

REFERENCES

- Abdollahi, E., Saghafi, N. and Malihe Hasanzade (2022). Are M1 and M2 macrophages Effectual Players in Pathological Conditions? *Proceedings of Anticancer Research*, [online] 6(3), pp.34–41. doi:<https://doi.org/10.26689/par.v6i3.3962>.
- Aderibigbe, B. and Buyana, B. (2018). Alginate in Wound Dressings. *Pharmaceutics*, [online] 10(2), p.42. doi:<https://doi.org/10.3390/pharmaceutics10020042>.
- Adib, Y., Bensussan, A. and Michel, L. (2022). Cutaneous Wound Healing: A Review about Innate Immune Response and Current Therapeutic Applications. *Mediators of Inflammation*, [online] 2022, pp.1–16. doi:10.1155/2022/5344085.
- Agren, M.S. (1994). Gelatinase activity during wound healing. *The British Journal of Dermatology*, [online] 131(5), pp.634–640. doi:<https://doi.org/10.1111/j.1365-2133.1994.tb04974.x>.
- Ahmed, I. and Ismail, N. (2020). M1 and M2 Macrophages Polarization via mTORC1 Influences Innate Immunity and Outcome of Ehrlichia Infection. *Journal of Cellular Immunology*, [online] 2(3). doi:<https://doi.org/10.33696/immunology.2.029>.
- Ahmadi, F., Oveisi, Z., Samani, S.M. and Amoozgar, Z. (2015). Chitosan based hydrogels: characteristics and pharmaceutical applications. *Research in pharmaceutical sciences*, [online] 10(1), pp.1–16. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4578208/> [Accessed 3 Mar. 2023].
- Aitcheson, S.M., Frentiu, F.D., Hurn, S.E., Edwards, K. and Murray, R.Z. (2021). Skin Wound Healing: Normal Macrophage Function and Macrophage Dysfunction in Diabetic Wounds. *Molecules*, [online] 26(16), pp.4917–4917. doi:<https://doi.org/10.3390/molecules26164917>.

Al-Mubarak, L. and Al-Haddab, M. (2013). Cutaneous wound closure materials: An overview and update. *Journal of Cutaneous and Aesthetic Surgery*, [online] 6(4), p.178. doi:10.4103/0974-2077.123395.

Amin, Md.L., Mawad, D., Dokos, S., Koshy, P., Martens, P.J. and Sorrell, C.C. (2020). Immunomodulatory properties of photopolymerizable fucoidan and carrageenans. *Carbohydrate Polymers*, [online] 230, p.115691. doi:10.1016/j.carbpol.2019.115691.

Aranaz, I., Alcántara, A.R., Civera, M.C., Arias, C., Elorza, B., Caballero, A.H. and Acosta, N. (2021). Chitosan: An Overview of Its Properties and Applications. *Polymers*, [online] 13(19), pp.3256–3256. doi:<https://doi.org/10.3390/polym13193256>.

Aranaz, I., Mengibar, M., Harris, R., Panos, I., Miralles, B., Acosta, N., Galed, G. and Heras, A. (2009). Functional Characterization of Chitin and Chitosan. *Current Chemical Biology*, [online] 3(2), pp.203–230. Available at: <https://www.eurekaselect.com/article/38214> [Accessed 19 Nov. 2023].

Ash, D.E. (2004). Structure and Function of Arginases. *The Journal of Nutrition*, [online] 134(10), pp.2760S2764S. doi:10.1093/jn/134.10.2760s.

Ashkani-Esfahani, S. (2012). Glucosamine Enhances Tissue Regeneration In The Process Of Wound Healing In Rats As Animal Model; A Stereological Study. *Journal of Cytology & Histology*, 03(04). doi:<https://doi.org/10.4172/2157-7099.1000150>.

Badan Penelitian dan Pengembangan Kesehatan (2020). *Laporan Nasional Riskesdas 2018*. [online] repository.badankebijakan.kemkes.go.id. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan. Available at: <https://repository.badankebijakan.kemkes.go.id/id/eprint/3514>.

Balkenende, D.W.R., Winkler, S.M. and Messersmith, P.B. (2019). Marine-inspired polymers in medical adhesion. *European Polymer Journal*, [online] 116, pp.134–143. doi:10.1016/j.eurpolymj.2019.03.059.

Beam, J.W. (2008). Tissue Adhesives for Simple Traumatic Lacerations. *Journal of Athletic Training*, [online] 43(2), pp.222–224. doi:10.4085/1062-6050-43.2.222.

Bertics, P.J., Koziol-White, C.J., Gavala, M.L. and Wiepz, G.J. (2014). Signal Transduction. *Middleton's Allergy*, [online] pp.184–202. doi:10.1016/b978-0-323-08593-9.00012-7.

Biranje, S.S., Madiwale, P.V., Patankar, K.C., Chhabra, R., Bangde, P., Dandekar, P. and Adivarekar, R.V. (2020). Cytotoxicity and hemostatic activity of chitosan/carrageenan composite wound healing dressing for traumatic hemorrhage. *Carbohydrate Polymers*, [online] 239, p.116106. doi:10.1016/j.carbpol.2020.116106.

Blanchet, X., Langer, M., Weber, C., Koenen, R.R. and von Hundelshausen, P. (2012). Touch of Chemokines. *Frontiers in Immunology*, [online] 3. doi:10.3389/fimmu.2012.00175.

Bronte, V. and Zanoello, P. (2005). Regulation of immune responses by L-arginine metabolism. *Nature Reviews Immunology*, [online] 5(8), pp.641–654. doi:10.1038/nri1668.

Brown, M.B., von Chamier, M., Allam, A.B. and Reyes, L. (2014). M1/M2 Macrophage Polarity in Normal and Complicated Pregnancy. *Frontiers in Immunology*, [online] 5. doi:10.3389/fimmu.2014.00606.

Buck, C.B., Thompson, C.D., Roberts, J.N., Müller, M., Lowy, D.R. and Schiller, J.T. (2006). Carrageenan Is a Potent Inhibitor of Papillomavirus Infection. *PLoS Pathogens*, [online] 2(7), p.e69. doi:10.1371/journal.ppat.0020069.

