

DAFTAR PUSTAKA

- Abazari, M., Ghaffari, A., Rashidzadeh, H., Badeleh, S. M., & Maleki, Y. (2022). A systematic review on classification, identification, and healing process of burn wound healing. *The International Journal of Lower Extremity Wounds*, 21(1), 18–30. <https://doi.org/10.1177/1534734620924857>
- Abbasi, A. R., Sohail, M., Minhas, M. U., Khaliq, T., Kousar, M., Khan, S., Hussain, Z., & Munir, A. (2020). Bioinspired sodium alginate based thermosensitive hydrogel membranes for accelerated wound healing. *International Journal of Biological Macromolecules*, 155, 751–765. <https://doi.org/10.1016/j.ijbiomac.2020.03.248>
- Agbenorku, P., Akpaloo, J., Chirurgie, F., Aboah, K., Klutsey, E., Hoyte-Williams, P. E., Farhat, B., Turkson, E., Yorke, J., Ametih, R., & Hussey, R. (2015). Chemical burn injury in Kumasi: The trend and complications following and their management. *Plastic and Reconstructive Surgery - Global Open*, 3(10). <https://doi.org/10.1097/GOX.0000000000000519>
- Ahn, Y., Kim, H., & Kwak, S.-Y. (2019). Self-reinforcement of alginate hydrogel via conformational control. *European Polymer Journal*, 116, 480–487. <https://doi.org/10.1016/j.eurpolymj.2019.03.017>
- Ahmad, S., Ahmad, M., Manzoor, K., Purwar, R., & Ikram, S. (2019). A review on latest innovations in natural gums based hydrogels: Preparations & applications. *International Journal of Biological Macromolecules*, 136, 870–890. <https://doi.org/10.1016/j.ijbiomac.2019.06.113>
- Ahmed, E. M. (2015). Hydrogel: Preparation, characterization, and applications: A review. *Journal of Advanced Research*, 6(2), 105–121. <https://doi.org/10.1016/j.jare.2013.07.006>
- Alavarse, A. C., Frachini, E. C. G., da Silva, R. L. C. G., Lima, V. H., Shavandi, A., & Petri, D. F. S. (2022). Crosslinkers for polysaccharides and proteins: Synthesis conditions, mechanisms, and crosslinking efficiency, a review. *International Journal of Biological Macromolecules*, 202, 558–596. <https://doi.org/10.1016/j.ijbiomac.2022.01.029>
- Aljghami, M. E., Saboor, S., & Amini-Nik, S. (2019). Emerging Innovative Wound Dressings. *Annals of Biomedical Engineering*, 47(3), 659–675. <https://doi.org/10.1007/s10439-018-02186-w>
- Alnaief, M., Alzaitoun, M. A., García-González, C. A., & Smirnova, I. (2011). Preparation of biodegradable nanoporous microspherical aerogel based on

- alginate. *Carbohydrate Polymers*, 84(3), 1011–1018.
<https://doi.org/10.1016/j.carbpol.2010.12.060>
- Avery, N. C., & Bailey, A. J. (2006). The effects of the Maillard reaction on the physical properties and cell interactions of collagen. *Pathologie Biologie*, 54(7), 387–395. <https://doi.org/10.1016/j.patbio.2006.07.005>
- Bella, J., & Hulmes, D. J. S. (2017). Fibrillar Collagens. *Subcell Biochem*, 82, 457–490. https://doi.org/10.1007/978-3-319-49674-0_14
- Bhagwat, P. K., & Dandge, P. B. (2016). Isolation, characterization and valorizable applications of fish scale collagen in food and agriculture industries. *Biocatalysis and Agricultural Biotechnology*, 7, 234–240. <https://doi.org/10.1016/j.bcab.2016.06.010>
- Bierhalz, A. C. K., Westin, C. B., & Moraes, Â. M. (2016). Comparison of the properties of membranes produced with alginate and chitosan from mushroom and from shrimp. *International Journal of Biological Macromolecules*, 91, 496–504. <https://doi.org/10.1016/j.ijbiomac.2016.05.095>
- Bounds, E. J., Khan, M., & Kok, S. J. (2023). Electrical Burns. *StatPearls*. <https://www.ncbi.nlm.nih.gov/books/NBK519514/>
- Cao, L., Lu, W., Mata, A., Nishinari, K., & Fang, Y. (2020). Egg-box model-based gelation of alginate and pectin: A review. *Carbohydrate Polymers*, 242, 116389. <https://doi.org/10.1016/j.carbpol.2020.116389>
- Castillo, R. V., & Müller, A. J. (2009). Crystallization and morphology of biodegradable or biostable single and double crystalline block copolymers. *Progress in Polymer Science*, 34(6), 516–560. <https://doi.org/10.1016/j.progpolymsci.2009.03.002>
- Chaerani, M. A. D., Baraja, H. A., Putranti, I. N. D., Reswari, K. E., & Ainurofiq, A. (2025). Alginate/collagen hydrogel containing calcium from eggshell waste as a potential diabetic foot ulcer wound dressing. *Materials Today Communications*, 42, 111417. <https://doi.org/10.1016/j.mtcomm.2024.111417>
- Chaudhary, S., & Chakraborty, E. (2022). Hydrogel based tissue engineering and its future applications in personalized disease modeling and regenerative therapy. *Beni-Suef University Journal of Basic and Applied Sciences*, 11(1), 3. <https://doi.org/10.1186/s43088-021-00172-1>
- Chen, T., Chen, Y., Rehman, H. U., Chen, Z., Yang, Z., Wang, M., Li, H., & Liu, H. (2018). Ultratough, Self-Healing, and Tissue-Adhesive Hydrogel for

