

DAFTAR PUSTAKA

- Abel L, Sánchez FO, Oberti J, Thuc NV, Hoa LV, Lap VD, Skamene E, Lagrange PH, Schurr E. Susceptibility to leprosy is linked to the human NRAMP1 gene. *J Infect Dis*. 1998 Jan;177(1):133-45. doi: 10.1086/513830.
- Anggraini Tiara S. G, Fifa Argentina, Subandrate. Hubungan Faktor Risiko dengan kejadian E rythema Nodosum Leprosum (ENL) di RSUP DR Mohammad Hoesin Palembang. *Majalah Kedokteran Sriwijaya*, Th. 51 Nomor 2, April 2019.
- Akagawa K, 2004. The activation of bactericidal mechanisms of macrophages against intracellular bacteria. *Molecular Medicine*. 41: 991-998
- Bakker MI, May L, Hatta M, Kwenang A, Klatser PR, Oskam L, Houwing-Duistermaat JJ. Genetic, household and spatial clustering of leprosy on an island in Indonesia: a population-based study. *BMC Med Genet*. 2005 Nov 24; 6: 40. doi: 10.1186/1471-2350-6-40. PMID: 16307680; PMCID: PMC1318483
- Bhandari J, Awais M, Robbins B, et al. 2021. *Leprosy*. Treasure Island (FL): StatPearls Publishing LLC.
- Blackwell JM, Goswami T, Evans CA, Sibthorpe D, Papo N. 2001. SLC11A1 (formerly NRAMP1) and disease resistance. *Cell Microbiol*;3:773–784.
- Brochado MJ, Gatti MF, Zago MA, Roselino AM. Association of the solute carrier family 11 member 1 gene polymorphisms with susceptibility to leprosy in a Brazilian sample. *Mem Inst Oswaldo Cruz*. 2016 Feb;111(2):101-5. doi: 10.1590/0074-02760150326
- Canonne-Hergaux F, Fleming MD, Levy JE, Gauthier S, Ralph T, Picard V, Andrews NC, Gros P. The Nramp2/DMT1 iron transporter is induced in the duodenum of microcytic anemia mice but is not properly targeted to the intestinal brush border. *Blood*. 2000;96:3964–3970
- Cunrath O, Bumann D. Host resistance factor SLC11A1 restricts *Salmonella* growth through magnesium deprivation. *Science*. 2019;366: 995-999
- Choudhuri K, 1995. The immunology of leprosy: unraveling an enigma. *Int J of Leprosy And other Mycobact Dis* 63(3):430-47.



nhoff R, Hatta M, Siro TW. Choosing the decolourizer and its strength to *Mycobacterium leprae*. Does it actually matter? *Lepr Rev* 1998 59(2):128-33. doi: 10.5935/0305-7518.19980013. PMID: 9715597.

- Dubaniewicz, A., Jamieson, S., Dubaniewicz-Wybieralska, M. et al. Association between SLC11A1 (formerly NRAMP1) and the risk of sarcoidosis in Poland. *Eur J Hum Genet.* 2006;13:829–834. DOI:10.1038/sj.ejhg.5201370
- Dunstan SJ, Ho VA, Duc CM, Lanh MN, Phuong CX, Luxemburger C, Wain J, Dudbridge F, Peacock CS, House D, Parry C, Hien TT, Dougan G, Farrar J, Blackwell JM. 2001. Typhoid fever and genetic polymorphisms at the natural resistance-associated macrophage protein 1. *J Infect Dis.* 183(7):1156-60. Epub 2001 Mar 1.
- Dwiyanti R, Hatta M, Natzir R, Pratiwi S, Sabir M, Yadi Y, Noviyanthi RA, Junita AR, Tandirogang N, Masyhudi A, Fias M, Saning J, Bahar B. 2017. Association of Typhoid Fever Severity with Polymorphisms NOD2, VDR and NRAMP1 Genes in Endemic Area, Indonesia. *J Med Sci.* 2017;17(3): 133-139. DOI: 10.3923/jms.2017.133.139
- Eichelmann K, S.E. González González, J.C. Salas-Alanis, J. Ocampo-Candiani 2013; Leprosy. An Update: Definition, Pathogenesis, Classification, Diagnosis, and Treatment; Lepra: Puesta al día. Definición, patogénesis, clasificación, diagnóstico y tratamiento. *Actas Dermosifiliogr.* Vol. 104. Issue 7. Pages 554-563 (September 2013). DOI: 10.1016/j.adengl.2012.03.028
- Eva A. Suwito, Hartati F. 2022. Faktor Risiko Reaksi Erythema Nodosum Leprosum di RSUD Patut Patuh Patju Tahun 2016 – 2020. *Jurnal Kedokteran Unram* 2022.
- Fe Eleanor F. Pardillo, Tranquilino T. Fajardo, Rodolfo M. Abalos, David Scollard, Robert H. Gelber, Methods for the Classification of Leprosy for Treatment Purposes, *Clinical Infectious Diseases.* 2007; 44(8):1096–1099, <https://doi.org/10.1086/512809>
- Fitness J, Floyd S, Warndirff DK, Schali L, Mwaungulu L, Crampin AC, Fine PEM, Hill AVS. 2004. Large-scale candidate gene of leprosy susceptibility in the Karonga district of Northern Malawi. *Am. J. Trop. Med. Hyg.* 71(3): 330–340
- Fransisca C, Zulkarnain I, Ervianti E, Damayanti D, Sari M, Budiono B, Prakoeswa CRS, Alinda MD, Kusumaputra BH, Listiawan MY. 2021. A Retrospective Study: Epidemiology, Onset, and Duration of Erythema Nodosum Leprosum in Surabaya, Indonesia. *Berk. Ilmu Kesehat. Kulit dan Kelamin.* 33(1):8.doi:10.20473/bikk.v33.1.2021.8-12.