Caetano-Anollés, D. (2013). Polymerase Chain Reaction. *Brenner's Encyclopedia of Genetics*, [online] pp.392–395. doi:10.1016/b978-0-12-374984-0.01186-4.

Calabrese, E.J. (2013). Biphasic dose responses in biology, toxicology and medicine: Accounting for their generalizability and quantitative features. *Environmental Pollution*, [online] 182, pp.452–460. doi:<https://doi.org/10.1016/j.envpol.2013.07.046>.

Caldwell, R.W., Rodriguez, P.C., Toque, H.A., Narayanan, S.P. and Caldwell, R.B. (2018).

Arginase: A Multifaceted Enzyme Important in Health and Disease. *Physiological Reviews*, [online] 98(2), pp.641–665. doi:10.1152/physrev.00037.2016.

Calvo, G.H., Cosenza, V.A., Sáenz, D.A., Navarro, D.A., Stortz, C.A., Céspedes, M.A., Mamone, L.A., Casas, A.G. and Di Venosa, G.M. (2019). Disaccharides obtained from carrageenans as potential antitumor agents. *Scientific Reports*, [online] 9(1). doi:10.1038/s41598-019-43238-y.

Campbell, L., Saville, C.R., Murray, P.J., Cruickshank, S.M. and Hardman, M.J. (2013). Local Arginase 1 Activity Is Required for Cutaneous Wound Healing. *Journal of Investigative Dermatology*, [online] 133(10), pp.2461–2470. doi:10.1038/jid.2013.164.

Chai, C., Guo, Y., Huang, Z., Zhang, Z., Yang, S., Li, W., Zhao, Y. and Hao, J. (2020). Antiswelling and Durable Adhesion Biodegradable Hydrogels for Tissue Repairs and Strain Sensors. *Langmuir*, 36(35), pp.10448–10459. doi:<https://doi.org/10.1021/acs.langmuir.0c01605>.

Chai, C., Guo, Y., Huang, Z., Zhang, Z., Yang, S., Li, W. Zhao, Y., and Hao, J. (2020). Antiswelling and Durable Adhesion Biodegradable Hydrogels for Tissue Repairs and Strain Sensors. [online] *Langmuir*. Available at: <https://pubs.acs.org/doi/abs/10.1021/acs.langmuir.0c01605> [Accessed 19 Nov. 2023].

Chandra, S., Romero, M.J., Shatanawi, A., Alkilany, A.M., R. William Caldwell and R. William Caldwell (2011). Oxidative species increase arginase activity in endothelial cells through the RhoA/Rho kinase pathway. *British Journal of Pharmacology*, [online] 165(2), pp.506–519. doi:<https://doi.org/10.1111/j.1476-5381.2011.01584.x>.

Chávez-Galán, L., Olleros, M.L., Vesin, D. and Garcia, I. (2015). Much More than M1 and M2 Macrophages, There are also CD169+ and TCR+ Macrophages. *Frontiers in Immunology*, [online] 6. doi:10.3389/fimmu.2015.00263.

- Chelombitko, M.A., Федоров, A.B., O.P. Ilyinskaya, Zinovkin, R.A. and Chernyak, B.V. (2016). Role of reactive oxygen species in mast cell degranulation. *Biochemistry (Moscow)*, [online] 81(12), pp.1564–1577. doi:<https://doi.org/10.1134/s000629791612018x>.
- Chen, K., Bao, Z., Tang, P., Gong, W., Yoshimura, T. and Wang, J.M. (2018). Chemokines in homeostasis and diseases. *Cellular & Molecular Immunology*, [online] 15(4), pp.324–334. doi:10.1038/cmi.2017.134.
- Choi, S., Park, C., Ahn, M., Jun Hwa Lee and Shin, T. (2012). Immunohistochemical study of arginase 1 and 2 in various tissues of rats. *Acta histochemica*, [online] 114(5), pp.487–494. doi:<https://doi.org/10.1016/j.acthis.2011.09.002>.
- Cialdai, F., Chiara Risaliti and Monici, M. (2022). Role of fibroblasts in wound healing and tissue remodeling on Earth and in space. *Frontiers in Bioengineering and Biotechnology*, [online] 10. doi:<https://doi.org/10.3389/fbioe.2022.958381>.
- Cohen, B., Panker, M., Zuckerman, E., Foox, M. and Zilberman, M. (2013). Effect of calcium phosphate-based fillers on the structure and bonding strength of novel gelatin–alginate bioadhesives. *Journal of Biomaterials Applications*, 28(9), pp.1366–1375. doi:<https://doi.org/10.1177/0885328213509502>.
- Comino-Sanz, I.M., López-Franco, M.D., Castro, B. and Pancorbo-Hidalgo, P.L. (2021). The Role of Antioxidants on Wound Healing: A Review of the Current Evidence. *Journal of Clinical Medicine*, [online] 10(16), p.3558. doi:10.3390/jcm10163558.
- Das, S. and Baker, A.B. (2016). Biomaterials and Nanotherapeutics for Enhancing Skin Wound Healing. *Frontiers in Bioengineering and Biotechnology*, [online] 4. doi:10.3389/fbioe.2016.00082.
- Deshmane, S.L., Kremlev, S., Amini, S. and Sawaya, B.E. (2009). Monocyte Chemoattractant Protein-1 (MCP-1): An Overview. *Journal of Interferon & Cytokine Research*, [online] 29(6), pp.313–326. doi:10.1089/jir.2008.0027.

DiPietro, L.A., Polverini, P.J., Rahbe, S.M. and Kovacs, E.J. (1995). Modulation of JE/MCP-1 expression in dermal wound repair. *The American journal of pathology*, [online] 146(4), pp.868–75. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1869244/> [Accessed 6 Aug. 2022].

El Kasmi, K.C., Qualls, J.E., Pesce, J.T., Smith, A.M., Thompson, R.W., Henao-Tamayo, M., Basaraba, R.J., König, T., Schleicher, U., Koo, M.-S., Kaplan, G., Fitzgerald, K.A., Tuomanen, E.I., Orme, I.M., Kanneganti, T.-D., Bogdan, C., Wynn, T.A. and Murray, P.J. (2008). Toll-like receptor–induced arginase 1 in macrophages thwarts effective immunity against intracellular pathogens. *Nature Immunology*, [online] 9(12), pp.1399–1406. doi:10.1038/ni.1671.