- Wound Dressing. *ACS Applied Materials & Interfaces*, 10(39), 33523–33531. <https://doi.org/10.1021/acsami.8b10064>
- Cheol Kim, H., Na Lee, J., Kim, E., Hee Kim, M., & Ho Park, W. (2021). Self-healable poly(γ -glutamic acid)/chitoooligosaccharide hydrogels via ionic and π -interactions. *Materials Letters*, 297, 129987. <https://doi.org/10.1016/j.matlet.2021.129987>
- Chopra, H., Bibi, S., Kumar, S., Khan, M. S., Kumar, P., & Singh, I. (2022). Preparation and Evaluation of Chitosan/PVA Based Hydrogel Films Loaded with Honey for Wound Healing Application. *Gels*, 8(2). <https://doi.org/10.3390/gels8020111>
- Chyzy, A., & Plonska-Brzezinska, M. E. (2020). Hydrogel Properties and Their Impact on Regenerative Medicine and Tissue Engineering. *In Molecules* (Vol. 25, Issue 24). MDPI AG. <https://doi.org/10.3390/molecules25245795>
- Çelik, E., Bayram, C., Akçapinar, R., Türk, M., & Denkbaş, E. B. (2016). The effect of calcium chloride concentration on alginate/Fmoc-diphenylalanine hydrogel networks. *Materials Science and Engineering C*, 66, 221–229. <https://doi.org/10.1016/j.msec.2016.04.084>
- Darby, I. A., Laverdet, B., Bonté, F., & Desmoulière, A. (2014). Fibroblasts and myofibroblasts in wound healing. *Clinical, Cosmetic and Investigational Dermatology*, 7, 301–311. <https://doi.org/10.2147/CCID.S50046>
- Darge, H. F., Andrgie, A. T., Tsai, H. C., & Lai, J. Y. (2019). Polysaccharide and polypeptide based injectable thermo-sensitive hydrogels for local biomedical applications. *International Journal of Biological Macromolecules*, 133, 545–563. <https://doi.org/10.1016/j.ijbiomac.2019.04.131>
- Delavary, B. M., van der Veer, W. M., van Egmond, M., Niessen, F. B., & Beelen, R. H. J. (2011). Macrophages in skin injury and repair. *Immunobiology*, 216(7), 753–762. <https://doi.org/10.1016/j.imbio.2011.01.001>
- Deligkaris, K., Tadele, T. S., Olthuis, W., & van den Berg, A. (2010). Hydrogel-based devices for biomedical applications. *Sensors and Actuators B: Chemical*, 147(2), 765–774. <https://doi.org/10.1016/j.snb.2010.03.083>
- Demeter, M., Scărișoreanu, A., & Călina, I. (2023). State of the Art of Hydrogel Wound Dressings Developed by Ionizing Radiation. *Gels*, 9(1), 55. <https://doi.org/10.3390/gels9010055>
- Dhand, A. P., Galarraga, J. H., & Burdick, J. A. (2021). Enhancing Biopolymer Hydrogel Functionality through Interpenetrating Networks. *Trends in*

- Biotechnology*, 39(5), 519–538.
<https://doi.org/10.1016/j.tibtech.2020.08.007>
- Dinescu, S., Albu Kaya, M., Chitoiu, L., Ignat, S., Kaya, D. A., & Costache, M. (2018). *Collagen-Based Hydrogels and Their Applications for Tissue Engineering and Regenerative Medicine*, 1–21.
https://doi.org/10.1007/978-3-319-76573-0_54-1
- Dodero, A., Pianella, L., Vicini, S., Alloisio, M., Ottonelli, M., & Castellano, M. (2019). Alginate-based hydrogels prepared via ionic gelation: An experimental design approach to predict the crosslinking degree. *European Polymer Journal*, 118, 586–594.
<https://doi.org/10.1016/j.eurpolymj.2019.06.028>
- Elodi Satria, K., Sedjati, S., & Yudiati, E. (2024). Alginate-Gamat Gel Hydrogel Films as the Potential Wound Dressing. *In J. Mar. Biotechnol. Immunol* ISSN (Vol. 2, Issue 2).
- Elsayed, E. W., El-Ashmawy, A. A., El-Bassyouni, G. T., Mousa, S. M., El-Manawaty, M., & Emara, L. H. (2023). Formulation and evaluation of alginate-gelatin hydrogel scaffolds loaded with zinc-doped hydroxyapatite and 5-fluorouracil. *International Journal of Biological Macromolecules*, 237. <https://doi.org/10.1016/j.ijbiomac.2023.124147>
- Figuerola-Pizano, M. D., Vélaz, I., Peñas, F. J., Zavala-Rivera, P., Rosas-Durazo, A. J., Maldonado-Arce, A. D., & Martínez-Barbosa, M. E. (2018). Effect of freeze-thawing conditions for preparation of chitosan-poly (vinyl alcohol) hydrogels and drug release studies. *Carbohydrate Polymers*, 195, 476–485. <https://doi.org/10.1016/j.carbpol.2018.05.004>
- Ferraro, V., Gaillard-Martinie, B., Sayd, T., Chambon, C., Anton, M., & Santé-Lhoutellier, V. (2017). Collagen type I from bovine bone. Effect of animal age, bone anatomy and drying methodology on extraction yield, self-assembly, thermal behaviour and electrokinetic potential. *International Journal of Biological Macromolecules*, 97, 55–66.
<https://doi.org/10.1016/j.ijbiomac.2016.12.068>
- Foncerrada, G., Capek, K. D., Herndon, D. N., Lee, J. O., Zapata-Sirvent, R. L., & Finnerty, C. (2017). The State of the Art on Burn Wound Healing. *Journal Avid Sci.*, 1, 4–52.
- Gaar, J., Naffa, R., & Brimble, M. (2020). Enzymatic and non-enzymatic crosslinks found in collagen and elastin and their chemical synthesis. *Organic Chemistry Frontiers*, 7, 2789–2814.

