

DAFTAR PUSTAKA

- Ansell, D. M., Campbell, L., Thomason, H. A., Brass, A., & Hardman, M. J. 2014. A statistical analysis of murine incisional and excisional acute wound models. In *Wound repair and regeneration: official publication of the Wound Healing Society [and] the European Tissue Repair Society* (Vol. 22, Issue 2, pp. 281–287). <https://doi.org/10.1111/wrr.12148>
- Bancroft, J. ., Suvarna K, S., & Layton, C. 2019. The Theory and Practice of Histological Techniques. In J. . Bancroft, S. Suvarna K, & C. Layton (Eds.), *Pathology* (Eighth Edi). Elsevier.
- Baranoski, S., & Elizabeth A. Ayello. 2012. *Wound Care Essentials* (Third). Lippincott Williams & Wilkins.
- Baron, J. M., Glatz, M., & Proksch, E. 2020. Optimal Support of Wound Healing: New Insights. *Dermatology*, 236(6), 593–600. <https://doi.org/10.1159/000505291>
- Barraud, N., Hassett, D. J., Hwang, S. H., Rice, S. A., Kjelleberg, S., & Webb, J. S. 2006. Involvement of nitric oxide in biofilm dispersal of *Pseudomonas aeruginosa*. In *Journal of Bacteriology* (Vol. 188, Issue 21, pp. 7344–7353). <https://doi.org/10.1128/JB.00779-06>
- Bertesteanu, S., Triaridis, S., Stankovic, M., Lazar, V., Chifiriuc, M. C., Vlad, M., & Grigore, R. 2014. Polymicrobial wound infections: Pathophysiology and current therapeutic approaches. *International Journal of Pharmaceutics*, 463(2), 119–126. <https://doi.org/10.1016/j.ijpharm.2013.12.012>
- Broniowska, K. A., Diers, A. R., & Hogg, N. 2013. S-Nitrosoglutathione. *Biochimica et Biophysica Acta - General Subjects*, 1830(5), 3173–3181. <https://doi.org/10.1016/j.bbagen.2013.02.004>
- Broniowska, K. A., & Hogg, N. 2012. *The Chemical Biology of S-Nitrosothiols*. 17(7). <https://doi.org/10.1089/ars.2012.4590>
- Carpenter, A. W., & Schoenfisch, M. H. 2012. Nitric oxide release: Part II. Therapeutic applications. *Chemical Society Reviews*, 41(10), 3742–3752. <https://doi.org/10.1039/c2cs15273h>
- Choi, M., Hasan, N., Cao, J., Lee, J., Hlaing, S. P., & Yoo, J. 2019. Chitosan-based nitric oxide-releasing dressing for anti-biofilm and in vivo. *INTERNATIONAL JOURNAL OF BIOLOGICAL MACROMOLECULES*. <https://doi.org/10.1016/j.ijbiomac.2019.10.009>
- Choi, M., Hasan, N., Cao, J., Lee, J., Hlaing, S. P., & Yoo, J. W. 2020. Chitosan-based nitric oxide-releasing dressing for anti-biofilm and in vivo healing activities in MRSA biofilm-infected wounds. *International Journal of Biological Macromolecules*, 142, 680–692. <https://doi.org/10.1016/j.ijbiomac.2019.10.009>
- 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>
- Cisneros, C. G., Bloemen, V., & Mignon, A. 2021. Synthetic, natural, and semisynthetic polymer carriers for controlled nitric oxide release in dermal applications: A review. *Polymers*, 13(5), 1–26. <https://doi.org/10.3390/polym13050760>
- Corpas, F. J., Alché, J. D., & Juan B. Barroso. 2013. *Current overview of S-nitrosoglutathione (GSNO) in higher plants.pdf*. 4.
- Darvishi, S., Tavakoli, S., Kharaziha, M., Girault, H. H., Kaminski, C. F., & Mela, I. 2022. Advances in the Sensing and Treatment of Wound Biofilms. In *Angewandte Chemie - International Edition* (Vol. 61, Issue 13). <https://doi.org/10.1002/anie.202112218>
- Demidova-Rice, T. N., Hamblin, M. R., & Herman, I. M. 2012. Acute and impaired wound healing: Pathophysiology and current methods for drug delivery, part 1: Normal and Chronic Wounds: Biology, Causes and Approaches to Care. *Advances in Skin and Wound Care*, 25(8), 349–370.
- Dorantes, L., & Ayala, M. 2019. Skin acute wound healing: A comprehensive review. *International Journal of*

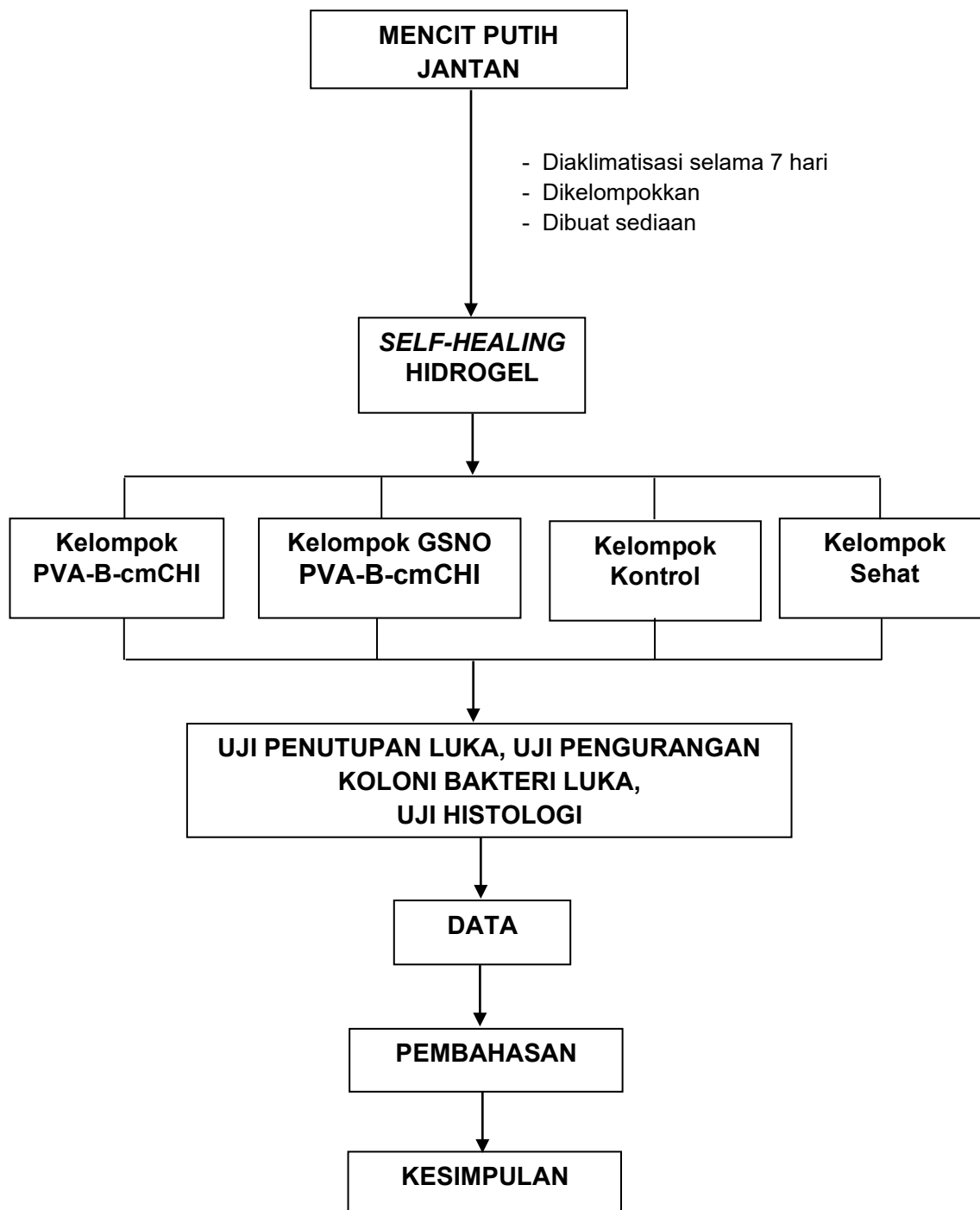
Inflammation, 2019(1), 1–15.