Farrell, R.E. (2010). RT-PCR. *RNA Methodologies*, [online] pp.385–448. doi:10.1016/b978-0-12-374727-3.00018-8.

Fitzmaurice, S.D., Sivamani, R.K. and Isseroff, R.R. (2011). Antioxidant Therapies for Wound Healing: A Clinical Guide to Currently Commercially Available Products. *Skin Pharmacology and Physiology*, [online] 24(3), pp.113–126. doi:10.1159/000322643.

Fujiwara, N. and Kobayashi, K. (2005). Macrophages in Inflammation. *Current Drug Targets - Inflammation & Allergy*, [online] 4(3), pp.281–286. doi:<https://doi.org/10.2174/1568010054022024>.

Fuster, J.J. and Walsh, K. (2014). The Good, the Bad, and the Ugly of interleukin-6 signaling. *The EMBO Journal*, [online] 33(13), pp.1425–1427. doi:<https://doi.org/10.15252/emboj.201488856>.

Galvin, R. and DeSimone, D. (2005). *Infection rate of simple suturing*. [online] Sciencedirect.com. Available at: <https://www.sciencedirect.com/science/article/abs/pii/S0361112476800561> [Accessed 16 Jul. 2022].

García-Gubern, C.F., Colon-Rolon, L. and Bond, M.C. (2010). Essential Concepts of Wound Management. *Emergency Medicine Clinics of North America*, [online] 28(4), pp.951–967. doi:10.1016/j.emc.2010.06.009.

Gause, W.C., Wynn, T.A. and Allen, J.E. (2013). Type 2 immunity and wound healing: evolutionary refinement of adaptive immunity by helminths. *Nature Reviews Immunology*, [online] 13(8), pp.607–614. doi:10.1038/nri3476.

Gerard, C. and Rollins, B.J. (2001). Chemokines and disease. *Nature Immunology*, [online] 2(2), pp.108–115. doi:10.1038/84209.

Godo, S. and Shimokawa, H. (2017). Endothelial Functions. *Arteriosclerosis, Thrombosis, and Vascular Biology*, [online] 37(9). doi:10.1161/atvbaha.117.309813.

Goren, I., Allmann, N., Yogev, N., Schürmann, C., Linke, A., Holdener, M., Waisman, A., Pfeilschifter, J. and Frank, S. (2009). A Transgenic Mouse Model of Inducible Macrophage Depletion. *The American Journal of Pathology*, [online] 175(1), pp.132–147. doi:10.2353/ajpath.2009.081002.

Griffin, D.R., Patterson, J.T. and Kasko, A.M. (2010). Photodegradation as a mechanism for controlled drug delivery. *Biotechnology and Bioengineering*, [online] 107(6), pp.1012–1019. doi:<https://doi.org/10.1002/bit.22882>.

Guo, S. and DiPietro, L.A. (2010). Factors Affecting Wound Healing. *Journal of Dental Research*, [online] 89(3), pp.219–229. doi:10.1177/0022034509359125.

Guvendiren M., Purcell B., Burdick J.A., Photopolymerizable systems, in *Polymer Science: A Comprehensive Reference*, Volume 9: Polymers in Biology and Medicine, Eds: Moeller M, Matyjaszewski K, 2012, Elsevier.

Halim, A.S., Emami, A., Salahshourifar, I. and Kannan, T.P. (2012). Keloid Scarring: Understanding the Genetic Basis, Advances, and Prospects. *Archives of Plastic Surgery*, [online] 39(03), pp.184–189. doi:10.5999/aps.2012.39.3.184.

Handel, T.M. and Domaille, P.J. (1996). Heteronuclear (¹H, ¹³C, ¹⁵N) NMR Assignments and Solution Structure of the Monocyte Chemoattractant Protein-1 (MCP-1) Dimer. *Biochemistry*, [online] 35(21), pp.6569–6584. doi:10.1021/bi9602270.

Hernowo, R. Y. (2023). The Effects of Carrageenan Bioglue on the Expression of MMP-9 and Inflammation Score in the Wound Healing Process of Wistar Rat Skin Anastomosis.

Hesketh, M., Sahin, K.B., West, Z.E. and Murray, R.Z. (2017). Macrophage Phenotypes Regulate Scar Formation and Chronic Wound Healing. *International Journal of Molecular Sciences*, [online] 18(7), p.1545. doi:10.3390/ijms18071545.

Hollander, J.E., Singer, A.J., Valentine, S.M. and Shofer, F.S. (2001). Risk Factors for Infection in Patients with Traumatic Lacerations. *Academic Emergency Medicine*, [online] 8(7), pp.716–720. doi:10.1111/j.1553-2712.2001.tb00190.x.

Hughes, C.E. and Nibbs, R.J.B. (2018). A guide to chemokines and their receptors. *The FEBS Journal*, [online] 285(16), pp.2944–2971. doi:10.1111/febs.14466.

Ishida, Y., Kuninaka, Y., Nosaka, M., Furuta, M., Kimura, A., Taruya, A., Yamamoto, H., Shimada, E., Akiyama, M., Mukaida, N. and Kondo, T. (2019). CCL2-Mediated Reversal of Impaired Skin Wound Healing in Diabetic Mice by Normalization of Neovascularization and Collagen Accumulation. *Journal of Investigative Dermatology*, [online] 139(12), pp.2517–2527.e5. doi:10.1016/j.jid.2019.05.022.

Ishihara M., Ono K., Sato M., Nakanishi K., Saito Y., Yura H., Matsui, T., Hattori, H., Fujita, M., Kikuchi, M. and Kurita, A. (2001). Acceleration of wound contraction and healing with a photocrosslinkable chitosan hydrogel. *Wound Repair and Regeneration*, 9(6), pp.513–521. doi:<https://doi.org/10.1046/j.1524-475x.2001.00513.x>.