- Gao, Y., Kang, Y., Wang, T., Li, C., Shen, S., Qu, C., Gong, S., Liu, P., Yang, L., Liu, J., Han, B., & Li, C. (2022). Alginate microspheres-collagen hydrogel, as a novel 3D culture system, enhanced skin wound healing of hUCMSCs in rats model. *Colloids and Surfaces B: Biointerfaces*, 219, 112799. <https://doi.org/10.1016/j.colsurfb.2022.112799>
- Garg, S., Garg, A., & Vishwavidyalaya, R. D. (2016). Hydrogel: Classification, properties, preparation and technical features. *Asian J. Biomater. Res*, 2(6), 163-170.
- Ge, B., Wang, H., Li, J., Liu, H., Yin, Y., Zhang, N., & Qin, S. (2020). Comprehensive Assessment of Nile Tilapia Skin (*Oreochromis niloticus*) Collagen Hydrogels for Wound Dressings. *Marine Drugs*, 18(4), 178. <https://doi.org/10.3390/md18040178>
- Genevro, G. M., de Moraes, M. A., & Beppu, M. M. (2019). Freezing influence on physical properties of glucomannan hydrogels. *International Journal of Biological Macromolecules*, 128, 401–405. <https://doi.org/10.1016/j.ijbiomac.2019.01.112>
- Ghosh, B., Mukhopadhyay, M., & Bhattacharya, D. (2021). Biopolymer-based nanofilms for the treatment of burn wounds. In *Biopolymer-Based Nano Films* (pp. 311–336). Elsevier. <https://doi.org/10.1016/B978-0-12-823381-8.00005-3>
- Gomez-Florit, M., Pardo, A., Domingues, R. M. A., Graça, A. L., Babo, P. S., Reis, R. L., & Gomes, M. E. (2020). Natural-Based Hydrogels for Tissue Engineering Applications. *Molecules*, 25(24), 5858. <https://doi.org/10.3390/molecules25245858>
- Gómez-Guillén, M. C., Giménez, B., López-Caballero, M. E., & Montero, M. P. (2011). Functional and bioactive properties of collagen and gelatin from alternative sources: A review. *Food Hydrocolloids*, 25(8), 1813–1827. <https://doi.org/10.1016/j.foodhyd.2011.02.007>
- Gonçalves, M. M., Carneiro, J., Justus, B., Espinoza, J. T., Budel, J. M., Farago, P. V., & Paula, J. P. de. (2020). Preparation and characterization of a novel antimicrobial film dressing for wound healing application. *Brazilian Journal of Pharmaceutical Sciences*, 56. <https://doi.org/10.1590/s2175-97902020000118784>
- Grigore, A., Sarker, B., Fabry, B., Boccaccini, A. R., & Detsch, R. (2014). Behavior of Encapsulated MG-63 Cells in RGD and Gelatine-Modified Alginate Hydrogels. *Tissue Engineering Part A*, 20(15–16), 2140–2150. <https://doi.org/10.1089/ten.tea.2013.0416>

- Hacker, M. C., & Mikos, A. G. (2011). Synthetic Polymers. *Principles of Regenerative Medicine*, 587–622. <https://doi.org/10.1016/B978-0-12-381422-7.10033-1>
- Hu, C., Lu, W., Mata, A., Nishinari, K., & Fang, Y. (2021). Ions-induced gelation of alginate: Mechanisms and applications. *International Journal of Biological Macromolecules*, 177, 578–588. <https://doi.org/10.1016/j.ijbiomac.2021.02.086>
- Hu, T., & Lo, A. C. Y. (2021). Collagen–alginate composite hydrogel: Application in tissue engineering and biomedical sciences. *Polymers*, 13(11). <https://doi.org/10.3390/polym13111852>
- Huang, Q., Zou, Y., Arno, M. C., Chen, S., Wang, T., Gao, J., Dove, A. P., & Du, J. (2017). Hydrogel scaffolds for differentiation of adipose-derived stem cells. *Chemical Society Reviews*, 46(20), 6255–6275. <https://doi.org/10.1039/C6CS00052E>
- Hoffman, A. S. (2012). Hydrogels for biomedical applications. *Advanced Drug Delivery Reviews*, 64, 18–23. <https://doi.org/10.1016/j.addr.2012.09.010>
- Hoyer, B., Bernhardt, A., Lode, A., Heinemann, S., Sewing, J., Klinger, M., Notbohm, H., & Gelinsky, M. (2014). Jellyfish collagen scaffolds for cartilage tissue engineering. *Acta Biomaterialia*, 10(2), 883–892. <https://doi.org/10.1016/j.actbio.2013.10.022>
- Ishfaq, B., Khan, I. U., Khalid, S. H., & Asghar, S. (2023). Design and evaluation of sodium alginate-based hydrogel dressings containing *Betula utilis* extract for cutaneous wound healing. *Frontiers in Bioengineering and Biotechnology*, 11. <https://doi.org/10.3389/fbioe.2023.1042077>
- Jackson, D. MacG. (1959). Diagnosis in the Management of Burns. *BMJ*, 1(5132), 1263–1267. <https://doi.org/10.1136/bmj.1.5132.1263>
- Jafari, H., Lista, A., Siekapen, M. M., Ghaffari-Bohlouli, P., Nie, L., Alimoradi, H., & Shavandi, A. (2020). Fish Collagen: Extraction, Characterization, and Applications for Biomaterials Engineering. *Polymers*, 12(10), 2230. <https://doi.org/10.3390/polym12102230>
- Jahanbakhsh, A., Nourbakhsh, M. S., Bonakdar, S., Shokrgozar, M. A., & Haghighipour, N. (2020). Evaluation of alginate modification effect on cell-matrix interaction, mechanotransduction and chondrogenesis of encapsulated MSCs. *Cell and Tissue Research*, 381(2), 255–272. <https://doi.org/10.1007/s00441-020-03216-7>

- Jeschke, M. G., van Baar, M. E., Choudhry, M. A., Chung, K. K., Gibran, N. S., & Logsetty, S. (2020). Burn injury. *Nature Reviews Disease Primers*, 6(1). <https://doi.org/10.1038/s41572-020-0145-5>
- Jiao, T., Lian, Q., Lian, W., Wang, Y., Li, D., Reis, R. L., & Oliveira, J. M. (2023). Properties of Collagen/Sodium Alginate Hydrogels for Bioprinting of Skin Models. *Journal of Bionic Engineering*, 20(1), 105–118. <https://doi.org/10.1007/s42235-022-00251-8>
- Jing, H., Huang, X., Du, X., Mo, L., Ma, C., & Wang, H. (2022). Facile synthesis of pH-responsive sodium alginate/carboxymethyl chitosan hydrogel beads promoted by hydrogen bond. *Carbohydrate Polymers*, 278, 118993. <https://doi.org/10.1016/j.carbpol.2021.118993>
- Jones, E. M., Cochrane, C. A., & Percival, S. L. (2015). The Effect of pH on the Extracellular Matrix and Biofilms. *Advances in Wound Care*, 4(7), 431–439. <https://doi.org/10.1089/wound.2014.0538>
- Jridi, M., Bardaa, S., Moalla, D., Rebaï, T., Souissi, N., Sahnoun, Z., & Nasri, M. (2015). Microstructure, rheological and wound healing properties of collagen-based gel from cuttlefish skin. *International Journal of Biological Macromolecules*, 77, 369–374. <https://doi.org/10.1016/j.ijbiomac.2015.03.020>
- Kalra, G., Sharma, A., & Rolekar, N. (2019). Changing trends in electrical burn injury due to technology. *Indian Journal of Burns*, 27(1), 70. https://doi.org/10.4103/ijb.ijb_22_19
- Kan, Y., Salimon, A. I., & Korsunsky, A. M. (2020). On the electrospinning of nanostructured collagen-PVA fiber mats. *Materials Today: Proceedings*, 33, 2013–2019. <https://doi.org/10.1016/j.matpr.2020.07.621>
- Kang, S., Kim, T., Kim, B., Jeong, Y., Park, Y. il, Noh, S. M., & Park, J. (2018). Novel thermal radical initiators based on a triazene moiety for radical polymerization. *Journal of Industrial and Engineering Chemistry*, 68, 1–5. <https://doi.org/10.1016/j.jiec.2018.08.008>
- Kavitha, N., Karunya, T. P., Kanchana, S., Mohan, K., Sivaramakrishnan, R., Uthra, S., Kapilan, K., Yuvaraj, D., & Arumugam, M. (2019). Formulation of alginate based hydrogel from brown seaweed, *Turbinaria conoides* for biomedical applications. *Heliyon*, 5(12), e02916. <https://doi.org/10.1016/j.heliyon.2019.e02916>
- Khabbaz, B., Solouk, A., & Mirzadeh, H. (2019). Polyvinyl alcohol/soy protein isolate nanofibrous patch for wound-healing applications. *Progress in Biomaterials*, 8(3), 185–196. <https://doi.org/10.1007/s40204-019-00120-4>