Thomas. 2017. Macrophages and Iron Metabolism, p 803-812. In Gordon, J. (ed), *Myeloid Cells in Health and Disease*. DOI:10.1128/microbiolspec.MCHD-0037-2016.

Goldsby RA, 2000, Kuby Immunology, 4th edition, WH Freeman and Company, New York. p.83-104, 173-188, 269-288, 390-391.

Hastuti R, Kesuma PZ, Utami HP. 2022. Karakteristik pasien eritema nodosum leprosum di Rumah Sakit Umum Pusat Rivai Abdullah Tahun 2019. *Syifa' Med.* 12(2):139–145. doi:10.24036/perspektif.v4i4.466.

Hatta M, Izumi S, Klatser PR. Evaluation of the *Mycobacterium leprae* Particle Agglutination test as tool in the epidemiology of leprosy in high prevalence village in South Sulawesi, Indonesia. *South east Asia J. Trop Med Hyg* 1995; 26(4): 631- 635.

Hatta M, Ratnawati, Tanaka M, Ito J, Shirakawa T, Kawabata M. NRAMP1/SLC11A1 gene polymorphisms and host susceptibility to *Mycobacterium tuberculosis* and *M. leprae* in South Sulawesi, Indonesia. *Southeast Asian J Trop Med Public Health.* 2010 Mar;41(2):386-94. PMID: 20578522

Hatta M, van Beers SM, Madjid B, Djumadi A, de Wit MY, Klatser PR. Distribution and persistence of *Mycobacterium leprae* nasal carriage among a population in which leprosy is endemic in Indonesia. *Trans R Soc Trop Med Hyg* 1995;89(4): 381-385. doi: 10.1016/0035-9203(95)90018-7.

Hatta M. Bahan Kuliah Penyakit Tropis. *Mycobacterium leprae*. 2020

Hatta M. Epidemiology of leprosy: Molecular, Biological and immunological approach. *Advance Experiment in Medical Biology* 2003; 531: 269-278. <https://www.ncbi.nlm.nih.gov/pubmed/12916799>. PMID:12916799

Iyer A, Hatta M, Usman R, Luiten S, Oskam L, Faber W, Geluk A, Das PK. Serum levels of interferon-gamma, tumour necrosis factor-alpha, soluble interleukin-6R and soluble cell activation markers for monitoring response to treatment of leprosy reactions. *Clin Exp Immunol.* 2007 Nov;150(2):210-6. doi: 10.1111/j.1365-2249.2007.03485.x.

Iyer A, van Eijk M, Silva E, Hatta M, Faber W, Aerts JMFG, Das PK. Increased chitotriosidase activity in serum of leprosy patients: Association with bacillary leprosy. *Clin Imm* 2009; 131(3):501-509. <https://doi.org/10.1016/j.clim.2009.02.003>.

Jeng Hsien Yen, Chia Hui Lin. 2005. Natural resistance-associated macrophage χ in 1 gene polymorphisms in rheumatoid arthritis. *Immunology Letters.* 91-298.



, Stern P, Takahashi K, Hunter K, Peterson LB, Wicker LS. In vivo RNA interference demonstrates a role for Nramp1 in modifying susceptibility to

type 1 diabetes. *Nat Genet.* 2006 Apr;38(4):479-83. doi: 10.1038/ng1766. Epub 2006 Mar 19. PMID: 16550170.