Ishizuka, K., Kimura, T., Igata-Yi, R., Katsuragi, S., Takamatsu, J. and Miyakawa, T. (1997). Identification of monocyte chemoattractant protein-1 in senile plaques and reactive microglia of Alzheimer's disease. *Psychiatry and Clinical Neurosciences*, [online] 51(3), pp.135–138. doi:10.1111/j.1440-1819.1997.tb02375.x.

Itagaki, N., Oda, Y., Hirata, T., Nguyen, H.K., Kawaguchi, D., Matsuno, H. and Tanaka, K. (2017). Surface Characterization and Platelet Adhesion on Thin Hydrogel Films of Poly(vinyl ether). *Langmuir*, 33(50), pp.14332–14339. doi:<https://doi.org/10.1021/acs.langmuir.7b03427>.

Jacob, S., Nair, A.B., Shah, J., Nagaraja Sreeharsha, Gupta, S. and Pottathil Shinu (2021). Emerging Role of Hydrogels in Drug Delivery Systems, Tissue Engineering and Wound Management. *Pharmaceutics*, [online] 13(3), pp.357–357. doi:<https://doi.org/10.3390/pharmaceutics13030357>.

Jameson, J., Ugarte, K., Chen, N., Yachi, P., Fuchs, E., Boismenu, R. and Havran, W.L. (2002). A Role for Skin $\gamma\delta$ T Cells in Wound Repair. *Science*, [online] 296(5568), pp.747–749. doi:10.1126/science.1069639.

Jayasingam, S.D., Citartan, M., Thang, T.H., Mat Zin, A.A., Ang, K.C. and Ch'ng, E.S. (2020). Evaluating the Polarization of Tumor-Associated Macrophages Into M1 and M2 Phenotypes in Human Cancer Tissue: Technicalities and Challenges in Routine Clinical Practice. *Frontiers in Oncology*, [online] 9. doi:10.3389/fonc.2019.01512.

Jiang, J., Jia, T., Gong, W., Ning, B., Wooley, P.H. and Yang, S.-Y. (2016). Macrophage Polarization in IL-10 Treatment of Particle-Induced Inflammation and Osteolysis. *American Journal of Pathology*, [online] 186(1), pp.57–66. doi:<https://doi.org/10.1016/j.ajpath.2015.09.006>.

Jodynis-Liebert, J. and Małgorzata Kujawska (2020). Biphasic Dose-Response Induced by Phytochemicals: Experimental Evidence. *Journal of Clinical Medicine*, [online] 9(3), pp.718–718. doi:<https://doi.org/10.3390/jcm9030718>.

Junker, J.P.E., Kamel, R.A., Caterson, E.J. and Eriksson, E. (2013). *Clinical Impact Upon Wound Healing and Inflammation in Moist, Wet, and Dry Environments | Advances in Wound Care*. [online] Advances in Wound Care. Available at: <https://www.liebertpub.com/doi/10.1089/wound.2012.0412> [Accessed 22 Nov. 2023].

Kalitnik, A.A., Barabanova, A.O., Nagorskaya, V.P., Реунов, А.В., Глазунов, В.П., Соловьева, Т.Ф. and Yermak, I.M. (2012). Low molecular weight derivatives of different carrageenan types and their antiviral activity. *Journal of Applied Phycology*, [online] 25(1), pp.65–72. doi:<https://doi.org/10.1007/s10811-012-9839-8>.

Kamala, F.Z., Budhijanto, W., Purnomo, E., Nugraheni, P.S., 2022. Optimization Concentration of Irgacure® 2959 as Photo-initiator on Chitosan-Kappa-Carrageenan Based Hydrogel for Tissue Sealant. *International Journal of Technology*. Volume 13(8), pp. 1715-1725. doi : <https://doi.org/10.14716/ijtech.v13i8.6166>

Kämpfer, H., Pfeilschifter, J. and Frank, S. (2003). Expression and Activity of Arginase Isoenzymes During Normal and Diabetes-Impaired Skin Repair. *Journal of Investigative Dermatology*, [online] 121(6), pp.1544–1551. doi:<https://doi.org/10.1046/j.1523-1747.2003.12610.x>.

Kolarsick, P.A.J., Kolarsick, M.A. and Goodwin, C. (2011). Anatomy and Physiology of the Skin. *Journal of the Dermatology Nurses' Association*, [online] 3(4), pp.203–213. doi:[10.1097/jdn.0b013e3182274a98](https://doi.org/10.1097/jdn.0b013e3182274a98).

Kral, J.B., Schrottmaier, W.C., Salzmann, M. and Assinger, A. (2016). Platelet Interaction with Innate Immune Cells. *Transfusion Medicine and Hemotherapy*, [online] 43(2), pp.78–88. doi:[10.1159/000444807](https://doi.org/10.1159/000444807).

Krzyszczuk, P., Schloss, R., Palmer, A. and Berthiaume, F. (2018). The Role of Macrophages in Acute and Chronic Wound Healing and Interventions to Promote Pro-wound Healing Phenotypes. *Frontiers in Physiology*, [online] 9. doi:[10.3389/fphys.2018.00419](https://doi.org/10.3389/fphys.2018.00419).

Kuninaka, Y., Ishida, Y., Ishigami, A., Nosaka, M., Matsuki, J., Yasuda, H., Kofuna, A., Kimura, A., Furukawa, F. and Kondo, T. (2022). Macrophage polarity and wound age determination. *Scientific Reports*, [online] 12(1). doi:<https://doi.org/10.1038/s41598-022-24577-9>.

LeBlanc, K., Langemo, D., Woo, K., Campos, H.M.H., Santos, V. and Holloway, S. (2019). Skin tears: prevention and management. *British Journal of Community Nursing*, [online] 24(Sup9), pp.S12–S18. doi:10.12968/bjcn.2019.24.sup9.s12.

LeBlanc, K., Woo, K., van den Kerkhof, E. and Woodbury, G. (2020). *Skin tear prevalence and incidence in the long-term care population: a prospective study*. [online] Journal of Wound Care.

Available at:

<https://www.magonlinelibrary.com/doi/abs/10.12968/jowc.2020.29.Sup7.S16#:~:text=type%20and%20location.-,Results%3A,the%20long%2Dterm%20care%20population> [Accessed 16 Jul. 2022].

