

DAFTAR PUSTAKA

- Abdalla, A.M.E., Xiao, L., Ullah, M.W., Yu, M., Ouyang, C., Yang, G., 2018. *Current challenges of cancer anti-angiogenic therapy and the promise of nanotherapeutics*. *Theranostics* 8(2), 533–548. doi:10.7150/thno.21674
- Abdolmaleki, Z., Arab, H.A., Amanpour, S., Muhammadnejad, S., 2016. *Anti-angiogenic effects of ethanolic extract of Artemisia sieberi compared to its active substance, artemisinin*. *Rev. Bras. Farmacogn.* 26(3):326-333, doi.org/10.1016/j.bjp.2015.11.008
- Bisht, M., Dhasmana, D.C., Bist, S.S., 2010. *Angiogenesis: Future of pharmacological modulation*. *Indian J. Pharmacol.* 42, 2–8.
- Chaudhary, H.S., Soni, B., Shrivastava, A.R., Shrivastava, S., 2013. *Diversity and versatility of actinomycetes and its role in antibiotic production*. *J. Appl. Pharm. Sci.* 3(8) : 83-94, DOI: 10.7324/JAPS.2013.38.S14
- Davies-Bolorunduro, O.F., Adeleye, I.A., Akinleye, M.O., Wang, P.G., 2019. *Anticancer potential of metabolic compounds from marine actinomycetes isolated from Lagos Lagoon sediment*. *J. Pharm. Anal.* 9(3), 201-208. <https://doi.org/10.1016/j.jpha.2019.03.004>
- Dhanasekaran, D., & Jiang, Y. *Actino Bacteria Basics and Biotechnological Applications*. Intech Open
- Esser, J.S., Rahner, S., Deckler, M., Bode, C., Patterson, C., Moser, M., 2015. *Fibroblast Growth Factor Signaling Pathway in Endothelial Cells is Activated by Bmper to Promote Angiogenesis*. *Arterioscler. Thromb. Vasc. Biol.* 35, 358–367. <https://doi.org/10.1161/ATVBAHA.114.304345>
- Hanahan, D. & Weinberg, R.A. 2000. *The hallmarks of cancer*. *Cell*, 100(1):57-70. [https://doi.org/10.1016/s0092-8674\(00\)81683-9](https://doi.org/10.1016/s0092-8674(00)81683-9)
- Jeong, S.J., Koh, W., Lee, E.O., Lee, Hyo Jung, Lee, Hyo Jeong, Bae, H., Lü, J., Kim, S.H., (2011). *Antiangiogenic phytochemicals and medicinal herbs. phytotherapy research* : PTR 25(1), 1-10. <https://doi.org/10.1002/ptr.3224>
- Jeltsch, M., Leppa, V., 2016. *Receptor Tyrosine Kinase-Mediated* 1–22.
- Jones, A.C., Blum, J.E., & Pawlik, J.R. 2005. *Testing for Defensive Synergy in Caribbean Sponges: Bad Taste or Glass Spicules* J.