Lastória JC, de Abreu MAMM. 2014. Leprosy: Review of the epidemiological, clinical, and etiopathogenic aspects - Part 1. *An. Bras. Dermatol.* 89(2):205–218.doi:10.1590/abd1806-4841.20142450.

Legua P. 2018. Leprosy. *Int. J. of Infectious Dis.*:3–398.doi:10.1016/j.ijid.2018.04.3574.

Lim SD, Kiskiss DF, Jacobson RR, Choi YS, Good RA. Thymus-dependent lymphocytes of peripheral blood in leprosy patients. *Infect Immun.* 1974; 9(2):394–9.

Mabalay MC, Helwig EB, Tolentino JG, Binford CH. The histopathology and histochemistry of erythema nodosum leprosum. *Int J Lepr.* 1965;33:28–49

Mustafa H and Hatta M. Analysis polymorphism of nucleotide binding oligomerization domain 2 (NOD2) gene locus exon 4 802 on leprosy patients in Makassar: *Tropical Medicine & International Health.* 16. Supplement 1:188, [Abstract No. 1.3-074], October (2011). First published: 3 October 2011. DOI: 10.1111/j.1365-3156.2011.02861.x

Moraes MO, Sarro EN, Almeida AS, Saraiva BC, Nery JA, Martins RC, Sampaio EP, 1999. Cytokine mRNA expression in Leprosy: a possible role for interferon-gamma and interleukin - 12 in reactions (RR and ENL). *Scand J Immunol* 50(5):541-9.

Negera E, Walker SL, Girma S, Doni SN, Tsegaye D, Lambert SM, et al. (2017) Clinico-pathological features of erythema nodosum leprosum: A case-control study at ALERT hospital, Ethiopia. *PLoS Negl Trop Dis* 11(10): e0006011. <https://doi.org/10.1371/journal.pntd.0006011>

Nobre ML, Illarramendi X, Dupnik KM, Hacker M de A, Nery JA da C, Jerônimo SMB, Sarno EN. 2017. Multibacillary leprosy by population groups in Brazil: Lessons from an observational study. *PLoS Negl. Trop. Dis.* 11(2):1–14.doi:10.1371/journal.pntd.0005364.

Polycarpou A, Walker SL, Lockwood DN. A Systematic Review of Immunological Studies of Erythema Nodosum Leprosum. *Front Immunol.* 2017; 8: 233. doi:10.3389/fimmu.2017.00233.



A 2005. The global campaign to eliminate leprosy. *PLoS Med* 2(12): . DOI: 10.1371/journal.pmed.0020341

MAMM, Hatta M, Widiana IGR, Adiguna MS, Wardana M, Dwiyanti R, Dwiyanti RA, Sabir M, Yadi Y, Paramita S, Junita AR, Primaguna MR.

Higher Treg FoxP3 and TGF- β mRNA Expression in Type 2 Reaction ENL (Erythema Nodosum Leprosum) Patients in *Mycobacterium leprae* infection. The Open Microbiology Journal. 2020; 14: 304-309. DOI: 10.2174/1874434602014010304.

Safira, N.F., & Aryoko, W., (2020). Faktor Risiko Penderita Kusta Tipe Multibasiler Di Rsud Tugurejo Semarang. Diponegoro Medical Journal (Jurnal Kedokteran Diponegoro) Online : <http://ejournal3.undip.ac.id/index.php/medico> E-ISSN : 2540-8844 Volume 9, Nomor 2, Maret 2020

Saraswati, P. A., Mas Rusyati, L. M., & Karmila, I. D. (2019). Karakteristik Penderita Kusta Multi Basiller (MB) dengan Reaksi Erythema Nodosum Leprosum (ENL) di Poliklinik Kulit dan Kelamin RSUP Sanglah selama Tahun 2016-2018. Intisari Sains Medis, 10(3), 655–658. <https://doi.org/10.15562/ism.v10i3.477>

Scollard D. M. 2016. Infection with Mycobacterium lepromatosis. The American journal of tropical medicine and hygiene, 95(3), 500–501. <https://doi.org/10.4269/ajtmh.16-0473>

Scollard DM, Adams LB, Gillis TP, Krahenbuhl JL, Truman RW, Williams DL. The continuing challenges of leprosy. Clin Microbiol Rev. 2006 Apr;19(2):338-81. doi: 10.1128/CMR.19.2.338-381.2006. PMID: 16614253; PMCID: PMC1471987.

Scollard DM. 2020. Leprosy treatment: Can we replace opinions with research? *PLoS Negl. Trop. Dis.* 14(10):1–3.doi:10.1371/journal.pntd.0008636.