- Fan, L., Ge, X., Qian, Y., Wei, M., Zhang, Z., Yuan, W. E., & Ouyang, Y. 2020. Advances in Synthesis and Applications of Self-Healing Hydrogels. *Frontiers in Bioengineering and Biotechnology*, 8(July), 1–14. <https://doi.org/10.3389/fbioe.2020.00654>
- Fontana, K., & Mutus, B. 2017. Nitric Oxide-Donating Devices for Topical Applications. In *Nitric Oxide Donors: Novel Biomedical Applications and Perspectives*. Elsevier Inc. <https://doi.org/10.1016/B978-0-12-809275-0.00003-X>
- Förstermann, U., & Sessa, W. C. 2012. Nitric oxide synthases: Regulation and function. *European Heart Journal*, 33(7), 1–13. <https://doi.org/10.1093/eurheartj/ehr304>
- Gantwerker, E. A., & Hom, D. B. 2011. Skin: Histology and Physiology of Wound Healing. *Facial Plastic Surgery Clinics of North America*, 19(3), 441–453. <https://doi.org/10.1016/j.fsc.2011.06.009>
- Gonzalez, A. C. D. O., Andrade, Z. D. A., Costa, T. F., & Medrado, A. R. A. P. 2016. Wound healing - A literature review. *Anais Brasileiros de Dermatologia*, 91(5), 614–620. <https://doi.org/10.1590/abd1806-4841.20164741>
- Goy, R. C., De Britto, D., & Assis, O. B. G. 2009. A review of the antimicrobial activity of chitosan. *Polimeros*, 19(3), 241–247. <https://doi.org/10.1590/S0104-14282009000300013>
- Guo, S., & DiPietro, L. A. 2010. Critical review in oral biology & medicine: Factors affecting wound healing. *Journal of Dental Research*, 89(3), 219–229. <https://doi.org/10.1177/0022034509359125>
- Gushiken, L. F. S., Beserra, F. P., Bastos, J. K., Jackson, C. J., & Pellizzon, C. H. 2021. Cutaneous wound healing: An update from physiopathology to current therapies. *Life*, 11(7), 1–15. <https://doi.org/10.3390/life11070665>
- Hasan, N., Cao, J., Lee, J., Naeem, M., Hlaing, S. P., Kim, J., Jung, Y., Lee, B. L., & Yoo, J. W. 2019a. PEI/NONOates-doped PLGA nanoparticles for eradicating methicillin-resistant Staphylococcus aureus biofilm in diabetic wounds via binding to the biofilm matrix. *Materials Science and Engineering C*, 103(December 2018). <https://doi.org/10.1016/j.msec.2019.109741>
- Hasan, N., Cao, J., Lee, J., Naeem, M., Hlaing, S. P., Kim, J., Jung, Y., Lee, B. L., & Yoo, J. W. 2019b. PEI/NONOates-doped PLGA nanoparticles for eradicating methicillin-resistant Staphylococcus aureus biofilm in diabetic wounds via binding to the biofilm matrix. *Materials Science and Engineering C*, 103(May). <https://doi.org/10.1016/j.msec.2019.109741>
- Hasan, N., Lee, J., Ahn, H.-J., Hwang, W. R., Akbar Bahar, M., Habibie, H., Amir, M. N., Lallo, S., Son, H.-J., & Yoo, J.-W. 2021. Nitric Oxide-Releasing Bacterial Cellulose/Chitosan Crosslinked Hydrogels for the Treatment of Polymicrobial Wound Infections. *Pharmaceutics*, 2022, 22. <https://doi.org/10.3390/pharmaceutics14010022>
- Hasan, N., Lee, J., Ahn, H. J., Hwang, W. R., Bahar, M. A., Habibie, H., Amir, M. N., Lallo, S., Son, H. J., & Yoo, J. W. 2022. Nitric oxide-releasing bacterial cellulose/chitosan crosslinked hydrogels for the treatment of polymicrobial wound infections. *Pharmaceutics*, 14(1). <https://doi.org/10.3390/pharmaceutics14010022>
- Hidayati, A. 2019. Infeksi Bakteri Di Kulit. In *Infeksi Bakteri Di Kulit*.
- Hlaing, S. P., Kim, J., Lee, J., Hasan, N., Cao, J., Naeem, M., Lee, E. H., Shin, J. H., Jung, Y., Lee, B. L., Jhun, B. H., & Yoo, J. W. 2018. S-Nitrosoglutathione loaded poly(lactic-co-glycolic acid) microparticles for prolonged nitric oxide release and enhanced healing of methicillin-resistant Staphylococcus aureus-infected wounds. *European Journal of Pharmaceutics and Biopharmaceutics*, 132, 94–102. <https://doi.org/10.1016/j.ejpb.2018.09.009>
- Hobley, L., Harkins, C., MacPhee, C. E., & Stanley-Wall, N. R. 2015. Giving structure to the biofilm matrix: An overview of individual strategies and emerging common themes. *FEMS Microbiology Reviews*, 39(5), 649–669. <https://doi.org/10.1093/femsre/fuv015>