- Khansari, M. M., Sorokina, L. v., Mukherjee, P., Mukhtar, F., Shirdar, M. R., Shahidi, M., & Shokuhfar, T. (2017). Classification of Hydrogels Based on Their Source: A Review and Application in Stem Cell Regulation. *JOM*, 69(8), 1340–1347. <https://doi.org/10.1007/s11837-017-2412-9>
- Kim, H., Shin, S., & Han, D. (2022). Review of History of Basic Principles of Burn Wound Management. *Medicina (Lithuania)*, 58(3). <https://doi.org/10.3390/medicina58030400>
- Landén, N. X., Li, D., & Ståhle, M. (2016). Transition from inflammation to proliferation: a critical step during wound healing. *Cellular and Molecular Life Sciences*, 73(20), 3861–3885. <https://doi.org/10.1007/s00018-016-2268-0>
- Lee, K. Y., & Mooney, D. J. (2012). Alginate: Properties and biomedical applications. *Progress in Polymer Science*, 37(1), 106–126. <https://doi.org/10.1016/j.progpolymsci.2011.06.003>
- Lee, H., Cho, E., Kerekes, T. W., Kwon, S. L., Yun, G. J., & Kim, J. (2020). Water-Resistant Mechanoluminescent Electrospun Fabrics with Protected Sensitivity in Wet Condition via Plasma-Enhanced Chemical Vapor Deposition Process. *Polymers*, 12(8), 1720. <https://doi.org/10.3390/polym12081720>
- Lee, K. Z., Jeon, J., Jiang, B., Subramani, S. V., Li, J., & Zhang, F. (2023). Protein-Based Hydrogels and Their Biomedical Applications. *Molecules*, 28(13), 4988. <https://doi.org/10.3390/molecules28134988>
- León-López, A., Morales-Peñaloza, A., Martínez-Juárez, V. M., Vargas-Torres, A., Zeugolis, D. I., & Aguirre-Álvarez, G. (2019). Hydrolyzed collagen-sources and applications. In *Molecules*, 24(22). <https://doi.org/10.3390/molecules24224031>
- Li, Z., Zhou, F., Li, Z., Lin, S., Chen, L., Liu, L., & Chen, Y. (2018). Hydrogel Cross-Linked with Dynamic Covalent Bonding and Micellization for Promoting Burn Wound Healing. *ACS Applied Materials & Interfaces*, 10(30), 25194–25202. <https://doi.org/10.1021/acsami.8b08165>
- Li, R., Guan, X., Lin, X., Guan, P., Zhang, X., Rao, Z., Du, L., Zhao, J., Rong, J., & Zhao, J. (2020). Poly(2-hydroxyethyl methacrylate)/β-cyclodextrin-hyaluronan contact lens with tear protein adsorption resistance and sustained drug delivery for ophthalmic diseases. *Acta Biomaterialia*, 110, 105–118. <https://doi.org/10.1016/j.actbio.2020.04.002>

- Lin, Y.-K., Lin, T.-Y., & Su, H.-P. (2011). Extraction and characterisation of telopeptide-poor collagen from porcine lung. *Food Chemistry*, 124(4), 1583–1588. <https://doi.org/10.1016/j.foodchem.2010.08.018>
- Liu, H.-F., Zhang, F., & Lineaweaver, W. C. (2017). History and Advancement of Burn Treatments. *Annals of Plastic Surgery*, 78(2), S2–S8. <https://doi.org/10.1097/SAP.0000000000000896>
- Liu, S., Liu, X., Ren, Y., Wang, P., Pu, Y., Yang, R., Wang, X., Tan, X., Ye, Z., Maurizot, V., & Chi, B. (2020). Mussel-Inspired Dual-Cross-linking Hyaluronic Acid/ε-Polylysine Hydrogel with Self-Healing and Antibacterial Properties for Wound Healing. *ACS Applied Materials & Interfaces*, 12(25), 27876–27888. <https://doi.org/10.1021/acsami.0c00782>
- Liu, Y., Wei, H., Li, S., Wang, G., Guo, T., & Han, H. (2022). Facile fabrication of semi-IPN hydrogel adsorbent based on quaternary cellulose via amino-anhydride click reaction in water. *International Journal of Biological Macromolecules*, 207, 622–634. <https://doi.org/10.1016/j.ijbiomac.2022.03.032>
- Lu, C.-H., Yu, C.-H., & Yeh, Y.-C. (2021). Engineering nanocomposite hydrogels using dynamic bonds. *Acta Biomaterialia*, 130, 66–79. <https://doi.org/10.1016/j.actbio.2021.05.055>
- Madaghiele, M., Demitri, C., Sannino, A., & Ambrosio, L. (2014). Polymeric hydrogels for burn wound care: Advanced skin wound dressings and regenerative templates. In *Burns and Trauma*, 2(4), 153–161. Oxford University Press. <https://doi.org/10.4103/2321-3868.143616>
- Mahmood, A., Patel, D., Hickson, B., DesRochers, J., & Hu, X. (2022). Recent Progress in Biopolymer-Based Hydrogel Materials for Biomedical Applications. *International Journal of Molecular Sciences*, 23(3), 1415. <https://doi.org/10.3390/ijms23031415>
- Maity, C., & Das, N. (2022). Alginate-Based Smart Materials and Their Application: Recent Advances and Perspectives. *Topics in Current Chemistry*, 380(1), 3. <https://doi.org/10.1007/s41061-021-00360-8>
- Malektaj, H., Drozdov, A. D., & deClaville Christiansen, J. (2023). Mechanical Properties of Alginate Hydrogels Cross-Linked with Multivalent Cations. *Polymers*, 15(14), 3012. <https://doi.org/10.3390/polym15143012>
- Man, Z., Sidi, L., Xubo, Y., Jin, Z., & Xin, H. (2021). An in situ catechol functionalized ε-polylysine/polyacrylamide hydrogel formed by hydrogen bonding recombination with high mechanical property for hemostasis.