Serra MAADO, Santos CDS, Lima Neto PM, Oliveira KGZ, Oliveira FJF De, Gordon ASDA, Matos DP, Lima RJCP, Bezerra JM, Costa Maia Dias IC, *et al.* 2019. Factors Associated with Multibacillary Leprosy in a Priority Region for Disease Control in Northeastern Brazil: A Retrospective Observational Study. *J. Trop. Med.* 2019.doi:10.1155/2019/5738924.

Soe-Lin, S., Apte, S. S., Andriopoulos, B., Jr., Andrews, M. C., Schranzhofer, M., Kahawita, T., Garcia-Santos, D., Ponka, P. 2009. Nramp1 promotes efficient macrophage recycling of iron following erythrophagocytosis in vivo. *Proc. Nat. Acad. Sci.* 106: 5960-5965, 2009.

Solikhah, A., Sudaryanto, A., & Yulian, V. (2016). Hubungan tingkat pengetahuan tentang kusta (Leprosy) dengan perawatan diri pada penderita kusta di wilayah kabupaten Sukoharjo. 1–13.

Ulfa, F. (2015). Kualitas Hidup Orang Yang Pernah Menderita Kusta (OYPMK).



MAG, Silva NL, de Ramos AL, Hatagima A, Magalhães V. NRAMP1 polymorphisms in individuals with leprosy reactions attended at two reference centers in Recife, northeastern Brazil. *Revista da Sociedade Brasileira de Medicina Tropical* 2010; 43(3):281-286.

- Thungady E, Mas Rusyati LM, Praharsini I. 2020. Kadar serotonin serum yang rendah merupakan factor resiko terjadinya eritema nodosum leprosum. *Medicina (B. Aires)*. 51(1):23–27.doi:10.15562/medicina.v51i1.388
- Walker SL, Balagon M, Darlong J, Doni SN, Hagge DA, Halwai V, et al. ENLIST 1: an international multi-centre cross-sectional study of the clinical features of erythema nodosum leprosum. *PLoS Negl Trop Dis*. 2015;9(9):e0004065. Doi:10.1371/journal.pntd.0004065
- Walker SL, Lebas E, Doni SN, Lockwood DN, Lambert SM. The mortality associated with erythema nodosum leprosum in ethiopia: a retrospective hospital-based study. *PLoS Negl Trop Dis* (2014) 8(3):e2690.10.1371/journal.pntd.0002690
- Weiss G. Iron metabolism in the anemia of chronic disease. *Biochimica et Biophysica Acta (BBA) - General Subjects*. 2009;1790(7):682–693. doi: 10.1016/j.bbagen.2008.08.006.
- Wessling-Resnick M. 2015. Nramp1 and Other Transporters Involved in Metal Withholding during Infection. *The Journal of biological chemistry*, 290(31), 18984–18990. doi:10.1074/jbc.R115.643973
- WHO Guidelines for the management of severe erythema nodosum leprosum (ENL) reactions. 2010. Access: 30 December 2020
- World Health Organization. Global leprosy update, 2018: Moving towards a leprosy-free world. *Wkly Epidemiol Rec* 2019, 94, 389-412
- Yang YS, Kim SJ, Kim JW, Koh EM. 2000. NRAMP1 gene polymorphisms in patients with rheumatoid arthritis in Koreans. *J Korean Med Sci*. 2000 Feb;15(1):83-7.



LAMPIRAN

REKOMENDASI PERSETUJUAN ETIK

Nomor : 528/UN4.6.4.5.31/ PP36/ 2022

Tanggal: 19 September 2022

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

No Protokol	UH22090499		No Sponsor	
Peneliti Utama	dr. Safruddin Amin, Sp.KK(K), FINSADV, FAADV		Sponsor	
Judul Peneliti	Analisis kadar serum NRAMP, PARK-2 dan VDR pada pasien ENL, MB Tanpa ENL dan Orang Sehat			
No Versi Protokol	1	Tanggal Versi	2 September 2022	
No Versi PSP		Tanggal Versi		
Tempat Penelitian	Laboratorium Imunologi dan Biologi Molekuler Fakultas Kedokteran Universitas Hasanuddin Makassar			
Jenis Review	☐ Exempted ☒ Expedited ☐ Fullboard Tanggal		Masa Berlaku 19 September 2022 sampai 19 September 2023	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 protokol yang disetujui (protocol deviation / violation)
- Mematuhi semua peraturan yang ditentukan





ELISA (Enzyme-Linked Immunosorbent Assay) Kit NRAMP-1