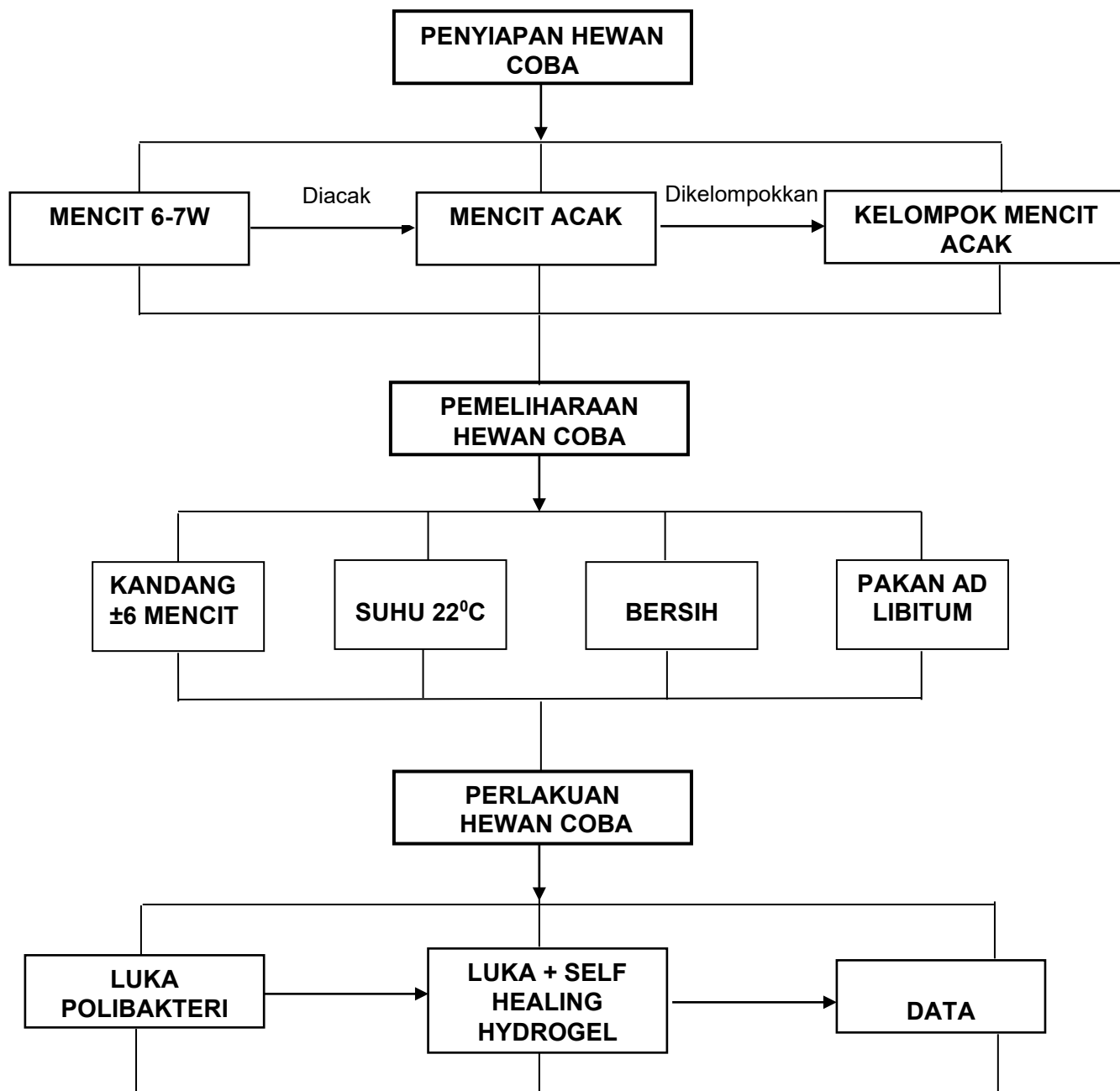
- Jahnová, J., Luhová, L., & Petřivalský, M. 2019. S-nitrosogluthione reductase-the master regulator of protein S-nitrosation in plant NO signaling. *Plants*, 8(2), 1–19. <https://doi.org/10.3390/plants8020048>
- Joy, J., George, E., Anas, S., & Thomas, S. 2020. Applications of self-healing polymeric systems. In *Self-Healing Polymer-Based Systems*. INC. <https://doi.org/10.1016/b978-0-12-818450-9.00016-7>
- Lee, J., Kwak, D., Kim, H., Kim, J., Hlaing, S. P., Hasan, N., Cao, J., & Yoo, J. W. 2020. Nitric oxide-releasing s-nitrosogluthione-conjugated poly(Lactic-co-glycolic acid) nanoparticles for the treatment of MRSA-infected cutaneous wounds. *Pharmaceutics*, 12(7), 1–14. <https://doi.org/10.3390/pharmaceutics12070618>
- Lu, B., Lin, F., Jiang, X., Cheng, J., Lu, Q., Song, J., Chen, C., & Huang, B. 2017. One-Pot Assembly of Microfibrillated Cellulose Reinforced PVA-Borax Hydrogels with Self-Healing and pH-Responsive Properties. *ACS Sustainable Chemistry and Engineering*, 5(1), 948–956. <https://doi.org/10.1021/acssuschemeng.6b02279>
- Mahmudah, R., Soleha, T. U., & Ekowati, C. 2013. Identifikasi Methicillin-Resistant Staphylococcus Aureus (MRSA) Pada Tenaga Medis Dan Paramedis Di Ruang Intensivecare Unit (ICU) Dan Ruang Perawatan Bedah Rumah Sakit Umum Daerah Abdul Moeloek. *Medical Journal of Lampung University*, 2(4), 70–78.
- Maria Aditya Pardomuan Hutauruk, Wiwit Ade Widiawati, & Alida Fidiawaty. 2017. *Gambaran Histopatologi Kulit Mencit Putih (Mus Musculus) Setelah Diberi Paparan Asap Pembakaran*. 4.
- Masson-Meyers, D. S., Andrade, T. A. M., Caetano, G. F., Guimaraes, F. R., Leite, M. N., Leite, S. N., & Frade, M. A. C. 2020. Experimental models and methods for cutaneous wound healing assessment. *International Journal of Experimental Pathology*, 101(1–2), 21–37. <https://doi.org/10.1111/iep.12346>
- Matica, M. A., Achmann, F. L., Tøndervik, A., Sletta, H., & Ostafe, V. 2019. Chitosan as a wound dressing starting material: Antimicrobial properties and mode of action. *International Journal of Molecular Sciences*, 20(23), 1–34. <https://doi.org/10.3390/ijms20235889>
- McCarthy, H., Rudkin, J. K., Black, N. S., Gallagher, L., O'Neill, E., & O'Gara, J. P. 2015. Methicillin resistance and the biofilm phenotype in staphylococcus aureus. *Frontiers in Cellular and Infection Microbiology*, 5(January), 1–9. <https://doi.org/10.3389/fcimb.2015.00001>
- Messner, K., Vuong, B., & Tranmer, G. K. 2022. The Boron Advantage: The Evolution and Diversification of Boron's Applications in Medicinal Chemistry. *Pharmaceutics*, 15(3), 1–33. <https://doi.org/10.3390/ph15030264>
- Paricio, L., Neufeld, B., & Reynolds, M. 2019. Combined influence of nitric oxide and surface roughness in biofilm reduction across bacteria strains. *Biointerphases*, 14(2), 021004. <https://doi.org/10.1116/1.5089246>
- Poh, W. H., & Rice, S. A. 2022. Recent Developments in Nitric Oxide Donors and Delivery for Antimicrobial and Anti-Biofilm Applications. *Molecules*, 27(3). <https://doi.org/10.3390/molecules27030674>
- Pubchem. 2021. *Compound Summary S-nitrosogluthione*. <https://pubchem.ncbi.nlm.nih.gov/compound/S-nitrosogluthione#section=Chemical-Disease-Co-Occurrences-in-Literature>
- Pubchem. 2022a. *Compound Summary: N-(2-carboxyethyl)chitosan*. <https://pubchem.ncbi.nlm.nih.gov/compound/129721847#section=Structures>
- Pubchem. 2022b. *Compound Summary: Polyvinyl alcohol*. <https://pubchem.ncbi.nlm.nih.gov/compound/Polyvinyl-alcohol>
- Rudy Agung Nugroho. 2018. Mengenal Mencit Sebagai Hewan Laboratorium. In Andi Hafitz Khanz (Ed.), *Mulawarman University Press*. Mulawarman University Press.
- Salgado, G., Ng, Y. Z., Koh, L. F., Goh, C. S. M., & Common, J. E. 2017. Human reconstructed skin xenografts on mice to model skin physiology. *Differentiation*, 98(August 2019), 14–24. <https://doi.org/10.1016/j.diff.2017.09.004>