- Exp. Mar. Biol. Ecol., 322 : 67-81.
- Kane, S.N., Mishra, A., Dutta, A.K., 2016. *Preface: International Conference on Recent Trends in Physics (ICRTP 2016)*. J. Phys. Conf. Ser. 755, 1–12.
- Kumala, T., Jayuska, A., Ardinarsih, P. 2015. *Uji aktivitas antibakteri isolat actinomycetes 9ISP1 dari spons asal perairan Pulau Randayan*. JKK, 4(2) : 30-36, ISSN 2303-1077
- Moreno-Jiménez, I., Hulsart-Billstrom, G., Lanham, S.A., Janeczek, A.A., Kontouli, N., Kanczler, J.M., Evans, N.D., Oreffo, R.O.C., 2016. *The chorioallantoic membrane (CAM) assay for the study of human bone regeneration: A refinement animal model for tissue engineering*. Scientific reports, 6,32168. <https://doi.org/10.1038/srep32168>
- Mustafida, R.Y., Al-Munawir, Dewi, R. 2014. *Efek Antiangiogenik Ekstrak Etanol Buah Mahkota Dewa (Phaleria macrocarpa (Scheff. Boerl.) pada Membran Korio Alontois (CAM) Embrio Ayam*. *Junal Pustaka Kesehatan* 2(1):1-5.
- Nathan, J., Kannan, R.R., 2020. *Antiangiogenic molecules from marine actinomycetes and the importance of using zebrafish model in cancer research*. *Heliyon* 6, e05662.
- Parsons-Wingenter, P., Elliott, K.E., Clark, J.I., Farr, A.G., 2000. *Fibroblast growth factor-2 selectively stimulates angiogenesis of small vessels in arterial tree*. *Arterioscler. Thromb. Vasc. Biol.* 20, 1250–1256.
- Rambabu, V., Suba, S., Vijayakumar, S., 2015. *Antimicrobial and antiproliferative prospective of kosinostatin - A secondary metabolite isolated from Streptomyces sp.* *J. Pharm. Anal.* 5(6), 378-382. <https://doi.org/10.1016/j.jpha.2014.11.002>
- Rante, H., Alam, G, Usmar, & Wahid, S N.A.A. 2020. *Isolasi actinomycetes simbion sponge pulau barrang caddi makassar sebagai penghasil senyawa antimikroba*. *Majalah Farmasi dan Farmakologi*, 24(1), 25-28. <https://doi.org/10.20956/mff.v24i1.8572>
- Ribatti, D., 2010. *The chick embryo chorioallantoic membrane as an in vivo assay to study antiangiogenesis*. *Pharmaceuticals* 3, 482–513.
- Risdian, C., Mozef, T., Wink, J., 2019. *Biosynthesis of polyketides in Streptomyces*. *Microorganisms* 7(5), 124. <https://doi.org/10.3390/microorganisms7050124>
- Ruddon, R.W., 2007. *Cancer biology*. 4th ed. Oxford University Press
- Rusdiana, I.A., Hambali, E., Rahayuningsih, M., 2018. *Pengaruh Sonikasi*

Terhadap Sifat Fisik Formula Herbisida yang Ditambahkan Surfaktan Dietanolamida. Agroradix J. Ilmu Peneliti. 1, 34–41.

Sardjono, C., Sandra, F., 2009. *Angiogenesis: Patofisiologi dan Aplikasi Klinis. J. Kedokt. Maranatha 8, 174–187.*

Sharah, A.,Karnila,R.,Desmelati.2015. *The manufacture of lactic acid bacteria growth curve in the isolation of kembung (Rastrelliger sp) peda.Jurnal Online Mahasiswa, 2(2). ISSN:2355-6900*

Salamah, N., Sugiyanto, Hartati, M.S., dan Hayati, F.2010. *Antiangiogenic activity of methanolic extract from akar pasak bumi (Eurycoma longifolia, Jack) on chorioallantoic membrane of chicken embryo induced by bFGF. Majalah Obat Tradisional, 15(1), 1-7*

Sulistiyani, N. dan Narwanti, I. 2017. *Aktivitas Cairan Kultur Bakteri Penghasil Antibiotik (Isolat P301) terhadap Staphylococcus aureus ATCC 25923 dan Optimasi Waktu Produksi Metabolit Sekunder. Jurnal Ilmu Kefarmasian, 13(2): ISSN 2614-6495*