- International Journal of Biological Macromolecules*, 191, 714–726.
<https://doi.org/10.1016/j.ijbiomac.2021.09.100>
- Manon-Jensen, T., Kjeld, N. G., & Karsdal, M. A. (2016). Collagen-mediated hemostasis. *Journal of Thrombosis and Haemostasis*, 14(3), 438–448.
<https://doi.org/10.1111/jth.13249>
- Mihajlovic, M., Staropoli, M., Appavou, M. S., Wyss, H. M., Pyckhout-Hintzen, W., & Sijbesma, R. P. (2017). Tough Supramolecular Hydrogel Based on Strong Hydrophobic Interactions in a Multiblock Segmented Copolymer. *Macromolecules*, 50(8), 3333–3346.
<https://doi.org/10.1021/acs.macromol.7b00319>
- Montalbano, G., Toumpaniari, S., Popov, A., Duan, P., Chen, J., Dalgarno, K., Scott, W. E., & Ferreira, A. M. (2018). Synthesis of bioinspired collagen/alginate/fibrin based hydrogels for soft tissue engineering. *Materials Science and Engineering C*, 91, 236–246.
<https://doi.org/10.1016/j.msec.2018.04.101>
- Morgado, P. I., Aguiar-Ricardo, A., & Correia, I. J. (2015). Asymmetric membranes as ideal wound dressings: An overview on production methods, structure, properties and performance relationship. In *Journal of Membrane Science* (Vol. 490, pp. 139–151). Elsevier.
<https://doi.org/10.1016/j.memsci.2015.04.064>
- Muktar, M. Z., Ismail, W. I. W., Razak, S. I. A., Razali, M. H., & Amin, K. A. M. (2018). Accelerated Wound Healing of Physically Cross Linked Gellan Gum-Virgin Coconut Oil Hydrogel Containing Manuka Honey. *ASM Sci. J. Special Issue*, 166–182
- Nischwitz, S. P., Hofmann, E., & Kamolz, L.-P. (2019). pH of a burn wound — what's next? *Burns*, 45(6), 1484–1485.
<https://doi.org/10.1016/j.burns.2018.10.030>
- NCBI. (2024a). *Collagen I, alpha chain (98-110) | C57H91N19O16 | CID 6913668 - PubChem*.
https://pubchem.ncbi.nlm.nih.gov/compound/Collagen-I_-alpha-chain-_98-110
- NCBI. (2024b). *Sodium 3,4,5,6-tetrahydroxyoxane-2-carboxylate | CID 5102882 Pubchem*.
https://pubchem.ncbi.nlm.nih.gov/compound/Sodium-3_4_5_6-tetrahydroxyoxane-2-carboxylate
- NCBI. (2024c). *Calcium Chloride | CID 5284359. Pubchem*.
<https://pubchem.ncbi.nlm.nih.gov/compound/Calcium-Chloride>

- NCBI. (2024d). *Water* | CID 962. *Pubchem*.
<https://pubchem.ncbi.nlm.nih.gov/compound/Water>.
- Nezhad-Mokhtari, P., Ghorbani, M., Roshangar, L., & Soleimani Rad, J. (2019). Chemical gelling of hydrogels-based biological macromolecules for tissue engineering: Photo- and enzymatic-crosslinking methods. *International Journal of Biological Macromolecules*, 139, 760–772. <https://doi.org/10.1016/j.ijbiomac.2019.08.047>
- Nizamoglu, M., Tan, A., Vickers, T., Segaren, N., Barnes, D., & Dziewulski, P. (2016). Cold burn injuries in the UK: the 11-year experience of a tertiary burns centre. *Burns & Trauma*, 4. <https://doi.org/10.1186/s41038-016-0060-x>
- Ono, S., Imai, R., Ida, Y., Shibata, D., Komiya, T., & Matsumura, H. (2015). Increased wound pH as an indicator of local wound infection in second degree burns. *Burns*, 41(4), 820–824. <https://doi.org/10.1016/j.burns.2014.10.023>
- Palmer, I., Clarke, S. A., Nelson, J., Schatton, W., Dunne, N. J., & Buchanan, F. (2012). Identification of a suitable sterilisation method for collagen derived from a marine Demosponge. *International Journal of Nano and Biomaterials*, 4(2), 148. <https://doi.org/10.1504/IJNBM.2012.050306>
- Pan, Z., & Brassart, L. (2022). Constitutive modelling of hydrolytic degradation in hydrogels. *Journal of the Mechanics and Physics of Solids*, 167, 105016. <https://doi.org/10.1016/j.jmps.2022.105016>
- Patel, R., Desai, R., Patel, A., Shah, S., Prajapati, B., Patel, V., & Alexander, A. (2023). Burn assessment: A critical review on care, advances in burn healing and pre-clinical animal studies. *Journal of Research in Pharmacy*, 27(4), 1577–1593. <https://doi.org/10.29228/jrp.443>
- Pereira, R., Carvalho, A., Vaz, D. C., Gil, M. H., Mendes, A., & Bártolo, P. (2013). Development of novel alginate based hydrogel films for wound healing applications. *International Journal of Biological Macromolecules*, 52(1), 221–230. <https://doi.org/10.1016/j.ijbiomac.2012.09.031>
- Pinto, C., Méndez, L., Camacho-Rodríguez, B., & Silva-Cote, I. (2024). Antibacterial PVA/Chitosan/alginate/Meropenem-based hydrogel as a potential therapeutic strategy for chronic ulcers infections. *International Journal of Polymeric Materials and Polymeric Biomaterials*, 73(12), 1021–1033. <https://doi.org/10.1080/00914037.2023.2243363>
- Power, G., Moore, Z., & O'Connor, T. (2017). Measurement of pH, exudate composition and temperature in wound healing: a systematic review.