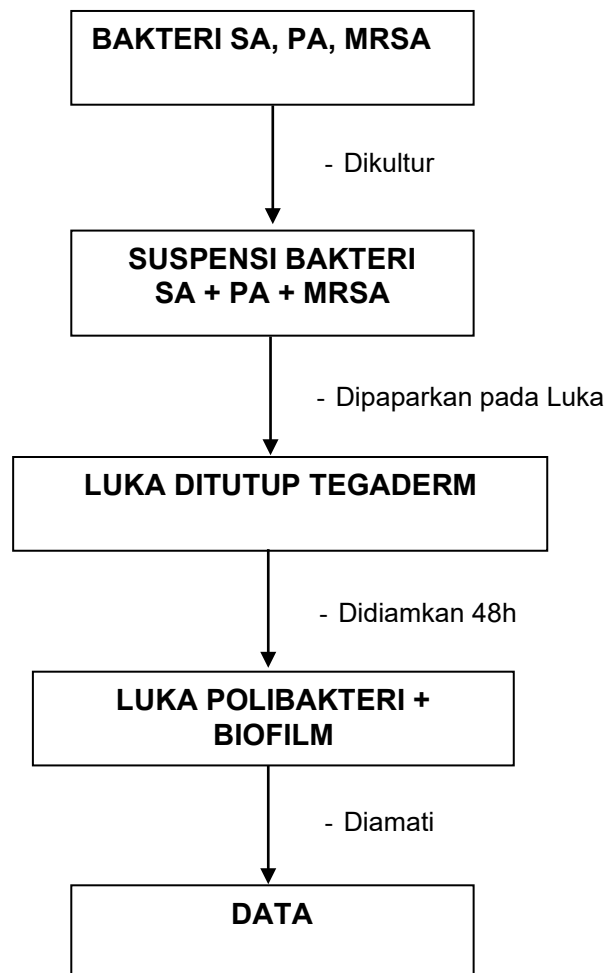
- Salman, S. A., & Bakr, N. A. 2018. DSC and TGA Properties of PVA Films Filled with Na₂S₂O₃.5H₂O Salt. *Journal of Chemical, Biological, and Physical Sciences*, 8(March), 1–11. <https://doi.org/10.24214/jcbps.C.8.2.00111>
- Seth, A. K., Geringer, M. R., Hong, S. J., Leung, K. P., Mustoe, T. A., & Galiano, R. D. 2012. In vivo modeling of biofilm-infected wounds: A review. *Journal of Surgical Research*, 178(1), 330–338. <https://doi.org/10.1016/j.jss.2012.06.048>
- Shahzad Malik, U., Bilal Khan Niazi, M., Jahan, Z., Iqbal Zafar, M., Vo, D.-V. N., & Sher, F. 2022. *Nano-structured dynamic Schiff base cues as robust self-healing polymers for biomedical and tissue engineering applications: a review*. 20, 495–517. <https://doi.org/10.1007/s10311-021-01337-1>
- Sharon Baranoski, & Ayello, E. A. 2011. *Wound Care Essentials* (Maureen McKinney (ed.); Third). Lippincott Williams and Wilkin.
- Singh, R. J., Hogg, N., Joseph, J., & Kalyanaraman, B. 1996. Mechanism of nitric oxide release from S-nitrosothiols. *Journal of Biological Chemistry*, 271(31), 18596–18603. <https://doi.org/10.1074/jbc.271.31.18596>
- St. Geme, J. W., & Rempe, K. A. 2018. Classification of Bacteria. In *Principles and Practice of Pediatric Infectious Diseases*. <https://doi.org/10.1016/B978-0-323-40181-4.00114-6>
- Summerfield, A., Meurens, F., & Ricklin, M. E. 2015. The immunology of the porcine skin and its value as a model for human skin. *Molecular Immunology*, 66(1), 14–21. <https://doi.org/10.1016/j.molimm.2014.10.023>
- Talebian, S., Mehrali, M., Taebnia, N., Pablo Pennisi, C., Babu Kadumudi, F., Foroughi, J., Hasany, M., Nikkhah, M., Akbari, M., Orive, G., & Dolatshahi-Pirouz, A. 2019. *Review 1801664 (1 of 47) Self-Healing Hydrogels: The Next Paradigm Shift in Tissue Engineering?* <https://doi.org/10.1002/adv.201801664>
- Tu, Y., Chen, N., Li, C., Liu, H., Zhu, R., Chen, S., Xiao, Q., Liu, J., Ramakrishna, S., & He, L. 2019. Advances in injectable self-healing biomedical hydrogels. *Acta Biomaterialia*, 90, 1–20. <https://doi.org/10.1016/j.actbio.2019.03.057>
- Velnar, T., Bailey, T., & Smrkolj, V. 2009. The wound healing process: An overview of the cellular and molecular mechanisms. *Journal of International Medical Research*, 37(5), 1528–1542. <https://doi.org/10.1177/147323000903700531>
- Wang, F., Yuan, Q., Chen, F., Pang, J., Pan, C., Xu, F., & Chen, Y. 2021. Fundamental Mechanisms of the Cell Death Caused by Nitrosative Stress. *Frontiers in Cell and Developmental Biology*, 9(September), 1–10. <https://doi.org/10.3389/fcell.2021.742483>
- Witte, M. B., D, M., Barbul, A., & D, M. 2002. *Role of nitric oxide in wound repair*. 183, 406–412.
- Yang, Y., Qi, P., Yang, Z., & Huang, N. 2015. Nitric oxide based strategies for applications of biomedical devices. *Bio-Surface and Bio-Triology*, 1–25. <https://doi.org/10.1016/j.bsbt.2015.08.003>
- Yap, L. P., Sancheti, H., Ybanez, M. D., Garcia, J., Cadenas, E., & Han, D. 2010. Determination of GSH, GSSG, and GSNO Using HPLC with Electrochemical Detection. In *Methods in Enzymology* (1st ed., Vol. 473, Issue 10). Elsevier Inc. [https://doi.org/10.1016/S0076-6879\(10\)73006-8](https://doi.org/10.1016/S0076-6879(10)73006-8)
- Zhang, Y., & Huang, Y. 2021. *Rational Design of Smart Hydrogels for Biomedical Applications*. <https://doi.org/10.3389/fchem.2020.615665>