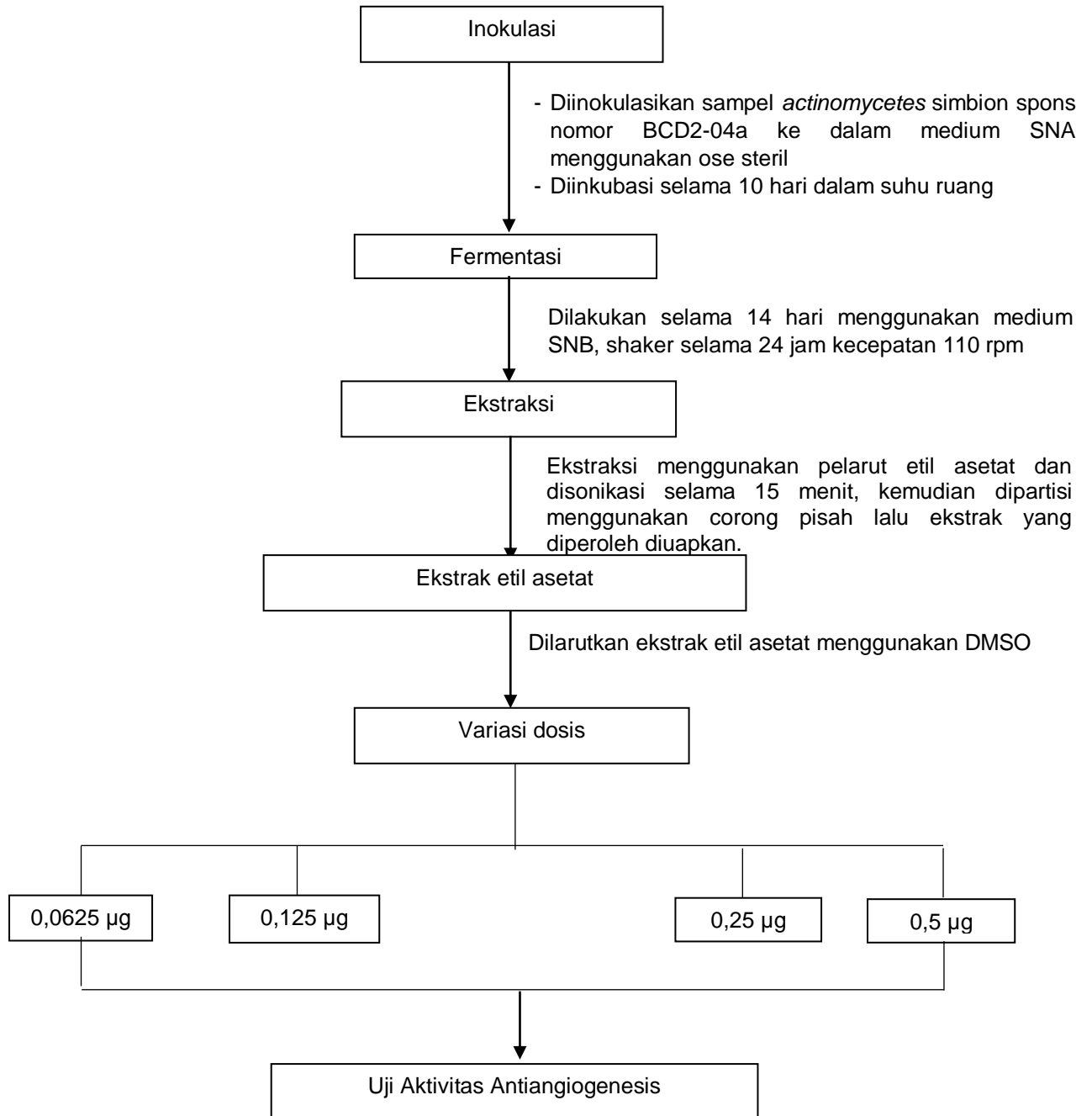
Van Soest, R.W.M., Boury-Esnault, N., Vacelet, J., Dohrmann, M., Erpenbeck, D., de Voogd, N.J., Santodomingo, N., Vanhoorne, B., Kelly, M., Hooper, J.N.A., 2012. *Global diversity of sponges (Porifera). PLoS ONE 7(4): e35105.https://doi.org/10.1371/journal.pone.0035105*