- Journal of Wound Care*, 26(7), 381–397.
<https://doi.org/10.12968/jowc.2017.26.7.381>
- Puppi, D., Chiellini, F., Piras, A. M., & Chiellini, E. (2010). Polymeric materials for bone and cartilage repair. *Progress in Polymer Science*, 35(4), 403–440.
<https://doi.org/10.1016/j.progpolymsci.2010.01.006>
- Putro, P. A., Sulaeman, A. S., & Erizal. (2019). Synthesis and characterization of swelling properties superabsorbent Hydrogel Carboxymethylcellulose-g-Poly (Acrylic Acid)/Natrium Alginate cross-linked by gamma-ray irradiation technique. *Journal of Physics: Conference Series*, 1171, 012011.
<https://doi.org/10.1088/1742-6596/1171/1/012011>
- Ramadass, S. K., Perumal, S., Gopinath, A., Nisal, A., Subramanian, S., & Madhan, B. (2014). Sol–Gel Assisted Fabrication of Collagen Hydrolysate Composite Scaffold: A Novel Therapeutic Alternative to the Traditional Collagen Scaffold. *ACS Applied Materials & Interfaces*, 6(17), 15015–15025. <https://doi.org/10.1021/am502948g>
- Ramadhan, T., Ching, S. H., Prakash, S., & Bhandari, B. (2019). Time dependent gelling properties of cuboid alginate gels made by external gelation method: Effects of alginate-CaCl₂ solution ratios and pH. *Food Hydrocolloids*, 90, 232–240.
<https://doi.org/10.1016/j.foodhyd.2018.12.022>
- Rana, M. M., Rahman, M. S., Ullah, M. A., Siddika, A., Hossain, M. L., Akhter, M. S., Hasan, M. Z., & Asaduzzaman, S. M. (2020). Amnion and collagen-based blended hydrogel improves burn healing efficacy on a rat skin wound model in the presence of wound dressing biomembrane. *Bio-Medical Materials and Engineering*, 31(1), 1–17.
<https://doi.org/10.3233/BME-201076>
- Ribotta, P. D., Colombo, A., & Rosell, C. M. (2012). Enzymatic modifications of pea protein and its application in protein-cassava and corn starch gels. *Food Hydrocolloids*, 27(1), 185–190.
<https://doi.org/10.1016/j.foodhyd.2011.07.006>
- Ricard-Blum, S. (2011). The Collagen Family. *Cold Spring Harbor Perspectives in Biology*, 3(1), a004978–a004978.
<https://doi.org/10.1101/cshperspect.a004978>
- Rowe, R. C., Sheskey, P. J., & Quinn, M. E. (2009). *Handbook of Pharmaceutical Excipients*. (Sixth Edit). Pharmaceutical Press.

- S. A. Bento, C., Gaspar, M. C., Coimbra, P., de Sousa, H. C., & E. M. Braga, M. (2023). A review of conventional and emerging technologies for hydrogels sterilization. *International Journal of Pharmaceutics*, 634, 122671. <https://doi.org/10.1016/j.ijpharm.2023.122671>
- Sánchez-Cid, P., Jiménez-Rosado, M., Romero, A., & Pérez-Puyana, V. (2022). Novel Trends in Hydrogel Development for Biomedical Applications: A Review. *Polymers*, 14, 3023. <https://doi.org/10.3390/polym14153023>
- Saputra, D. (2023). Tinjauan Komprehensif tentang Luka Bakar: Klasifikasi, Komplikasi dan Penanganan. *Sciена*, 2(5), 197–208. <http://journal.scientic.id/index.php/sciена/issue/view/12>
- Saric, M., Eisoldt, L., Döring, V., & Scheibel, T. (2021). Interplay of Different Major Ampullate Spidroins during Assembly and Implications for Fiber Mechanics. *Advanced Materials*, 33(9). <https://doi.org/10.1002/adma.202006499>
- Schaefer, T. J., & Tannan, S. C. (2022). Thermal Burns. *StatPearls*. <https://www.ncbi.nlm.nih.gov/books/NBK430773/>
- Segger, D., Aßmus, U., Brock, M., Erasmy, J., Finkel, P., Fitzner, A., Heuss, H., Kortemeier, U., Munke, S., Rheinländer, T., Schmidt-Lewerkühne, H., Schneider, W., & Weser, G. (2008). Multicenter study on measurement of the natural pH of the skin surface. *International Journal of Cosmetic Science*, 30(1), 75–75. https://doi.org/10.1111/j.1468-2494.2007.00403_1.x
- Serafin, A., Culebras, M., & Collins, M. N. (2023). Synthesis and evaluation of alginate, gelatin, and hyaluronic acid hybrid hydrogels for tissue engineering applications. *International Journal of Biological Macromolecules*, 233. <https://doi.org/10.1016/j.ijbiomac.2023.123438>
- Shafique, M., Sohail, M., Minhas, M. U., Khaliq, T., Kousar, M., Khan, S., Hussain, Z., Mahmood, A., Abbasi, M., Aziz, H. C., & Shah, S. A. (2021). Bio-functional hydrogel membranes loaded with chitosan nanoparticles for accelerated wound healing. *International Journal of Biological Macromolecules*, 170, 207–221. <https://doi.org/10.1016/j.ijbiomac.2020.12.157>
- Shahi, S., Roghani-Mamaqani, H., Talebi, S., & Mardani, H. (2022). Stimuli-responsive destructible polymeric hydrogels based on irreversible covalent bond dissociation. *Polymer Chemistry*, 13, 161–192. <https://doi.org/10.1039/D1PY01066B>