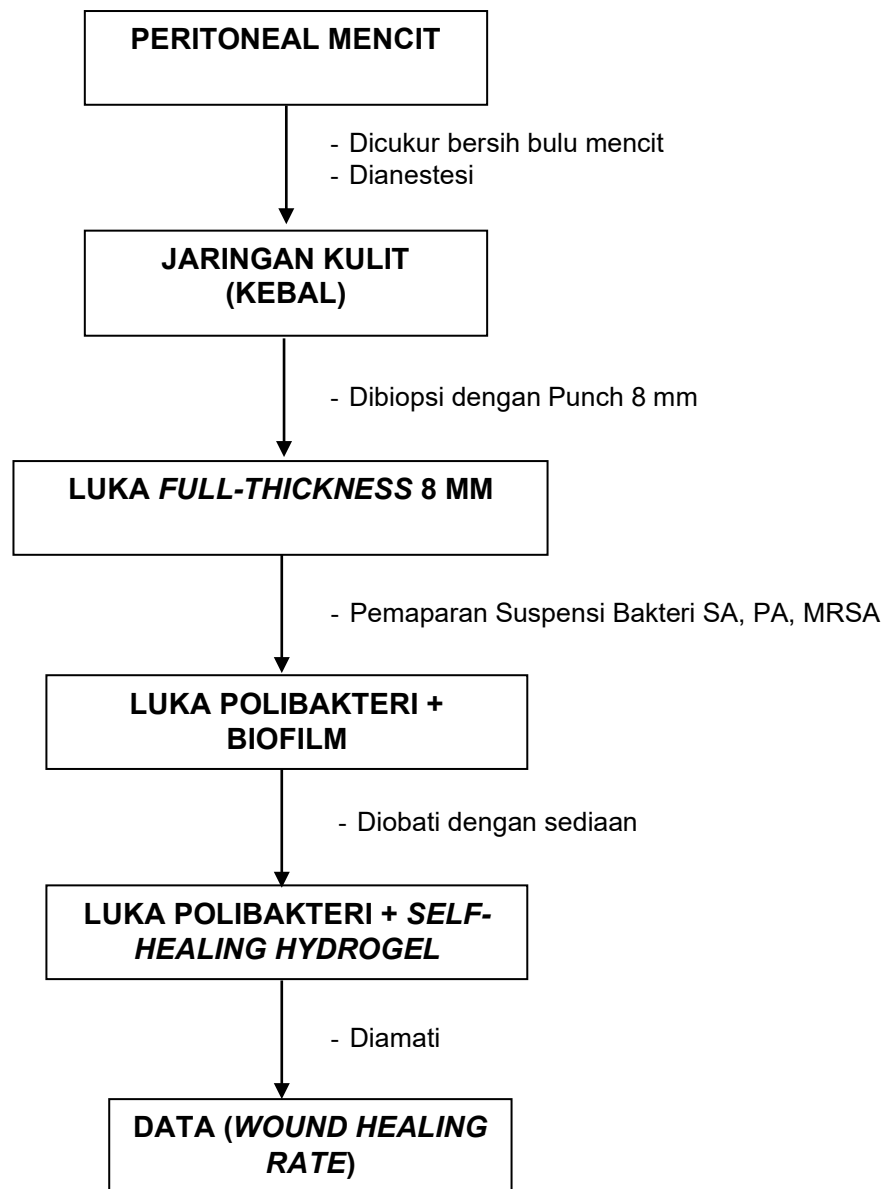
LAMPIRAN

Lampiran 1. Skema Kerja Evaluasi *In vivo*

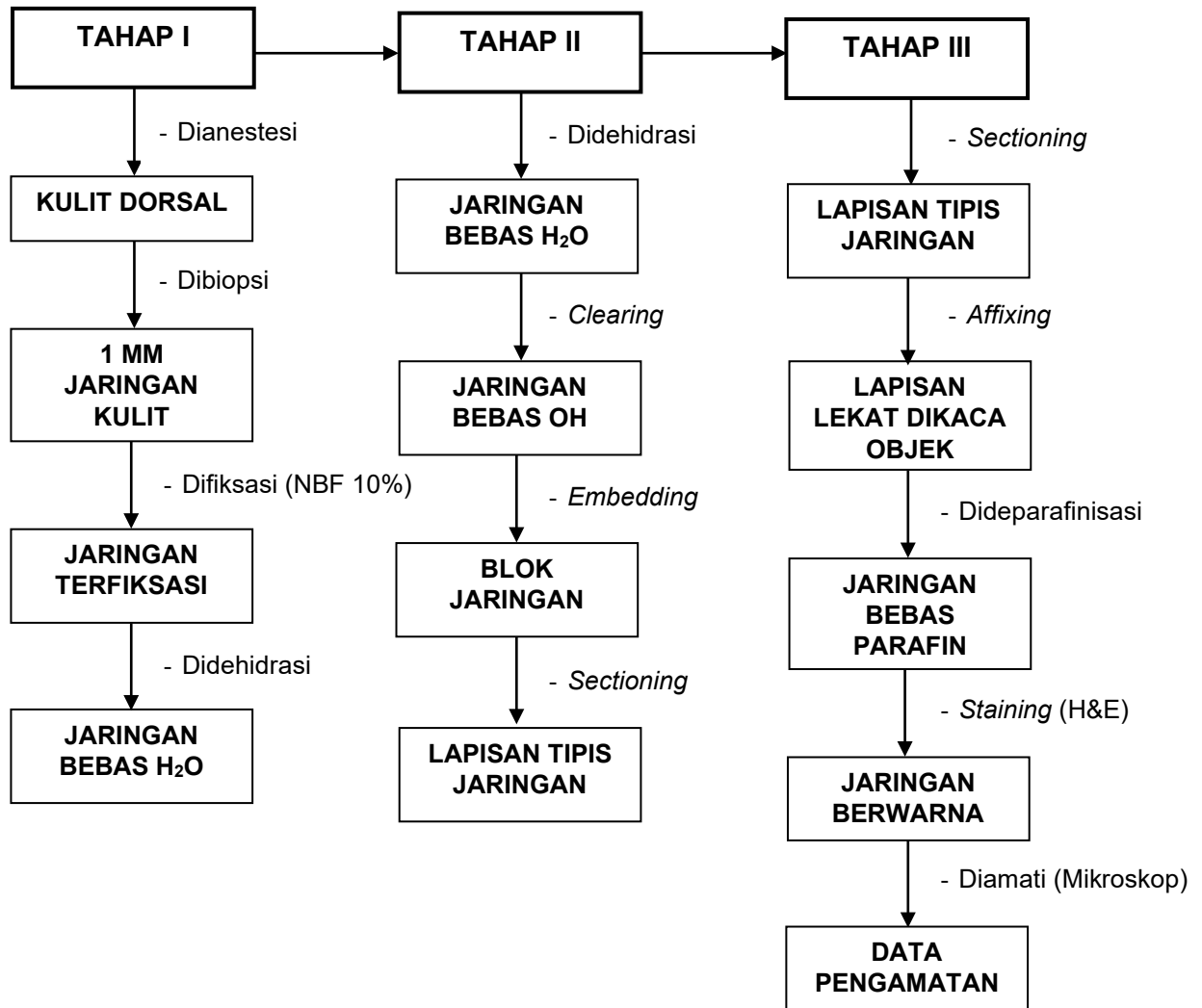
Lampiran 2. Skema Kerja Penyiapan Hewan Coba



Lampiran 3. Skema Kerja Pembentukan Biofilm

Lampiran 4. Skema Kerja Uji Aktivitas Penyembuhan Luka

Lampiran 5. Skema Kerja Pengujian Histologi



Lampiran 6. Komposisi Media

a. Tryptic Soy Agar (Oxoid®)

Komposisi	gram/liter
<i>Pancreatic digest of casein</i>	15,0
<i>Enzymatic digest of soya bean (papain)</i>	5,0
<i>Sodium chloride</i>	5,0
<i>Agar</i>	15,0
pH 7,3 ± 0,2 @ 25°C	

b. TSB/Tryptic Soy Broth (Oxoid®)

Komposisi	gram/liter
<i>Pancreatic digest of casein</i>	17,0
<i>Enzymatic digest of soya bean (papain)</i>	3,0
<i>Sodium chloride</i>	5,0
<i>Dipotassium hydrogen phosphate</i>	2,5
<i>Glucose</i>	2,5
pH 7,3 ± 0,2 @ 25°C	

c. Luria Broth (Miller®)

Komposisi	gram/liter
<i>Trptone</i>	10,0
<i>Yeast Extract</i>	5,0
<i>Sodium chloride</i>	5,0
pH 7,2 @ 25°C	

Lampiran 7. Data CFU Bacterial Burden

Data CFU Bacterial Burden (48 Jam)

K4-2 (UNTREATED)				
Replication	Dilution Factor	Volume Cultured	Number Colonies	CFU/mL Number
1	10000	0.05	125.00	25000000
2	10000	0.05	140.00	28000000
3	10000	0.05	130.00	26000000
Mean ± SD			131.666 ± 7.63762615825973	26333333.33333333 ± 1527525.23165195
K3-LE (BLANKO)				
Replication	Dilution Factor	Volume Cultured	Number Colonies	CFU/mL Number
1	10000	0.05	240	48000000
2	10000	0.05	261	52200000
3	10000	0.05	255	51000000
Mean ± SD			252 ± 10.816653826392	50400000 ± 2163330.76527839
K2-1 (GSNO)				
Replication	Dilution Factor	Volume Cultured	Number Colonies	CFU/mL Number
1	10000	0.05	304	60800000
2	10000	0.05	276	55200000
3	10000	0.05	301	60200000
Mean ± SD			293.666 ± 15.3731367434669	58733333.33333333 ± 3074627.34869339
BLANKO				
Replication	Dilution Factor	Volume Cultured	Number Colonies	CFU/mL Number
1	10000	0.05	121	24200000
2	10000	0.05	90	18000000
3	10000	0.05	103	20600000
Mean ± SD			104.666 ± 15.5670592384475	20933333.33333333 ± 3113411.8476895

Data CFU Bacterial Burden (Hari ke-7)

K4-2 (UNTREATED)				
Replication	Dilution Factor	Volume Cultured	Number Colonies	CFU/mL Number
1	1000000	0.05	289	5780000000
2	1000000	0.05	297	5940000000
3	1000000	0.05	305	6100000000
Mean ± SD			297 ± 8	5940000000 ± 160000000
K3-LE (BLANKO)				
Replication	Dilution Factor	Volume Cultured	Number Colonies	CFU/mL Number
1	100000	0.05	123	246000000
2	100000	0.05	110	220000000
3	100000	0.05	194	388000000
Mean ± SD			142.333 ± 45.2143045211726	284666666.666667 ± 90428609.0423453
K2-1 (GSNO)				
Replication	Dilution Factor	Volume Cultured	Number Colonies	CFU/mL Number
1	10000	0.05	9	1800000
2	10000	0.05	21	4200000
3	10000	0.05	17	3400000
Mean ± SD			15.6666 ± 6.11010092660779	3133333.33333333 ± 1222020.18532156

Data CFU Bacterial Burden (Hari ke-14)

K4-2 (UNTREATED)				
Replication	Dilution Factor	Volume Cultured	Number Colonies	CFU/mL Number
1	1000000	0.05	285	5700000000
2	1000000	0.05	304	6080000000
3	1000000	0.05	267	5340000000
Mean ± SD			285.333 ± 18.5022521151706	5706666666.66667 ± 370045042.303411
K3-LE (BLANKO)				
Replication	Dilution Factor	Volume Cultured	Number Colonies	CFU/mL Number
1	100000	0.05	270	540000000
2	100000	0.05	291	582000000
3	100000	0.05	266	532000000
Mean ± SD			275.666 ± 13.4288247189891	551333333.333333 ± 26857649.4379782
K2-1 (GSNO)				
Replication	Dilution Factor	Volume Cultured	Number Colonies	CFU/mL Number
1	100	0.05	14	28000
2	100	0.05	8	16000
3	100	0.05	6	12000
Mean ± SD			9.33333 ± 4.16333199893227	18666.6666666667 ± 8326.66399786453