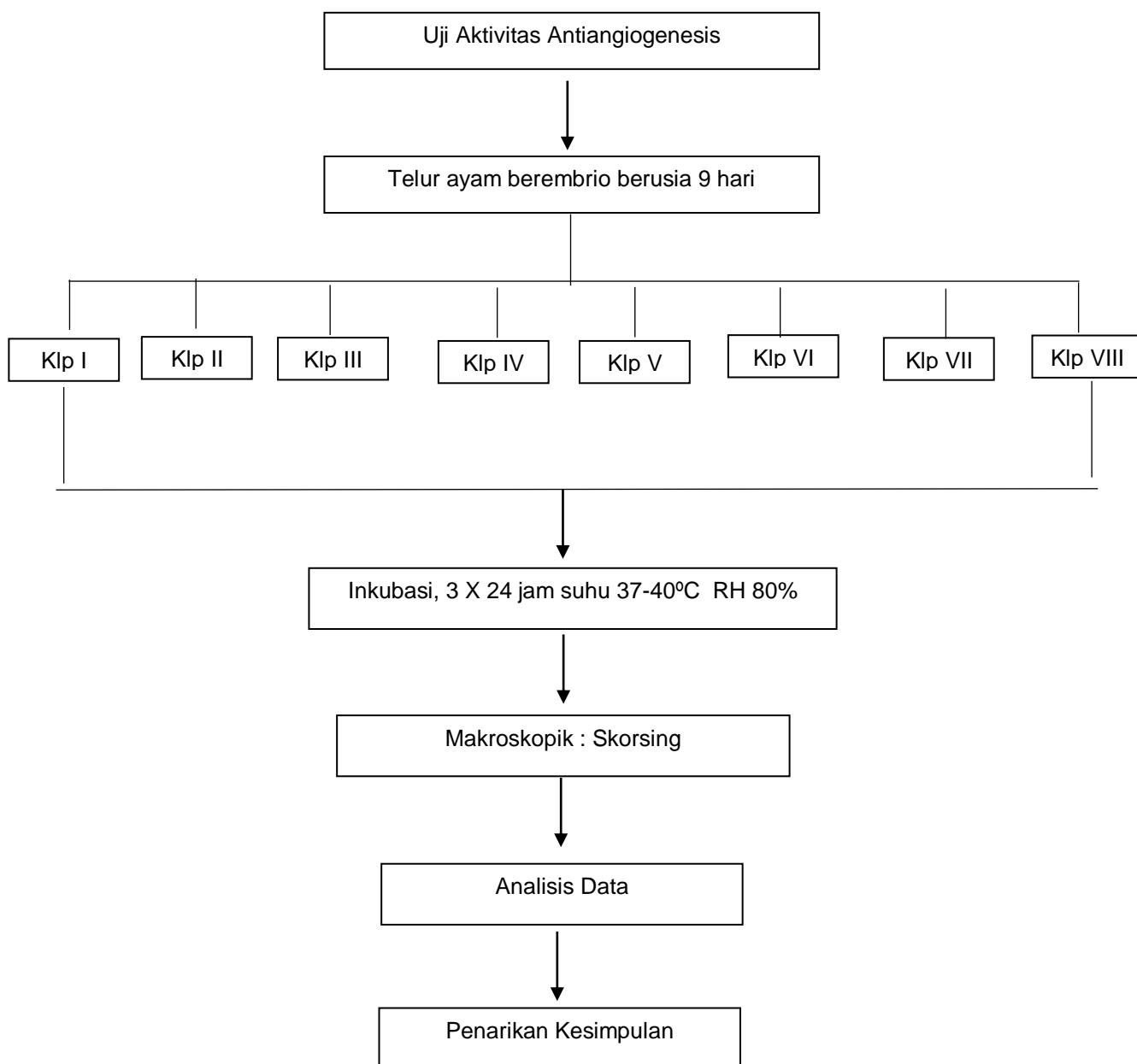
Ward, A.C., Bora, N., 2015. *The actinobacteria, Practical Handbook of Microbiology, Third Edition.*