Lee, J.W., Park, J. and Robinson, J.R. (2000). Bioadhesive-Based Dosage Forms: The Next Generation. *Journal of Pharmaceutical Sciences*, [online] 89(7), pp.850–866. doi:[https://doi.org/10.1002/1520-6017\(200007\)89:7%3C850::aid-jps2%3E3.0.co;2-g](https://doi.org/10.1002/1520-6017(200007)89:7%3C850::aid-jps2%3E3.0.co;2-g).

Lee, K.Y. and Mooney, D.J. (2012). Alginate: Properties and biomedical applications. *Progress in Polymer Science*, [online] 37(1), pp.106–126. doi:<https://doi.org/10.1016/j.progpolymsci.2011.06.003>.

Lee, W.-J., Liao, Y.-C., Wang, Y.-F., Lin, I.-Feng., Wang, S.-J. and Fuh, J.-L. (2018). Plasma MCP-1 and Cognitive Decline in Patients with Alzheimer's Disease and Mild Cognitive Impairment: A Two-year Follow-up Study. *Scientific Reports*, [online] 8(1). doi:10.1038/s41598-018-19807-y.

Levin, R., Grinstein, S. and Canton, J. (2016). The life cycle of phagosomes: formation, maturation, and resolution. *Immunological Reviews*, [online] 273(1), pp.156–179. doi:10.1111/imr.12439.

- Li, Y., Yang, H.Y. and Lee, S.S. (2021). Advances in biodegradable and injectable hydrogels for biomedical applications. *Journal of Controlled Release*, [online] 330, pp.151–160. doi:<https://doi.org/10.1016/j.jconrel.2020.12.008>.
- Liu, C., Li, Y., Yu, J., Li, F., Hou, S., Liu, Y., Guo, M., Xie, Y., Jian, M., Zhang, H., Xiao, B. and Ma, C. (2013). Targeting the Shift from M1 to M2 Macrophages in Experimental Autoimmune Encephalomyelitis Mice Treated with Fasudil. *PLOS ONE*, [online] 8(2), pp.e54841–e54841. doi:<https://doi.org/10.1371/journal.pone.0054841>.
- Low, Q.E.H., Drugea, I.A., Duffner, L.A., Quinn, D.G., Cook, D.N., Rollins, B.J., Kovacs, E.J. and DiPietro, L.A. (2001). Wound Healing in MIP-1 α –/– and MCP-1–/– Mice. *The American Journal of Pathology*, [online] 159(2), pp.457–463. doi:10.1016/s0002-9440(10)61717-8.
- Lucas, T., Waisman, A., Ranjan, R., Roes, J., Krieg, T., Müller, W., Roers, A. and Eming, S.A. (2010). Differential Roles of Macrophages in Diverse Phases of Skin Repair. *The Journal of Immunology*, [online] 184(7), pp.3964–3977. doi:10.4049/jimmunol.0903356.
- Luluah Al-Mubarak and Al-Haddab, M. (2013). Cutaneous wound closure materials: An overview and update. *Journal of Cutaneous and Aesthetic Surgery*, [online] 6(4), pp.178–178. doi:<https://doi.org/10.4103/0974-2077.123395>.
- Madrugá, L.Y.C., Popat, K.C., Balaban, R.C. and Kipper, M.J. (2021). Enhanced blood coagulation and antibacterial activities of carboxymethyl-kappa-carrageenan-containing nanofibers. *Carbohydrate Polymers*, [online] 273, p.118541. doi:10.1016/j.carbpol.2021.118541.
- McCarty, M.F. (1996). Glucosamine for wound healing. *Medical Hypotheses*, [online] 47(4), pp.273–275. doi:[https://doi.org/10.1016/s0306-9877\(96\)90066-3](https://doi.org/10.1016/s0306-9877(96)90066-3).
- McHugh, D.J. (2003). *A Guide to the Seaweed Industry*. [online] Fao.org. Available at: <https://www.fao.org/3/y4765e/y4765e00.htm#Contents> [Accessed 1 Aug. 2022].
- McKnight, G., Shah, J.M. and Hargest, R. (2022). Physiology of the skin. *Surgery (oxford)*, [online] 40(1), pp.8–12. doi:<https://doi.org/10.1016/j.mpsur.2021.11.005>.

Mercandetti, M. (2021). *Wound Healing and Repair: Overview, Types of Wound Healing, Categories of Wound Healing*. [online] Medscape.com. Available at: <https://emedicine.medscape.com/article/1298129-overview#:~:text=Overview%20of%20Wound%20Healing,-The%20amalgam%20of&text=The%20inflammatory%20phase%20occurs%20immediately,and%20can%20last%20for%20years>. [Accessed 30 Jul. 2022].

Mills, C.D. and Ley, K. (2014). M1 and M2 Macrophages: The Chicken and the Egg of Immunity. *Journal of Innate Immunity*, [online] 6(6), pp.716–726. doi:10.1159/000364945.

Minagawa, T., Okamura, Y., Shigemasa, Y., Minami, S. and Okamoto, Y. (2007). Effects of molecular weight and deacetylation degree of chitin/chitosan on wound healing. *Carbohydrate Polymers*, [online] 67(4), pp.640–644. doi:<https://doi.org/10.1016/j.carbpol.2006.07.007>.

Mirza, R., DiPietro, L.A. and Koh, T.J. (2009). Selective and Specific Macrophage Ablation Is Detrimental to Wound Healing in Mice. *The American Journal of Pathology*, [online] 175(6), pp.2454–2462. doi:10.2353/ajpath.2009.090248.

Mohamed, S.A. and Hargest, R. (2022). Surgical anatomy of the skin. *Surgery (Oxford)*, [online] 40(1), pp.1–7. doi:10.1016/j.mpsur.2021.11.021.

Mokhtari, H., Kharaziha, M., Karimzadeh, F. and Tavakoli, S. (2019). An injectable mechanically robust hydrogel of Kappa-carrageenan-dopamine functionalized graphene oxide for promoting cell growth. *Carbohydrate Polymers*, [online] 214, pp.234–249. doi:10.1016/j.carbpol.2019.03.030.