Lampiran 8. Data Hasil Perhitungan Luas Area & Penutupan Luka

Data Kelompok *Untreated*

<i>K4 (Untreated)</i>								
<i>K4-2</i>	Day Post Injury	% Wound Area						
		d	r	Wound Circle Area	W0	Wt	% WHR	% Wound Closure
	H0	8.086	4.043	51.326	51.320	51.320	100.000	0.000
	H2	8.067	4.034	51.085	51.320	51.080	99.532	0.468
	H4	8.288	4.144	53.922	51.320	53.920	105.066	-5.066
	H6	8.596	4.298	58.005	51.320	58.000	113.016	-13.016
	H8	10.082	5.041	79.793	51.320	79.790	155.475	-55.475
	H10	13.459	6.730	142.199	51.320	142.190	277.065	-177.065
	H12	13.723	6.862	147.832	51.320	147.830	288.055	-188.055
	H14	13.868	6.934	150.972	51.320	150.970	294.174	-194.174
<i>K4-II</i>								
<i>K4-II</i>	Day Post Injury	% Wound Area						
		d	r	Wound Circle Area	W0	Wt	% WHR	% Wound Closure
	H0	8.063	4.032	51.034	51.030	51.030	100.000	0.000
	H2	8.099	4.050	51.491	51.030	51.490	100.901	-0.901
	H4	8.620	4.310	58.329	51.030	58.320	114.286	-14.286
	H6	6.683	3.342	35.060	51.030	35.060	68.705	31.295
	H8	6.594	3.297	34.132	51.030	34.130	66.882	33.118
	H10	10.804	5.402	91.630	51.030	91.630	179.561	-79.561
	H12	11.103	5.552	96.772	51.030	96.770	189.634	-89.634
	H14	12.120	6.060	115.312	51.030	115.310	225.965	-125.965
<i>K4-3</i>								
<i>K4-3</i>	Day Post Injury	% Wound Area						
		d	r	Wound Circle Area	W0	Wt	% WHR	% Wound Closure
	H0	8.045	4.023	50.807	50.800	50.800	100.000	0.000
	H2	8.086	4.043	51.326	50.800	51.320	101.024	-1.024
	H4	8.132	4.066	51.912	50.800	51.910	102.185	-2.185
	H6	8.538	4.269	57.224	50.800	57.220	112.638	-12.638
	H8	9.881	4.941	76.643	50.800	76.640	150.866	-50.866
	H10	10.807	5.404	91.681	50.800	91.680	180.472	-80.472
	H12	11.462	5.731	103.131	50.800	103.130	203.012	-103.012
	H14	12.596	6.298	124.547	50.800	124.540	245.157	-145.157

Data Kelompok PVA-B-KmK

<i>K3 (BLANKO)</i>								
<i>K3-LE</i>	Day Post Injury	% Wound Area						
		d	r	Wound Circle Area	W0	Wt	% WHR	% Wound Closure
	H0	8.082	4.041	51.275	51.270	51.270	100.000	0.000
	H2	8.609	4.305	58.180	51.270	58.180	113.478	-13.478
	H4	8.024	4.012	50.542	51.270	50.540	98.576	1.424
	H6	7.851	3.926	48.386	51.270	48.380	94.363	5.637
	H8	7.818	3.909	47.980	51.270	47.980	93.583	6.417
	H10	6.057	3.029	28.799	51.270	28.790	56.154	43.846
	H12	5.700	2.850	25.505	51.270	25.500	49.737	50.263
	H14	5.609	2.805	24.697	51.270	24.690	48.157	51.843
<i>K3-2</i>								
<i>K3-2</i>	Day Post Injury	% Wound Area						
		d	r	Wound Circle Area	W0	Wt	% WHR	% Wound Closure
	H0	8.055	4.028	50.933	50.930	50.930	100.000	0.000
	H2	8.045	4.023	50.807	50.930	50.800	99.745	0.255
	H4	8.028	4.014	50.592	50.930	50.590	99.332	0.668
	H6	7.496	3.748	44.109	50.930	44.100	86.589	13.411
	H8	6.865	3.433	36.996	50.930	36.990	72.629	27.371
	H10	4.673	2.337	17.142	50.930	17.140	33.654	66.346
	H12	4.536	2.268	16.152	50.930	16.150	31.710	68.290
	H14	4.407	2.204	15.246	50.930	15.240	29.923	70.077
<i>K3-3</i>								
<i>K3-3</i>	Day Post Injury	% Wound Area						
		d	r	Wound Circle Area	W0	Wt	% WHR	% Wound Closure
	H0	8.079	4.040	51.237	51.230	51.230	100.000	0.000
	H2	8.040	4.020	50.744	51.230	50.740	99.044	0.956
	H4	7.914	3.957	49.166	51.230	49.160	95.959	4.041
	H6	7.662	3.831	46.084	51.230	46.080	89.947	10.053
	H8	7.283	3.642	41.638	51.230	41.630	81.261	18.739
	H10	7.206	3.603	40.762	51.230	40.760	79.563	20.437
	H12	6.750	3.375	35.767	51.230	35.760	69.803	30.197
	H14	6.487	3.244	33.034	51.230	33.030	64.474	35.526

Lampiran 8. Data Hasil Perhitungan Luas Area & Penutupan Luka

Data Kelompok PVA-B-KmK/GSNO

<i>K2 (GSNO)</i>								
<i>K2-1</i>								
Day Post Injury	% Wound Area							
	d	r	Wound Circle Area	W0	Wt	% WHR	% Wound Closure	
H0	8.024	4.012	50.542	50.542	50.542	100.000	0.000	
H2	7.920	3.960	49.240	50.542	49.391	97.723	2.277	
H4	7.890	3.945	48.868	50.542	48.990	96.929	3.071	
H6	6.190	3.095	30.078	50.542	30.170	59.693	40.307	
H8	4.390	2.195	15.129	50.542	15.190	30.054	69.946	
H10	4.190	2.095	13.782	50.542	13.840	27.383	72.617	
H12	3.390	1.695	9.021	50.542	9.070	17.946	82.054	
H14	0.950	0.475	0.708	50.542	0.723	1.430	98.570	
<i>K2-2</i>								
Day Post Injury	% Wound Area							
	d	r	Wound Circle Area	W0	Wt	% WHR	% Wound Closure	
H0	8.061	4.031	51.009	51.000	51.000	100.000	0.000	
H2	8.017	4.009	50.454	51.000	50.450	98.922	1.078	
H4	7.851	3.926	48.386	51.000	48.380	94.863	5.137	
H6	7.243	3.622	41.182	51.000	41.180	80.745	19.255	
H8	6.255	3.128	30.713	51.000	30.710	60.216	39.784	
H10	5.162	2.581	20.917	51.000	20.910	41.000	59.000	
H12	4.111	2.056	13.267	51.000	13.260	26.000	74.000	
H14	2.506	1.253	4.930	51.000	4.920	9.647	90.353	
<i>K2-LE</i>								
Day Post Injury	% Wound Area							
	d	r	Wound Circle Area	W0	Wt	% WHR	% Wound Closure	
H0	8.093	4.047	51.415	51.410	51.410	100.000	0.000	
H2	8.043	4.022	50.782	51.410	50.780	98.775	1.225	
H4	7.355	3.678	42.465	51.410	42.460	82.591	17.409	
H6	7.204	3.602	40.740	51.410	40.730	79.226	20.774	
H8	6.200	3.100	30.175	51.410	30.170	58.685	41.315	
H10	5.602	2.801	24.635	51.410	24.630	47.909	52.091	
H12	3.356	1.678	8.841	51.410	8.840	17.195	82.805	
H14	1.700	0.850	2.269	51.410	2.260	4.396	95.604	

Lampiran 9. Analisis Statistik *Bacterial burden*

Tests of Normality

KLP. PERLAKUAN	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CFU						
Kelompok Kontrol	.253	3	.	.964	3	.637
Kelompok PVA-B-KmK	.204	3	.	.993	3	.843
Kelompok PVA-B-KmK/GSNO	.350	3	.	.829	3	.187

a. Lilliefors Significance Correction

Descriptives

CFU

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Kelompok Kontrol	3	2633333333.3	152752523.17	88191710.369	2253875030.0	3012791636.7	2.50E+9	2.80E+9
Kelompok PVA-B-KmK	3	5020000000.0	210713075.06	121855250.61	4496559703.9	5543440296.1	4.80E+9	5.22E+9
Kelompok PVA-B-KmK/GSNO	3	5873333333.3	307462734.87	177513692.74	5109553558.7	6637113108.0	5.52E+9	6.08E+9
Total	9	4508888888.9	1468268065.1	489422688.38	3380278145.6	5637499632.2	2.50E+9	6.08E+9

Tests of Homogeneity of Variances

CFU		Levene Statistic	df1	df2	Sig.
	Based on Median	.169	2	6	.848
	Based on Median and with adjusted df	.169	2	3.400	.851
	Based on trimmed mean	1.162	2	6	.374

ANOVA

CFU

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.892E+19	2	8.461E+18	156.427	<.001
Within Groups	3.245E+17	6	5.409E+16		
Total	1.725E+19	8			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: CFU

LSD

(I) KLP. PERLAKUAN	(J) KLP. PERLAKUAN	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Kelompok Kontrol	Kelompok PVA-B-KmK	-2386666667*	189892757.26	<.001	-2851317505	-1922015828
	Kelompok PVA-B-KmK/GSNO	-3240000000*	189892757.26	<.001	-3704650838	-2775349162
Kelompok PVA-B-KmK	Kelompok Kontrol	2386666667*	189892757.26	<.001	1922015828.5	2851317504.8
	Kelompok PVA-B-KmK/GSNO	-853333333.3*	189892757.26	.004	-1317984172	-388682495.2
Kelompok PVA-B-KmK/GSNO	Kelompok Kontrol	3240000000*	189892757.26	<.001	2775349161.8	3704650838.2
	Kelompok PVA-B-KmK	853333333.3*	189892757.26	.004	388682495.15	1317984171.5

*. The mean difference is significant at the 0.05 level.