Weidner,W.,Schiefer,H.G.,Jantos,C.,Krauss,H.,Friedrich,H.J&Altmannberger,M.1991. *Chronic prostatitis: A Thourgh search for etiologically involved microorganisms in 1,461 patiens. Infection 19, S199-S125,https://doi.org/10.1007/BF0164368*

LAMPIRAN I

SKEMA KERJA





Keterangan :

- Klp I : Kontrol negatif
- Klp II : Kontrol bFGF 10 ng
- Klp III : Kontrol DMSO
- Klp IV : Kontrol bFGF 10 ng + DMSO 10 μ L
- Klp V : bFGF 10 ng + 0,0625 μ g ekstrak uji
- Klp VI : bFGF 10 ng + 0,125 μ g ekstrak uji
- Klp VII : bFGF 10 ng + 0,25 μ g ekstrak uji
- Klp VIII : bFGF 10 ng + 0,5 μ g ekstrak uji

Lampiran 2

Analisis Statistik Respon Angiogenesis dari pemberian metabolit sekunder Bakteri Actinomyces Symbion Spons

ANOVA

JumlahPembuluhDarah

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	386.278	5	77.256	66.219	.000
Within Groups	14.000	12	1.167		
Total	400.278	17			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: JumlahPembuluhDarah

Tukey HSD

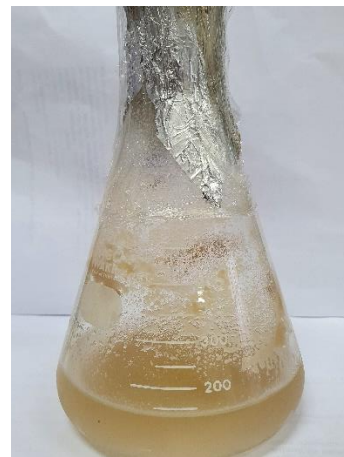
(I) Perlakuan	(J) Perlakuan	Mean Difference (I- J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
bFGF	bFGF+DMSO	1.000	.882	.858	-1.96	3.96
	bFGF+0,5 ug ekstrak uji	12.333 [*]	.882	.000	9.37	15.30
	bFGF+0.25 ug ekstrak uji	10.000 [*]	.882	.000	7.04	12.96
	bFGF+0.125 ug ekstrak uji	9.333 [*]	.882	.000	6.37	12.30
	bFGF+0.0625 ug ekstrak uji	5.000 [*]	.882	.001	2.04	7.96
bFGF+DMSO	bFGF	-1.000	.882	.858	-3.96	1.96
	bFGF+0,5 ug ekstrak uji	11.333 [*]	.882	.000	8.37	14.30
	bFGF+0.25 ug ekstrak uji	9.000 [*]	.882	.000	6.04	11.96
	bFGF+0.125 ug ekstrak uji	8.333 [*]	.882	.000	5.37	11.30