Moore, L.B., Sawyer, A.J., Charokopos, A., Skokos, E.A. and Kyriakides, T.R. (2015). Loss of monocyte chemoattractant protein-1 alters macrophage polarization and reduces NFκB activation in the foreign body response. *Acta Biomaterialia*, [online] 11, pp.37–47. doi:10.1016/j.actbio.2014.09.022.

Munder, M. (2009). Arginase: an emerging key player in the mammalian immune system. *British Journal of Pharmacology*, [online] 158(3), pp.638–651. doi:10.1111/j.1476-5381.2009.00291.x.

Munder, M. (2009). Arginase: an emerging key player in the mammalian immune system. *British Journal of Pharmacology*, [online] 158(3), pp.638–651. doi:10.1111/j.1476-5381.2009.00291.x.

Murakami, K., Aoki, H., Nakamura, S., Nakamura, S., Takikawa, M., Hanzawa, M., Kishimoto, S., Hattori, H., Tanaka, Y., Kiyosawa, T., Sato, Y. and Ishihara, M. (2010). Hydrogel blends of chitin/chitosan, fucoidan and alginate as healing-impaired wound dressings. *Biomaterials*, [online] 31(1), pp.83–90. doi:<https://doi.org/10.1016/j.biomaterials.2009.09.031>.

Nagaoka, I., Igarashi, M., Hua, J., Ju, Y., Yomogida, S. and Sakamoto, K. (2011). Recent aspects of the anti-inflammatory actions of glucosamine. *Carbohydrate Polymers*, [online] 84(2), pp.825–830. doi:<https://doi.org/10.1016/j.carbpol.2010.04.007>.

Neamtu, B., Barbu, A., Negrea, M.O., Berghea-Neamtu, C.Ş., Popescu, D., Zăhan, M. and Mireşan, V. (2022). Carrageenan-Based Compounds as Wound Healing Materials. *International Journal of Molecular Sciences*, [online] 23(16), p.9117. doi:10.3390/ijms23169117.

Necas, J. and Bartosikova, L. (2013). Carrageenan: a review. *Veterinární Medicína*, 58(No. 4), pp.187–205. doi:10.17221/6758-vetmed.

Ng, L.-T., Swami, S.N. and Gordon-Thomson, C. (2006). Hydrogels synthesised through photoinitiator-free photopolymerisation technique for delivering drugs including a tumour-tracing porphyrin. *Radiation Physics and Chemistry*, [online] 75(5), pp.604–612. doi:<https://doi.org/10.1016/j.radphyschem.2005.11.006>.

Nio, Y., Yamauchi, T., Iwabu, M., Okada-Iwabu, M., Funata, M., Yamaguchi, M., Ueki, K. and Kadowaki, T. (2012). Monocyte chemoattractant protein-1 (MCP-1) deficiency enhances alternatively activated M2 macrophages and ameliorates insulin resistance and fatty liver in

lipotrophic diabetic A-ZIP transgenic mice. *Diabetologia*, [online] 55(12), pp.3350–3358. doi:10.1007/s00125-012-2710-2.

Nouvong, A., Ambrus, A.M., Zhang, E.R., Hultman, L. and Collier, H.A. (2016). Reactive oxygen species and bacterial biofilms in diabetic wound healing. *Physiological Genomics*, [online] 48(12), pp.889–896. doi:10.1152/physiolgenomics.00066.2016.

O’Farrell, A.M., Liu, Y., Moore, K.W. and Mui, A.L. (1998). IL-10 inhibits macrophage activation and proliferation by distinct signaling mechanisms: evidence for Stat3-dependent and -independent pathways. *The EMBO Journal*, [online] 17(4), pp.1006–1018. doi:<https://doi.org/10.1093/emboj/17.4.1006>.

Orecchioni, M., Yanal Ghosheh, Akula Bala Pramod and Ley, K. (2019). Macrophage Polarization: Different Gene Signatures in M1(LPS+) vs. Classically and M2(LPS–) vs. Alternatively Activated Macrophages. *Frontiers in Immunology*, [online] 10. doi:<https://doi.org/10.3389/fimmu.2019.01084>.

Pacheco-Quito, E.-M., Ruiz-Caro, R. and Veiga, M.-D. (2020). Carrageenan: Drug Delivery Systems and Other Biomedical Applications. *Marine Drugs*, [online] 18(11), p.583. doi:10.3390/md18110583.

Pangestuti, R. and Kim, S.-K. (2014). Biological Activities of Carrageenan. *Advances in Food and Nutrition Research*, [online] pp.113–124. doi:10.1016/b978-0-12-800269-8.00007-5.

Pappas, S.P. (1989). Photoinitiated Polymerization. *Elsevier eBooks*, [online] pp.337–355. doi:<https://doi.org/10.1016/b978-0-08-096701-1.00135-x>.

Parentrengi, A. and Sulaeman, S. (2007). MENGENAL RUMPUT LAUT, *Kappaphycus alvarezii*. *Media Akuakultur*, [online] 2(1), pp.142–146. Available at: <http://ejournal-balitbang.kkp.go.id/index.php/ma/article/view/2804/2306> [Accessed 16 Jul. 2022].

Pathak, K. (2019). *Marine bioadhesives: opportunities and challenges | Therapeutic Delivery*. [online] Therapeutic Delivery. Available at: <https://www.future-science.com/doi/10.4155/tde-2019-0070> [Accessed 11 Aug. 2022].

Pellis, A., Guebitz, G.M. and Nyanhongo, G.S. (2022). Chitosan: Sources, Processing and Modification Techniques. *Gels*, [online] 8(7), pp.393–393. doi:<https://doi.org/10.3390/gels8070393>.

Pesce, J.T., Ramalingam, T.R., Mentink-Kane, M.M., Wilson, M.S., El Kasmi, K.C., Smith, A.M., Thompson, R.W., Cheever, A.W., Murray, P.J. and Wynn, T.A. (2009). Arginase-1-Expressing Macrophages Suppress Th2 Cytokine-Driven Inflammation and Fibrosis. *PLoS Pathogens*, [online] 5(4), p.e1000371. doi:10.1371/journal.ppat.1000371.