Tests of Normality

KLP. PERLAKUAN	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CFU						
Kelompok Kontrol	.175	3	.	1.000	3	1.000
PVA-B-KmK	.332	3	.	.863	3	.276
PVA-B-KmK/GSNO	.253	3	.	.964	3	.637

a. Lilliefors Significance Correction

Descriptives

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean			
					Lower Bound	Upper Bound	Minimum	Maximum
Kelompok Kontrol	3	5.9400E+11	16000000000	9237604307.0	5.5425E+11	6.3375E+11	5.78E+11	6.10E+11
PVA-B-KmK	3	28466666667	9042860904.2	5220898177.3	6002954872.3	50930378461	2.20E+10	3.88E+10
PVA-B-KmK/GSNO	3	313333333.33	122202018.53	70553368.295	9766690.6456	616899976.02	1.80E+8	4.20E+8
Total	9	2.0759E+11	2.90207E+11	96735607313	-15479377152	4.3067E+11	1.80E+8	6.10E+11

Tests of Homogeneity of Variances

CFU		Levene Statistic	df1	df2	Sig.
	Based on Median	1.771	2	6	.249
	Based on Median and with adjusted df	1.771	2	3.850	.285
	Based on trimmed mean	2.647	2	6	.150

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.731E+23	2	3.365E+23	2988.933	<.001
Within Groups	6.756E+20	6	1.126E+20		
Total	6.738E+23	8			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: CFU
LSD

(I) KLP. PERLAKUAN	(J) KLP. PERLAKUAN	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Kelompok Kontrol	PVA-B-KmK	5.65533E+11*	8663951711.5	<.001	5.4433E+11	5.8673E+11
	PVA-B-KmK/GSNO	5.93687E+11*	8663951711.5	<.001	5.7249E+11	6.1489E+11
PVA-B-KmK	Kelompok Kontrol	-5.65533E+11*	8663951711.5	<.001	-5.8673E+11	-5.4433E+11
	PVA-B-KmK/GSNO	28153333333*	8663951711.5	.017	6953407212.7	49353259454
PVA-B-KmK/GSNO	Kelompok Kontrol	-5.93687E+11*	8663951711.5	<.001	-6.1489E+11	-5.7249E+11
	PVA-B-KmK	-2.81533E+10*	8663951711.5	.017	-49353259454	-6953407213

*. The mean difference is significant at the 0.05 level.

Tests of Normality

KLP. PERLAKUAN	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CFU						
Kelompok Kontrol	.177	3	.	1.000	3	.970
PVA-B-KmK	.330	3	.	.866	3	.286
PVA-B-KmK	.292	3	.	.923	3	.463

a. Lilliefors Significance Correction

Descriptives

CFU

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Kelompok Kontrol	3	5.7067E+11	37004504230	21364560479	4.7874E+11	6.6259E+11	5.34E+11	6.08E+11
PVA-B-KmK	3	55133333333	2685764943.8	1550627113.3	48461523352	61805143315	5.32E+10	5.82E+10
PVA-B-KmK	3	1866666.6667	832666.39979	480740.17006	-201791.3384	3935124.6717	1.20E+6	2.80E+6
Total	9	2.0860E+11	2.73227E+11	91075785269	-1420515224	4.1862E+11	1.20E+6	6.08E+11

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
CFU	Based on Mean	3.895	2	6	.082
	Based on Median	3.699	2	6	.090
	Based on Median and with adjusted df	3.699	2	2.043	.209
	Based on trimmed mean	3.885	2	6	.083

ANOVA

CFU

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.945E+23	2	2.972E+23	647.787	<.001
Within Groups	2.753E+21	6	4.588E+20		
Total	5.972E+23	8			

Post Hoc Tests**Multiple Comparisons**

Dependent Variable: CFU

LSD

(I) KLP. PERLAKUAN	(J) KLP. PERLAKUAN	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Kelompok Kontrol	PVA-B-KmK	5.15533E+11*	17489975969	<.001	4.7274E+11	5.5833E+11
	PVA-B-KmK	5.70665E+11*	17489975969	<.001	5.2787E+11	6.1346E+11
PVA-B-KmK	Kelompok Kontrol	-5.15533E+11*	17489975969	<.001	-5.5833E+11	-4.7274E+11
	PVA-B-KmK	55131466667*	17489975969	.020	12335037191	97927896143
PVA-B-KmK	Kelompok Kontrol	-5.70665E+11*	17489975969	<.001	-6.1346E+11	-5.2787E+11
	PVA-B-KmK	-5.51315E+10*	17489975969	.020	-97927896143	-12335037191

*. The mean difference is significant at the 0.05 level.

Lampiran 10. Analisis Statistik Luas Area Luka

Tests of Normality

KELOMPOK PERLAKUAN	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
% LUAS AREA LUKA Untreated	.278	3	.	.940	3	.528
PVA-B-KmK	.181	3	.	.999	3	.939
PVA-B-KmK/GSNO	.245	3	.	.971	3	.672

a. Lilliefors Significance Correction

Oneway

Tests of Homogeneity of Variances

% LUAS AREA LUKA		Levene Statistic			
		Statistic	df1	df2	Sig.
% LUAS AREA LUKA	Based on Mean	3.861	2	6	.084
	Based on Median	1.260	2	6	.349
	Based on Median and with adjusted df	1.260	2	2.694	.411
	Based on trimmed mean	3.625	2	6	.093

ANOVA

% LUAS AREA LUKA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	107371.369	2	53685.685	103.681	<.001
Within Groups	3106.785	6	517.798		
Total	110478.154	8			

Tests of Normality

Kelompok Perlakuan	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Closure Untreated	.278	3	.	.940	3	.528
PVA-B-KmK	.181	3	.	.999	3	.939
PVA-B-KmK/GSNO	.239	3	.	.975	3	.695