	bFGF+0.0625 ug ekstrak uji	4.000 [*]	.882	.007	1.04	6.96
bFGF+0,5 ug ekstrak uji	bFGF	-12.333 [*]	.882	.000	-15.30	-9.37
	bFGF+DMSO	-11.333 [*]	.882	.000	-14.30	-8.37
	bFGF+0.25 ug ekstrak uji	-2.333	.882	.159	-5.30	.63
	bFGF+0.125 ug ekstrak uji	-3.000 [*]	.882	.047	-5.96	-.04
	bFGF+0.0625 ug ekstrak uji	-7.333 [*]	.882	.000	-10.30	-4.37
bFGF+0.25 ug ekstrak uji	bFGF	-10.000 [*]	.882	.000	-12.96	-7.04
	bFGF+DMSO	-9.000 [*]	.882	.000	-11.96	-6.04
	bFGF+0,5 ug ekstrak uji	2.333	.882	.159	-.63	5.30
	bFGF+0.125 ug ekstrak uji	-.667	.882	.970	-3.63	2.30
	bFGF+0.0625 ug ekstrak uji	-5.000 [*]	.882	.001	-7.96	-2.04
bFGF+0.125 ug ekstrak uji	bFGF	-9.333 [*]	.882	.000	-12.30	-6.37
	bFGF+DMSO	-8.333 [*]	.882	.000	-11.30	-5.37
	bFGF+0,5 ug ekstrak uji	3.000 [*]	.882	.047	.04	5.96
	bFGF+0.25 ug ekstrak uji	.667	.882	.970	-2.30	3.63
	bFGF+0.0625 ug ekstrak uji	-4.333 [*]	.882	.004	-7.30	-1.37
bFGF+0.0625 ug ekstrak uji	bFGF	-5.000 [*]	.882	.001	-7.96	-2.04
	bFGF+DMSO	-4.000 [*]	.882	.007	-6.96	-1.04
	bFGF+0,5 ug ekstrak uji	7.333 [*]	.882	.000	4.37	10.30
	bFGF+0.25 ug ekstrak uji	5.000 [*]	.882	.001	2.04	7.96
	bFGF+0.125 ug ekstrak uji	4.333 [*]	.882	.004	1.37	7.30

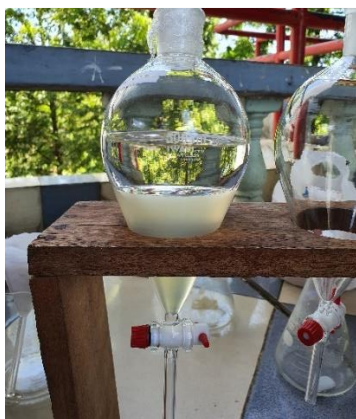
Lampiran 3
Dokumentasi Penelitian



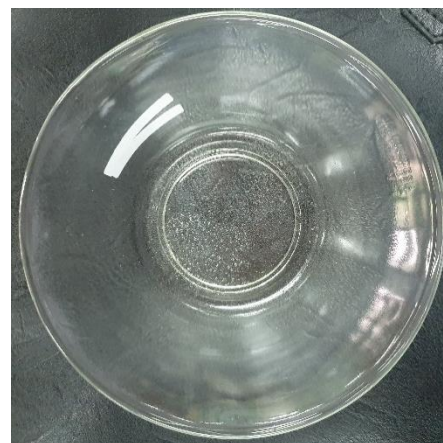
**Gambar 3. Isolat *Actinomycetes*
BCD2-02a**