Pettinelli, N., Rodríguez-Llamazares, S., Bouza, R., Barral, L., Feijoo-Bandín, S. and Lago, F. (2020). Carrageenan-based physically crosslinked injectable hydrogel for wound healing and tissue repairing applications. *International Journal of Pharmaceutics*, [online] 589, p.119828. doi:10.1016/j.ijpharm.2020.119828.

Pinkas, O., Goder, D., Noyvirt, R., Peleg, S., Kahlon, M. and Zilberman, M. (2017). Structuring of composite hydrogel bioadhesives and its effect on properties and bonding mechanism. *Acta Biomaterialia*, [online] 51, pp.125–137. doi:<https://doi.org/10.1016/j.actbio.2017.01.047>.

Popa, E.G., Carvalho, P.P., Dias, A.F., Santos, T.C., Santo, V.E., Marques, A.P., Viegas, C.A., Dias, I.R., Gomes, M.E. and Reis, R.L. (2014). Evaluation of their *in vitro* and *vivo* biocompatibility of carrageenan-based hydrogels. *Journal of Biomedical Materials Research Part A*, [online] 102(11), pp.4087–4097. doi:10.1002/jbm.a.35081.

Prasedya, E.S., Miyake, M., Kobayashi, D. and Hazama, A. (2016). Carrageenan delays cell cycle progression in human cancer cells in vitro demonstrated by FUCCI imaging. *BMC Complementary and Alternative Medicine*, [online] 16(1). doi:10.1186/s12906-016-1199-5.

Puspitasari, D., Budhijanto, W., Purnomo, E. and Nugraheni, P.S. (2023). *Optimization of Irgacure® 2959 Concentration as Photo-Initiator on Chitosan-Alginate Based Hydrogel for*

Colon Tissue Sealant. [online] IJTech - International Journal of Technology. Available at: <https://ijtech.eng.ui.ac.id/article/view/6164> [Accessed 13 Oct. 2023].

Qi, Z., Xu, J., Wang, Z., Nie, J. and Ma, G. (2013). Preparation and properties of photo-crosslinkable hydrogel based on photopolymerizable chitosan derivative. *International Journal of Biological Macromolecules*, [online] 53, pp.144–149.
doi:<https://doi.org/10.1016/j.ijbiomac.2012.10.021>.

Qi, W.-J., Li, Y., Wang, Y. and Yu, A.-L. (2015). IL-2 promotes macrophage M1 polarization via the Jak3-Stat5 signaling pathway. *Basic & Clinical Medicine*, [online] 35(8), p.1055. Available at: http://journal11.magtechjournal.com/Jwk_jcyxylc/EN/Y2015/V35/I8/1055 [Accessed 26 Dec. 2023].

Raghu, H., Lepus, C.M., Wang, Q., Wong, H.H., Lingampalli, N., Oliviero, F., Punzi, L., Giori, N.J., Goodman, S.B., Chu, C.R., Sokolove, J.B. and Robinson, W.H. (2016). CCL2/CCR2, but not CCL5/CCR5, mediates monocyte recruitment, inflammation and cartilage destruction in osteoarthritis. *Annals of the Rheumatic Diseases*, [online] 76(5), pp.914–922.
doi:10.1136/annrheumdis-2016-210426.

Rejo (2018). A Review of Moisture Balance Management in Dime Wound Care Guidelines. *Reaching the Unreached: Improving Population Health in the Rural and Remote Areas*. [online] doi:<https://doi.org/10.26911/theicph.2018.05.26>.

Rio, D.C. (2014). Reverse Transcription–Polymerase Chain Reaction. *Cold Spring Harbor Protocols*, [online] 2014(11), p.pdb.prot080887. doi:10.1101/pdb.prot080887.

Rivera, R.F. and Fagan, M. (2018). Laceration Repair. *Urgent Care Medicine Secrets*, [online] pp.270–278. doi:10.1016/b978-0-323-46215-0.00044-6.

Rodrigues, M., Kosaric, N., Bonham, C.A. and Gurtner, G.C. (2019). Wound Healing: A Cellular Perspective. *Physiological Reviews*, [online] 99(1), pp.665–706.
doi:10.1152/physrev.00067.2017.

Röszer, T. (2015). Understanding the Mysterious M2 Macrophage through Activation Markers and Effector Mechanisms. *Mediators of Inflammation*, [online] 2015, pp.1–16. doi:10.1155/2015/816460.

Santaella, A., Kuiperij, H.B., van Rumund, A., Esselink, R.A.J., van Gool, A.J., Bloem, B.R. and Verbeek, M.M. (2020). Cerebrospinal fluid monocyte chemoattractant protein 1 correlates with progression of Parkinson's disease. *npj Parkinson's Disease*, [online] 6(1). doi:10.1038/s41531-020-00124-z.

Schwalm, R. (2001). Photoinitiators and Photopolymerization. Elsevier eBooks, [online] pp.6946–6951. doi:<https://doi.org/10.1016/b0-08-043152-6/01230-4>.

Silva, F.R.F., Maria, C., Cybelle Teixeira Marques, Nascimento, M.S., Maria, N., Alexandre, H., Chavante, S.F. and Edda Lisboa Leite (2010). Anticoagulant activity, paw edema and pleurisy induced carrageenan: Action of major types of commercial carrageenans. *Carbohydrate Polymers*, [online] 79(1), pp.26–33. doi:<https://doi.org/10.1016/j.carbpol.2009.07.010>.

Singh, S., Anshita, D. and Ravichandiran, V. (2021). MCP-1: Function, regulation, and involvement in disease. *International Immunopharmacology*, [online] 101, p.107598. doi:10.1016/j.intimp.2021.107598.

Singh, S., Anshita, D. and Ravichandiran, V. (2021). MCP-1: Function, regulation, and involvement in disease. *International Immunopharmacology*, [online] 101, p.107598. doi:10.1016/j.intimp.2021.107598.