a. Lilliefors Significance Correction

→ Oneway

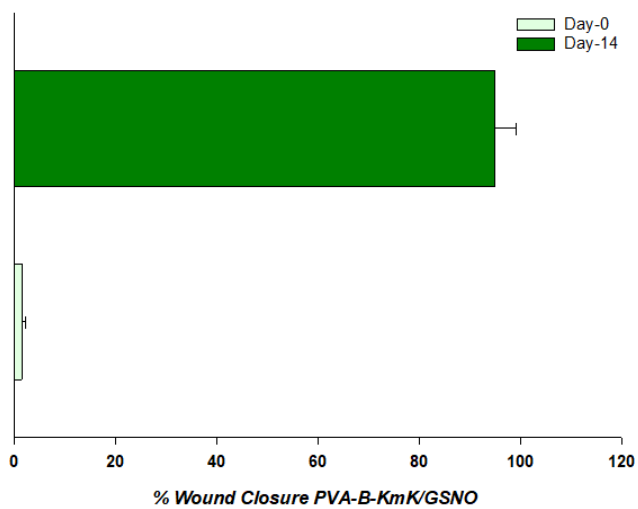
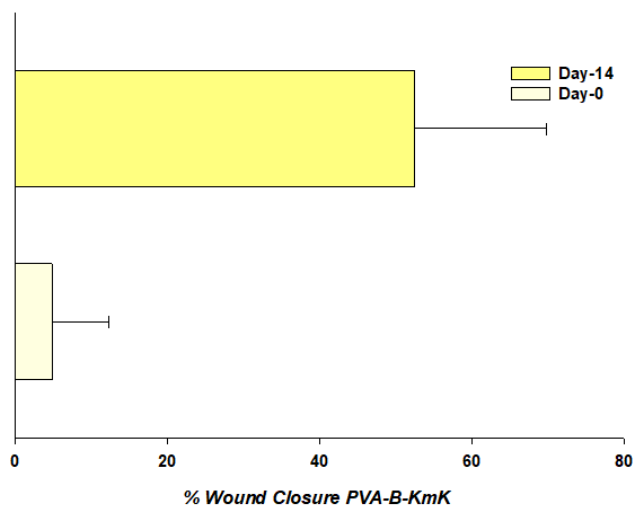
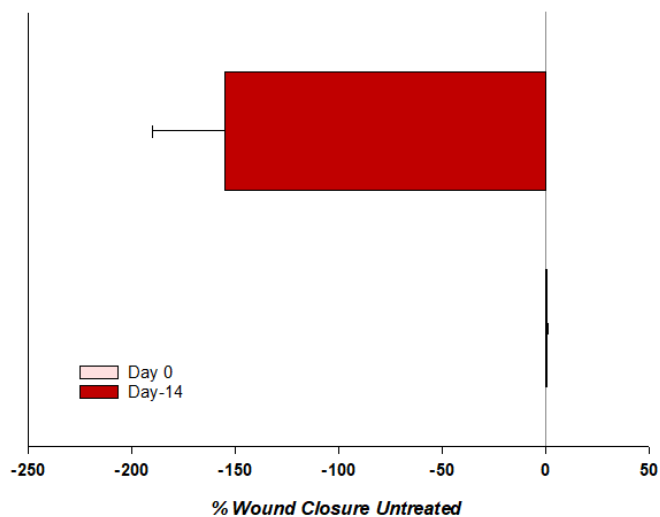
Tests of Homogeneity of Variances

Closure		Levene Statistic			
		Statistic	df1	df2	Sig.
Closure	Based on Mean	3.866	2	6	.083
	Based on Median	1.261	2	6	.349
	Based on Median and with adjusted df	1.261	2	2.692	.411
	Based on trimmed mean	3.629	2	6	.093

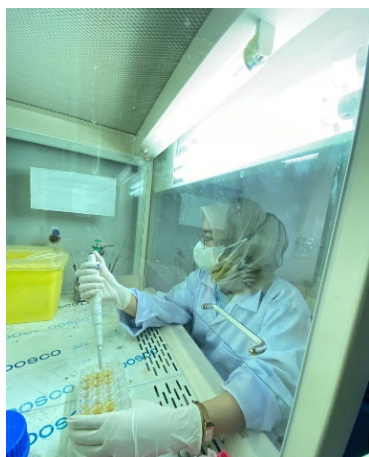
ANOVA

Closure

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	15955.416	2	7977.708	15.408	.004
Within Groups	3106.642	6	517.774		
Total	19062.058	8			

Lampiran 11. Grafik % Penyembuhan Luka Tiap Kelompok (Hari 2 & 12)

Lampiran 12. Dokumentasi Penelitian



Lampiran 13. Surat Persetujuan Kode Etik Penelitian



KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET DAN TEKNOLOGI
UNIVERSITAS HASANUDDIN FAKULTAS KEDOKTERAN
KOMITE ETIK PENELITIAN UNIVERSITAS HASANUDDIN
RSPTN UNIVERSITAS HASANUDDIN
RSUP Dr. WAHIDIN SUDIROHUSODO MAKASSAR
Sekretariat : Lantai 2 Gedung Laboratorium Terpadu
JL.PERINTIS KEMERDEKAAN KAMPUS TAMALANREA KM.10 MAKASSAR 90245.



Contact Person: dr. Agussalim Bukhari, MMed,PhD, SpGK TELP. 081241850858, 0411 5780103, Fax : 0411-581431

REKOMENDASI PERSETUJUAN ETIK

Nomor : 366/UN4.6.4.5.31/ PP36/ 2023

Tanggal: 9 Juni 2023

Dengan ini Menyatakan bahwa Protokol dan Dokumen yang Berhubungan Dengan Protokol berikut ini telah mendapatkan Persetujuan Etik :

No Protokol	UH23050339	No Sponsor	
Peneliti Utama	Nur Alifah, S.Farm	Sponsor	
Judul Peneliti	Uji Aktivitas In Vivo Pembalut Luka Yang Melepaskan S-Nitrosogluthatione Dari Self-Healing Hydrogel Polivinil Alkohol/Boraks Yang Diperkuat N-Carboxymethyl Chitosan Terhadap Luka Terinfeksi Polibakteri		
No Versi Protokol	2	Tanggal Versi	8 Juni 2023
No Versi PSP		Tanggal Versi	
Tempat Penelitian	Laboratorium PA RSUH dan Laboratorium Fakultas Farmasi Universitas Hasanuddin Makassar		
Jenis Review	<input type="checkbox"/> Exempted <input checked="" type="checkbox"/> Expedited <input type="checkbox"/> Fullboard Tanggal	Masa Berlaku 9 Juni 2023 sampai 9 Juni 2024	Frekuensi review lanjutan
Ketua KEP Universitas Hasanuddin	Nama Prof.Dr.dr. Suryani As'ad, M.Sc.,Sp.GK (K)	Tanda tangan	
Sekretaris KEP Universitas Hasanuddin	Nama dr. Agussalim Bukhari, M.Med.,Ph.D.,Sp.GK (K)	Tanda tangan	

Kewajiban Peneliti Utama:

- Menyerahkan Amandemen Protokol untuk persetujuan sebelum di implementasikan
- Menyerahkan Laporan SAE ke Komisi Etik dalam 24 Jam dan dilengkapi dalam 7 hari dan Laporan SUSAR dalam 72 Jam setelah Peneliti Utama menerima laporan
- Menyerahkan Laporan Kemajuan (progress report) setiap 6 bulan untuk penelitian resiko tinggi dan setiap setahun untuk penelitian resiko rendah
- Menyerahkan laporan akhir setelah Penelitian berakhir
- Melaporkan penyimpangan dari prokol yang disetujui (protocol deviation / violation)
- Mematuhi semua peraturan yang ditentukan

Lampiran 14. Sertifikat Pelatihan Etik Dasar Penelitian



The certificate features a background with a hexagonal pattern and a central emblem of a Garuda. At the top left are three logos: the Indonesian national emblem, a red and green circular logo, and a blue and red logo. A QR code is located in the top right corner.

SERTIFIKAT
DIBERIKAN KEPADA:
Nur Alifah
LULUS
PADA PELATIHAN ETIK DASAR PENELITIAN DAN GCP (GOOD CLINICAL PRACTICE)
Fakultas Kedokteran Universitas Hasanuddin
Makassar, 29-30 Desember 2022

Two official seals of Universitas Hasanuddin are present, each with a handwritten signature. The seal on the left is for the Dean, and the seal on the right is for the Chair of the Ethics Committee.

Prof. dr. Haerani Rasyid, M.Kes, Sp.PD-KGH, Sp.GK
Dekan Fakultas Kedokteran Universitas Hasanuddin

Prof. Dr. dr. Suryani As'ad, M.Sc., Sp.GK(K)
Ketua KEP FKUH, RSUH dan
RSUP dr. Wahidin Sudirohusodo

Lampiran 15. Daftar Riwayat Hidup

A. Data Pribadi

1. Nama : NUR ALIFAH
2. Tempat, Tgl. Lahir : Ujung Pandang, 19 Juni 1996
3. Alamat : JL. KR. Bontotangnga No. 30 Makassar
4. Kewarganegaraan : Warga Negara Indonesia

B. Riwayat Pendidikan

1. Diploma (D3) tahun 2017 di Poltekkes Kemenkes Makassar
2. Sarjana (S1) tahun 2019 di STIFA Makassar
3. Magister (S2) tahun 2024 di Universitas Hasanuddin Makassar

C. Pekerjaan dan Riwayat Pekerjaan

1. Jenis Pekerjaan : Pegawai Swasta
2. NIP : -
3. Pangkat/Jabatan :

D. Karya ilmiah yang telah dipublikasikan (misalnya pada jurnal) :

E. Makalah pada Seminar/Konferensi Ilmiah Nasional dan Internasional