, no. March 2019, 2016, doi: 10.1063/1.4941633.
- [66] Y. Chen, J. Li, J. Lu, M. Ding, and Y. Chen, “Synthesis and properties of Poly(vinyl alcohol) hydrogels with high strength and toughness,” *Polym. Test.*, vol. 108, no. February, p. 107516, 2022, doi: 10.1016/j.polymertesting.2022.107516.
- [67] P. Singhaboot, W. Kraisuwan, T. Chatkumpjunjalearn, P. Kroeksakul, and B. Chongkolnee, “Development and Characterization of Polyvinyl Alcohol/Bacterial Cellulose Composite for Environmentally Friendly Film,” *J. Ecol. Eng.*, vol. 24, no. 6, pp. 226–238, 2023, doi: 10.12911/22998993/162954.
- [68] D. L. Pavia, G. M. Lampman, G. S. Kriz, and J. R. Vyvyan, *Introduction to Spectroscopy Fourth Edition*. Washington: Brooks/Cole Cengage Learning, 2009.
- [69] K. H. Al-Ramlawee and E. J. Alkalifawi, “Production and characterization of bacterial cellulose utilizing Iraqi vinegar’s mother pellicles,” *J. Appl. Nat. Sci.*, vol. 15, no. 4, pp. 1619–1626, 2023, doi: 10.31018/jans.v15i4.5030.
- [70] R. Ummami, Busroni, and B. Piluharto, “Synthesis and Characterization of Bacterial Cellulose-Polyaniline Composite with Variation of Dopant Concentration,” *Berk. Sainstek*, vol. 9, no. 2, p. 69, 2021, doi: 10.19184/bst.v9i2.18120.
- [71] J. Tarique, S. M. Sapuan, and A. Khalina, “Effect of glycerol plasticizer loading on the physical, mechanical, thermal, and barrier properties of

- arrowroot (*Maranta arundinacea*) starch biopolymers,” *Sci. Rep.*, vol. 11, no. 1, pp. 1–17, 2021, doi: 10.1038/s41598-021-93094-y.
- [72] Y. Cai, J. Che, M. Yuan, X. Shi, W. Chen, and W. E. Yuan, “Effect of glycerol on sustained insulin release from PVA hydrogels and its application in diabetes therapy,” *Exp. Ther. Med.*, vol. 12, no. 4, pp. 2039–2044, 2016, doi: 10.3892/etm.2016.3593.
- [73] W. Feng and Z. Wang, “Tailoring the Swelling-Shrinkable Behavior of Hydrogels for Biomedical Applications,” *Adv. Sci.*, vol. 10, no. 28, pp. 1–41, 2023, doi: 10.1002/advs.202303326.