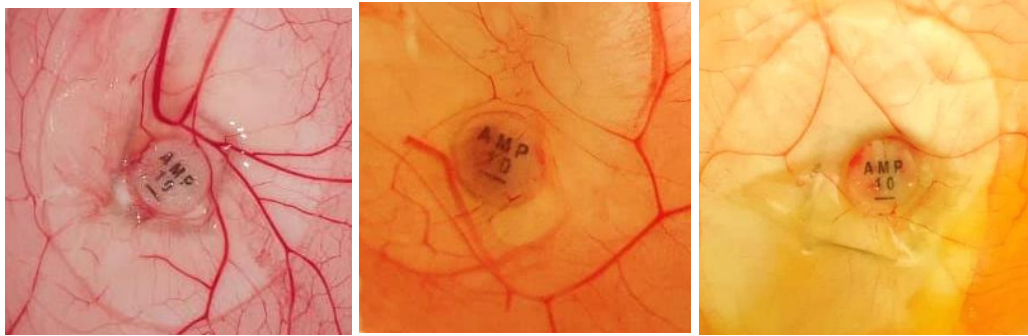
Gambar 4. Hasil Fermentasi



Gambar 5. Proses Ekstraksi



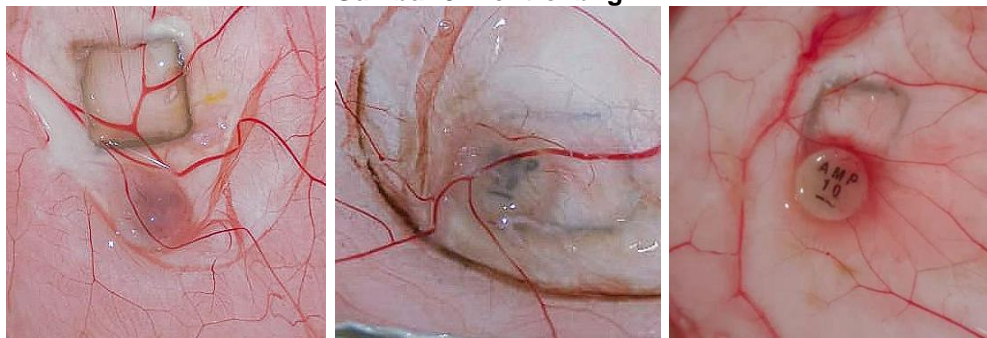
Gambar 6. Hasil Ekstraksi



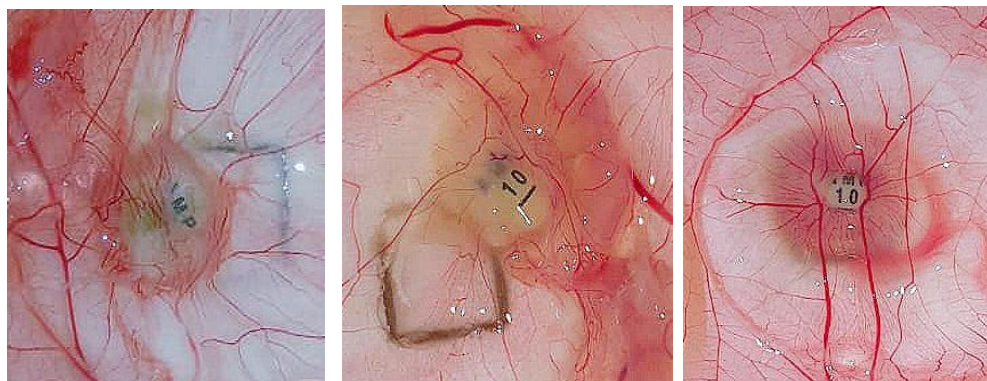
Gambar 7. Kontrol Paper disc



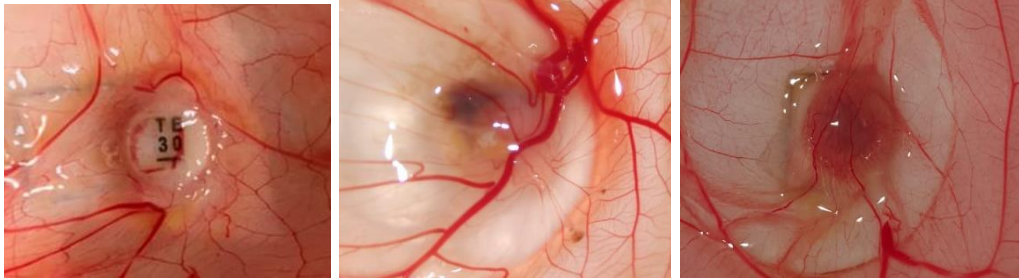
Gambar 8. Kontrol bFgf



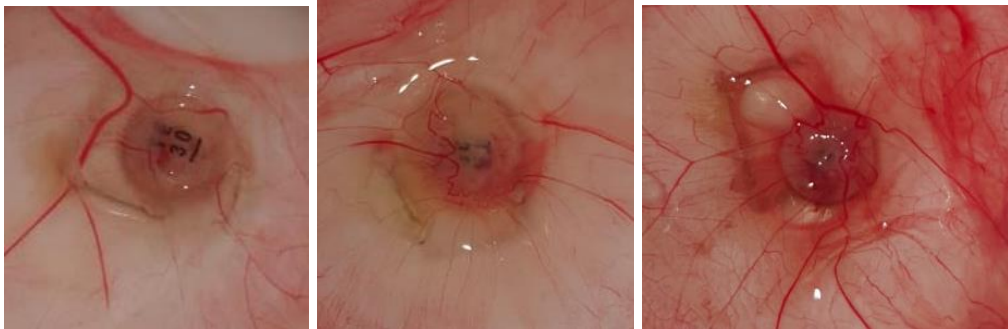
Gambar 9. Kontrol DMSO



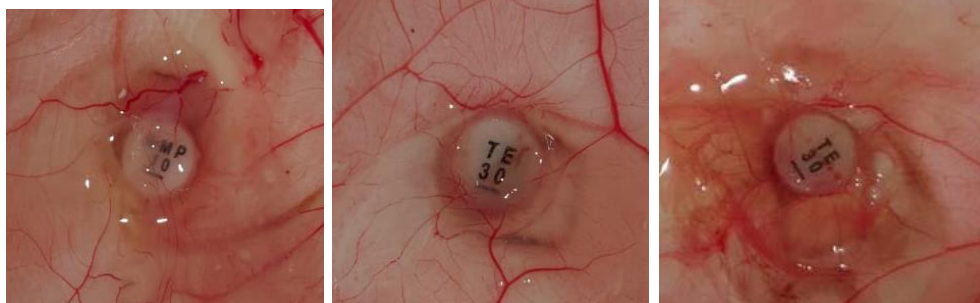
Gambar 10. Kontrol DMSO + Bfgf



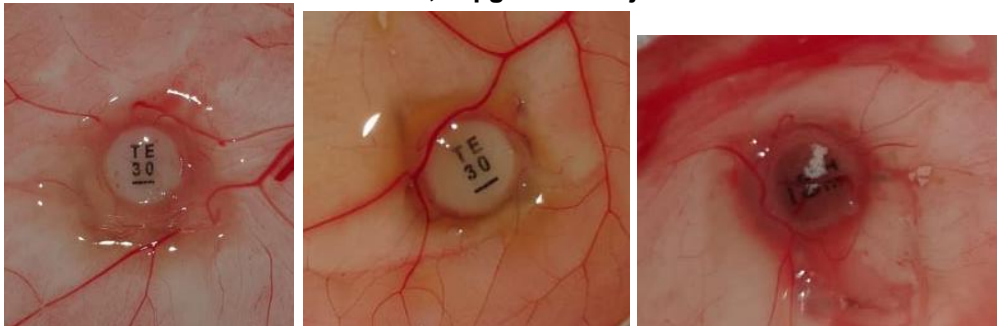
Gambar 11. 0,0625 µg ekstrak uji + bFGF



Gambar 12. 0,125 µg ekstrak uji + Bfgf



Gambar 13. 0,25 µg ekstrak uji + bFGF



Gambar 14. 0,5 µg ekstrak uji + bFGF

Lampiran 4

Komposisi Medium

Komposisi Medium SNA (*Starch Nitrate Agar*) dalam 1 L :

- Agar 20 g
- Pati 20 g
- KNO₃ 1 g
- MgSO₄ 0,5 g
- K₂HPO₄ 0,5 g
- NaCl 0,5 g
- FeSO₄ 0,001 g

Komposisi Medium SNB (*Starch Nitrate Broth*) dalam 1 L :

- Pati 20 g
- KNO₃ 1 g
- MgSO₄ 0,5 g
- K₂HPO₄ 0,5 g
- NaCl 0,5 g
- FeSO₄ 0,001 g