- Sharma, S., Rai, V. K., Narang, R. K., & Markandeywar, T. S. (2022). Collagen-based formulations for wound healing: A literature review. In *Life Sciences*, 290. <https://doi.org/10.1016/j.lfs.2021.120096>.
- Sharma, R., Malviya, R., Singh, S., & Prajapati, B. (2023). A Critical Review on Classified Excipient Sodium-Alginate-Based Hydrogels: Modification, Characterization, and Application in Soft Tissue Engineering. *Gels*, 9(5), 430. <https://doi.org/10.3390/gels9050430>
- Sherman, V. R., Yang, W., & Meyers, M. A. (2015). The materials science of collagen. *Journal of the Mechanical Behavior of Biomedical Materials*, 52, 22–50. <https://doi.org/10.1016/j.jmbbm.2015.05.023>
- Shrimali, H., Mandal, U. K., Nivsarkar, M., & Shrivastava, N. (2019). Fabrication and evaluation of a medicated hydrogel film with embelin from Embelia ribes for wound healing activity. *Future Journal of Pharmaceutical Sciences*, 5(1). <https://doi.org/10.1186/s43094-019-0011-z>
- Shu, W., Wang, Y., Zhang, X., Li, C., Le, H., & Chang, F. (2021). Functional Hydrogel Dressings for Treatment of Burn Wounds. *Bioengineering and Biotechnology*, 9, <https://doi.org/10.3389/fbioe.2021.788461>.
- Silvipriya, K., Kumar, K., Bhat, A., Kumar, B., John, A., & Lakshmanan, P. (2015). Collagen: Animal Sources and Biomedical Application. *Journal of Applied Pharmaceutical Science*, 5(03), 123–127. <https://doi.org/10.7324/JAPS.2015.50322>
- Sim, P., Strudwick, X. L., Song, Y., Cowin, A. J., & Garg, S. (2022). Influence of Acidic pH on Wound Healing In Vivo: A Novel Perspective for Wound Treatment. *International Journal of Molecular Sciences*, 23(21), 13655. <https://doi.org/10.3390/ijms232113655>
- Singh, S. K., Dhyani, A., & Juyal, D. (2017). Hydrogel: Preparation, characterization and applications. *The Pharma Innovation Journal*, 6(6), 25–32.
- Smith, R., Russo, J., Fiegel, J., & Brogden, N. (2020). Antibiotic Delivery Strategies to Treat Skin Infections When Innate Antimicrobial Defense Fails. *Antibiotics*, 9(2), 56. <https://doi.org/10.3390/antibiotics9020056>
- Sorushanova, A., Delgado, L. M., Wu, Z., Shologu, N., Kshirsagar, A., Raghunath, R., Mullen, A. M., Bayon, Y., Pandit, A., Raghunath, M., & Zeugolis, D. I. (2019). The Collagen Suprafamily: From Biosynthesis to Advanced Biomaterial Development. *Advanced Materials*, 31(1). <https://doi.org/10.1002/adma.201801651>

- Stoica, A. E., Chircov, C., & Grumezescu, A. M. (2020). Hydrogel dressings for the treatment of burn wounds: An up-to-date overview. *Materials*, 13(12), 1–24. MDPI AG. <https://doi.org/10.3390/ma13122853>.
- Stoppel, W. L., White, J. C., Horava, S. D., Henry, A. C., Roberts, S. C., & Bhatia, S. R. (2014). Terminal sterilization of alginate hydrogels: Efficacy and impact on mechanical properties. *Journal of Biomedical Materials Research Part B: Applied Biomaterials*, 102(4), 877–884. <https://doi.org/10.1002/jbm.b.33070>
- Su, J., Li, J., Liang, J., Zhang, K., & Li, J. (2021). Hydrogel preparation methods and biomaterials for wound dressing. *Life*, 11(10). <https://doi.org/10.3390/life11101016>
- SUN Pan, B., EN Chen, H., & Sung, W. C. (2018). Molecular and thermal characteristics of acid-soluble collagen from orbicular batfish: effects of deep-sea water culturing. *International Journal of Food Properties*, 21(1), 1080–1090. <https://doi.org/10.1080/10942912.2018.1476873>
- Surowiecka, A., Strużyna, J., Winiarska, A., & Korzeniowski, T. (2022). Hydrogels in Burn Wound Management—A Review. *Gels*, 8(2). <https://doi.org/10.3390/gels8020122>
- Tan, J., Luo, Y., Guo, Y., Zhou, Y., Liao, X., Li, D., Lai, X., & Liu, Y. (2023). Development of alginate-based hydrogels: Crosslinking strategies and biomedical applications. *International Journal of Biological Macromolecules*, 239, 124275. <https://doi.org/10.1016/j.ijbiomac.2023.124275>
- Tiwari, V. K. (2012). Burn wound: How it differs from other wounds. *Indian Journal of Plastic Surgery*, 45(2), 364–373. <https://doi.org/10.4103/0970-0358.101319>
- Tomić, S. Lj., Babić Radić, M. M., Vuković, J. S., Filipović, V. v., Nikodinovic-Runic, J., & Vukomanović, M. (2023). Alginate-Based Hydrogels and Scaffolds for Biomedical Applications. *Marine Drugs*, 21(3), 177. <https://doi.org/10.3390/md21030177>
- Tønnesen, H. H., & Karlsen, J. (2002). Alginate in Drug Delivery Systems. *Drug Development and Industrial Pharmacy*, 28(6), 621–630. <https://doi.org/10.1081/DDC-120003853>
- Ujang, Z., Rashid, A. H. A., Suboh, S. K., Halim, A. S., & Lim, C. K. (2014). Physical Properties and Biocompatibility of Oligochitosan Membrane Film as Wound Dressing. *Journal of Applied Biomaterials & Functional Materials*, 12(3), 155–162. <https://doi.org/10.5301/jabfm.5000190>