Stupin, V., Manturova, N., Silina, E., Litvitskiy, P., Vasin, V., Artyushkova, E., Ivanov, A., Gladchenko, M. and Aliev, S. (2020). The Effect of Inflammation on the Healing Process of Acute Skin Wounds Under the Treatment of Wounds with Injections in Rats. *Journal of Experimental Pharmacology*, [online] Volume 12, pp.409–422. doi:10.2147/jep.s275791.

- Tavakoli, S., Kharaziha, M., Kermanpur, A. and Mokhtari, H. (2019). Sprayable and injectable visible-light Kappa-carrageenan hydrogel for in-situ soft tissue engineering. *International Journal of Biological Macromolecules*, [online] 138, pp.590–601. doi:10.1016/j.ijbiomac.2019.07.126.
- Tavakoli, S., Mokhtari, H., Kharaziha, M., Kermanpur, A., Talebi, A. and Moshtaghian, J. (2020). A multifunctional nanocomposite spray dressing of Kappa-carrageenan-polydopamine modified ZnO/L-glutamic acid for diabetic wounds. *Materials Science and Engineering: C*, [online] 111, p.110837. doi:10.1016/j.msec.2020.110837.
- Tobacman, J.K. (2001). Review of harmful gastrointestinal effects of carrageenan in animal experiments. *Environmental Health Perspectives*, 109(10), pp.983–994. doi:10.1289/ehp.01109983.
- Tomal, W. and Ortyl, J. (2020). Water-Soluble Photoinitiators in Biomedical Applications. *Polymers*, [online] 12(5), pp.1073–1073. doi:<https://doi.org/10.3390/polym12051073>.
- Valones, M.A.A., Guimarães, R.L., Brandão, L.A.C., Souza, P.R.E. de, Carvalho, A. de A.T. and Crovela, S. (2009). Principles and applications of polymerase chain reaction in medical diagnostic fields: a review. *Brazilian Journal of Microbiology*, [online] 40(1), pp.1–11. doi:10.1590/s1517-83822009000100001.
- van der Vliet, A. and Janssen-Heininger, Y.M.W. (2014). Hydrogen Peroxide as a Damage Signal in Tissue Injury and Inflammation: Murderer, Mediator, or Messenger? *Journal of Cellular Biochemistry*, [online] 115(3), pp.427–435. doi:10.1002/jcb.24683.
- Wagner, W., Roderburg, C., Wein, F., Diehlmann, A., Frankhauser, M., Schubert, R., Eckstein, V. and Ho, A.D. (2007). Molecular and Secretory Profiles of Human Mesenchymal Stromal Cells and Their Abilities to Maintain Primitive Hematopoietic Progenitors. *Stem Cells*, [online] 25(10), pp.2638–2647. doi:10.1634/stemcells.2007-0280.

Wu, W., Wang, F., Gao, X., Niu, T., Zhen, Z., Chen, H. and Yan, X. (2016). Enhanced effect of κ -carrageenan on TNBS-induced inflammation in mice. *International Immunopharmacology*, [online] 39, pp.218–228. doi:<https://doi.org/10.1016/j.intimp.2016.07.031>.

Yadav, A., Saini, V. and Arora, S. (2010). MCP-1: Chemoattractant with a role beyond immunity: A review. *Clinica Chimica Acta*, [online] 411(21-22), pp.1570–1579. doi:10.1016/j.cca.2010.07.006.

Yag-Howard, C. (2014). Sutures, Needles, and Tissue Adhesives. *Dermatologic Surgery*, [online] 40(Supplement 9), pp.S3–S15. doi:10.1097/01.dss.0000452738.23278.2d.

Yousef, H., Alhajj, M. and Sharma, S. (2021). *Anatomy, Skin (Integument), Epidermis*. [online] Nih.gov. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK470464/> [Accessed 30 Jul. 2022].

Yu, W., Tu, Y., Long, Z., Liu, J., Kong, D., Peng, J., Wu, H., Zheng, G., Zhao, J., Chen, Y., Liu, R., Li, W. and Hai, C. (2022). Reactive Oxygen Species Bridge the Gap between Chronic Inflammation and Tumor Development. *Oxidative Medicine and Cellular Longevity*, [online] 2022, pp.1–22. doi:<https://doi.org/10.1155/2022/2606928>.

Yuan, H., Song, J., Zhang, W., Li, X., Li, N. and Gao, X. (2006). Antioxidant activity and cytoprotective effect of κ -carrageenan oligosaccharides and their different derivatives. *Bioorganic & Medicinal Chemistry Letters*, [online] 16(5), pp.1329–1334. doi:10.1016/j.bmcl.2005.11.057.

Yunna, C., Mengru, H., Lei, W. and Weidong, C. (2020). Macrophage M1/M2 polarization. *European Journal of Pharmacology*, [online] 877, p.173090. doi:10.1016/j.ejphar.2020.173090.

Zhang, I., Alizadeh, D., Liang, J., Zhang, L., Gao, H., Song, Y., Ren, H., Ouyang, M., Wu, X., Massimo D'Apuzzo and Badie, B. (2016). Characterization of Arginase Expression in Glioma-Associated Microglia and Macrophages. *PLOS ONE*, [online] 11(12), pp.e0165118–e0165118. doi:<https://doi.org/10.1371/journal.pone.0165118>.

Zhou, H., Hu, B., Zhaopeng, Z., Liu, J., Zhong, Q., Fan, Y. and Li, L. (2019). Elevated circulating T cell subsets and cytokines expression in patients with rheumatoid arthritis. *Clinical Rheumatology*, [online] 38(7), pp.1831–1839. doi:10.1007/s10067-019-04465-w.

Zhu, M., Ge, L., Lyu, Y., Zi, Y., Li, X., Li, D. and Mu, C. (2017). Preparation, characterization and antibacterial activity of oxidized κ -carrageenan. *Carbohydrate Polymers*, [online] 174, pp.1051–1058. doi:10.1016/j.carbpol.2017.07.029.

Zignani M., Tabatabay C., and Gurny, R. (1995). Topical semi-solid drug delivery: kinetics and tolerance of ophthalmic hydrogels. *Advanced Drug Delivery Reviews*, [online] 16(1), pp.51–60. doi:[https://doi.org/10.1016/0169-409x\(95\)00015-y](https://doi.org/10.1016/0169-409x(95)00015-y).