- Ullah, A., & Lim, S. I. (2022). Bioinspired tunable hydrogels: An update on methods of preparation, classification, and biomedical and therapeutic applications. *International Journal of Pharmaceutics*, 612, 121368. <https://doi.org/10.1016/j.ijpharm.2021.121368>
- Volpi, M., Paradiso, A., Costantini, M., & Świążkowski, W. (2022). Hydrogel-Based Fiber Biofabrication Techniques for Skeletal Muscle Tissue Engineering. *ACS Biomaterials Science & Engineering*, 8(2), 379–405. <https://doi.org/10.1021/acsbiomaterials.1c01145>
- Wang, Y., Beekman, J., Hew, J., Jackson, S., Issler-Fisher, A. C., Parungao, R., Lajevardi, S. S., Li, Z., & Maitz, P. K. M. (2018). Burn injury: Challenges and advances in burn wound healing, infection, pain and scarring. *Advanced Drug Delivery Reviews* 123, 3–17. <https://doi.org/10.1016/j.addr.2017.09.018>
- Wang, Q. Q., Liu, Y., Zhang, C. J., Zhang, C., & Zhu, P. (2019). Alginate/gelatin blended hydrogel fibers cross-linked by Ca²⁺ and oxidized starch: Preparation and properties. *Materials Science and Engineering C*, 99, 1469–1476. <https://doi.org/10.1016/j.msec.2019.02.091>
- Wang, J., Wang, L., Wu, C., Pei, X., Cong, Y., Zhang, R., & Fu, J. (2020). Antibacterial Zwitterionic Polyelectrolyte Hydrogel Adhesives with Adhesion Strength Mediated by Electrostatic Mismatch. *ACS Applied Materials & Interfaces*, 12(41), 46816–46826. <https://doi.org/10.1021/acsami.0c14959>
- Waresindo, W. X., Luthfianti, H. R., Priyanto, A., Hapidin, D. A., Edikresnha, D., Aimon, A. H., Suciati, T., & Khairurrijal, K. (2023). Freeze–thaw hydrogel fabrication method: basic principles, synthesis parameters, properties, and biomedical applications. *Materials Research Express*, 10(2), 024003. <https://doi.org/10.1088/2053-1591/acb98e>
- Wolfel, A., Romero, M. R., & Igarzabal, C. I. A. (2017). Post-synthesis modification of hydrogels. Total and partial rupture of crosslinks: Formation of aldehyde groups and re-crosslinking of cleaved hydrogels. *Polymer*, 116, 251–260. <https://doi.org/10.1016/j.polymer.2017.03.068>
- Xiao, J., Zhou, Y., Ye, M., An, Y., Wang, K., Wu, Q., Song, L., Zhang, J., He, H., Zhang, Q., & Wu, J. (2021). Freeze-Thawing Chitosan/Ions Hydrogel Coated Gauzes Releasing Multiple Metal Ions on Demand for Improved Infected Wound Healing. *Advanced Healthcare Materials*, 10(6). <https://doi.org/10.1002/adhm.202001591>
- Yang, B., Song, J., Jiang, Y., Li, M., Wei, J., Qin, J., Peng, W., López Lasaoa, F., He, Y., Mao, H., Yang, J., & Gu, Z. (2020). Injectable Adhesive Self-Healing

Multicross-Linked Double-Network Hydrogel Facilitates Full-Thickness Skin Wound Healing. *ACS Applied Materials & Interfaces*, 12(52), 57782–57797. <https://doi.org/10.1021/acsami.0c18948>

- Yazdi, M. K., Vatanpour, V., Taghizadeh, A., Taghizadeh, M., Ganjali, M. R., Munir, M. T., Habibzadeh, S., Saeb, M. R., & Ghaedi, M. (2020). Hydrogel membranes: A review. *Materials Science and Engineering: C*, 114, 111023. <https://doi.org/10.1016/j.msec.2020.111023>
- Yu, G., Niu, C., Liu, J., Wu, J., Jin, Z., Wang, Y., & Zhao, K. (2023). Preparation and Properties of Self-Cross-Linking Hydrogels Based on Chitosan Derivatives and Oxidized Sodium Alginate. *ACS Omega*, 8(22), 19752–19766. <https://doi.org/10.1021/acsomega.3c01401>
- Yuan, N., Xu, L., Xu, B., Zhao, J., & Rong, J. (2018). Chitosan derivative-based self-healable hydrogels with enhanced mechanical properties by high-density dynamic ionic interactions. *Carbohydrate Polymers*, 193, 259–267. <https://doi.org/10.1016/j.carbpol.2018.03.071>
- Zaferani, A., Talsma, D. T., Yazdani, S., Celie, J. W. A. M., Aikio, M., Heljasvaara, R., Navis, G. J., Pihlajaniemi, T., & van den Born, J. (2014). Basement Membrane Zone Collagens XV and XVIII/Proteoglycans Mediate Leukocyte Influx in Renal Ischemia/Reperfusion. *PLoS ONE*, 9(9), e106732. <https://doi.org/10.1371/journal.pone.0106732>
- Zhang, Y., Zhang, Y., Liu, X., Huang, L., Chen, Z., & Cheng, J. (2017). Influence of hydrolysis behaviour and microfluidisation on the functionality and structural properties of collagen hydrolysates. *Food Chemistry*, 227, 211–218. <https://doi.org/10.1016/j.foodchem.2017.01.049>
- Zhang, H., Peng, M., Cheng, T., Zhao, P., Qiu, L., Zhou, J., Lu, G., & Chen, J. (2018). Silver nanoparticles-doped collagen–alginate antimicrobial biocomposite as potential wound dressing. *Journal of Materials Science*, 53(21), 14944–14952. <https://doi.org/10.1007/s10853-018-2710-9>
- Zhang, L., Tai, Y., Liu, X., Liu, Y., Dong, Y., Liu, Y., Yang, C., Kong, D., Qi, C., Wang, S., & Midgley, A. C. (2021). Natural polymeric and peptide-loaded composite wound dressings for scar prevention. *Applied Materials Today*, 25. <https://doi.org/10.1016/j.apmt.2021.101186>
- Zhang, Y., Wang, Y., Li, Y., Yang, Y., Jin, M., Lin, X., Zhuang, Z., Guo, K., Zhang, T., & Tan, W. (2023). Application of Collagen-Based Hydrogel in Skin Wound Healing. *Gels*, 9(3). <https://doi.org/10.3390/gels9030185>

- Zhang, W., Liu, L., Cheng, H., Zhu, J., Li, X., Ye, S., & Li, X. (2024). Hydrogel-based dressings designed to facilitate wound healing. *Materials Advances*, 5(4), 1364–1394. <https://doi.org/10.1039/D3MA00682D>
- Zhao, R., Xie, P., Zhang, K., Tang, Z., Chen, X., Zhu, X., Fan, Y., Yang, X., & Zhang, X. (2017). Selective effect of hydroxyapatite nanoparticles on osteoporotic and healthy bone formation correlates with intracellular calcium homeostasis regulation. *Acta Biomaterialia*, 59, 338–350. <https://doi.org/10.1016/j.actbio.2017.07.009>
- Żwierello, W., Piorun, K., Skórka-Majewicz, M., Maruszewska, A., Antoniewski, J., & Gutowska, I. (2023). Burns: Classification, Pathophysiology, and Treatment: A Review. *International Journal of Molecular Sciences*, 24(4), 3749. <https://doi.org/10.3390/ijms24043749>