

## DAFTAR PUSTAKA

- Afonso, V., Champy, R., Mitrovic, D., et al. (2007). Reactive oxygen species and superoxide dismutases: Role in joint diseases. *Joint Bone Spine*, Vol. 74, Issue 4, pp. 324-329, <https://doi.org/10.1016/j.jbspin.2007.02.002>
- Akalan, C., Kravitz, L., Robergs, R.R. (2004).  $VO_{2max}$ . : Essentials of the most widely used test in Exercise Physiology. *ACSM' Health and Fitness Journal*, Vol. 8, No. 3, pp. 5-9.
- Alessio, H.M. (1993). Exercise-induced oxidative stress. *Medicine and Science in Sports and Exercise*, Vol, 25, No. 2, pp. 218-224
- Amin, M.N., Siddiqui, S.A., Uddin, M.G., et al. (2019). Increased oxidative stress, altered trace elements, and macro-minerals are associated with female obesity. *Biological Trace Element Research*, <https://doi.org/10.1007/s12011-019-02002-z>
- Andersen, L.B., Schnohr, P, Schroll, M, & Hein, H.O., (2000). All-cause mortality associated with physical activity during leisure time, work, sports, and cycling to work. *Archives of Internal Medicine*, 160(11), 1621-1628.
- Annes, J.P., Munger, J.S., & Rifkin, D.B. (2003). Making sense of latent TGF $\beta$  activation. *Journal of Cell Science*, Vol. 116, pp. 217-224. doi:10.1242/jcs.00229
- Arrol, B and Beaglehole, L. (1992). Does physical activity lower blood pressure: a critical review of the clinical trials. *J Clin Epidemiol*, Vol. 45, No. 5, pp. 439-447.
- Arslan, M., Ipekci, S.H., Kebabcilar, R., et al. (2014). Effect of aerobic exercise training on MDA and TNF- $\alpha$  levels in patients with type 2 diabetes mellitus. *International Scholarly Research Notices*, Volume 2014, Article ID 820387, <http://dx.doi.org/10.1155/2014/820387>
- Ashton, T., Rowlands, C.C., Jones, E., et al. (1998). Electron spin resonance spectroscopic detection of oxygen-centred radicals in human serum following exhaustive exercise. *European Journal of Applied Physiology and Occupational Physiology*, Volume 77, Issue 6, pp. 498–502, <https://doi.org/10.1007/s004210050366>
- Basset, D. R., & Howley, E. T., (2000). Limiting factors for maximum oxygen uptake and determinants of endurance performance. *Medicine &*

*Science in Sports & Exercise*. pp. 70 – 84.

- Bellocco, R., Jia, C., Ye, W., and Lagerros, Y.T. (2010). Effects of physical activity, body mass index, waist-to-hip ratio and waist circumference on total mortality risk in the Swedish National March Cohort. *European Journal of Epidemiology*, 25:777–788, DOI 10.1007/s10654-010-9497-6.
- Betteridge, D.J. (2000). What is oxidative stress. *Metabolism*, Vol. 49, Issue 2, Supplement 1, pp.3-8, [https://doi.org/10.1016/S0026-0495\(00\)80077-3](https://doi.org/10.1016/S0026-0495(00)80077-3)
- Bhale, D.V., Patil, D.S., Mahat, R.K. (2014). Study of malondialdehyde (MDA) as a marker of oxidative stress in obese male individuals. *International Journal of Recent Trends in Science and Technology*, Volume 10, Issue 1, 2014 pp 51-52.
- Billat, L.V., and Koralsztein, J.P. (1996). Significance of the velocity at  $VO_{2max}$  and time to exhaustion at this velocity. *Sports Med.*; 22 (2), pp. 90 – 108.
- Birben, E., Sahiner, U.M., Sackesen, et al. (2012) Oxidative stress and antioxidant defense. *WAO Journal*, 5:9–19.
- Blobe, G.C., Schiemann, W.P., & Lodish, H.F. (2000). Role of transforming growth factor beta in human disease. *N Engl J Med* 2000; 342:1350-1358, DOI: 10.1056/NEJM200005043421807
- Bonewald, L.F., & Dallas, S.L. (1994). Role of active and latent transforming growth factor  $\beta$  in bone formation. *Journal of Cellular Biochemistry*, Vol. 55, Issue 3, pp. 350-357, <https://doi.org/10.1002/jcb.240550312>
- Bonham, J. & Johnson, M. (2015). *Cycliing futures*. Adelaide: University of Adelaide Press.
- Booth, F.W., and Thomason, D.B. (1991). Molecular and cellular adaptation of muscle in response to exercise: perspectives of various models. *Physiol. Rev.*, Vol. 71, pp. 541-585.
- Borrestad, L.A.B., Ostergaard, L., Andersen, L.B., and Berre, E. (2012). Experiences from a randomised, controlled trial on cycling to school: Does cycling increase cardiorespiratory fitness?. *Scandinavian Journal of Public Health*, 40: 245–252, DOI: 10.1177/1403494812443606.

- Bouزيد, M.A., Hammouda, O., Matran, R., et al. (2014). Changes in oxidative stress markers and biological markers of muscle injury with aging at rest and in response to an exhaustive exercise. *Plos One*, 9(3): e90420, doi:10.1371/journal.pone.0090420
- Boveris, A. (2018). Physical activity as a metabolic stressor 1 – 3, 72(March), 512–520.
- Boveris, A., & Navarro, A. (2008). Systemic and mitochondrial adaptive responses to moderate exercise in rodents. *Free Radical Biology and Medicine*, 44(2), 224–229. <https://doi.org/10.1016/j.freeradbiomed.2007.08.015>
- Boyd, F.T., Cheifetz, S., Andres, J., et al. (1990). Transforming growth factor- $\beta$  receptors and binding proteoglycans. *J Cell Sci. Suppl.* 13, 131-138
- Buskirk, E.R., and Hodgson, J.L. (1987). Age and aerobic power: the rate of change in men and women. *Federation Proceedings*, 46(5):1824-1829.
- Cabrera, M.C.G., Domenech, E., Ji, L.L., and Vina, J. (2006). Exercise as an antioxidant: it up-regulates important enzymes for cell adaptations to exercise. *Science & Sports*, Vol. 21, pp. 85–89, doi:10.1016/j.scispo.2005.06.012
- Cabrera, M.C.G., Domenech, E., and Vina, J. (2008). Moderate exercise is an antioxidant: Upregulation of antioxidant genes by training. *Free Radical Biology & Medicine*, Vol. 44, pp. 126–131, doi:10.1016/j.freeradbiomed.2007.02.001
- Caspersen, C.J., Powell, K.E., & Christenson, G.M. (1985). Physical Activity, Exercise, and Physical Fitness: Definitions and Distinctions for Health-Related Research. *Public Health Reports*, Vol. 100, No. 2.
- Chaves, T.R., Lima, R.P.A., Ribeiro, M.R., et al. (2021). Association between values of anthropometric indicators, Total Antioxidant Capacity and Malondialdehyde in adults: a population-based study. *Nutr Clín Diet Hosp.*, Vol. 41, No. 3, pp. 47-57.
- Church, D.F., & Pryor, W.A. (1985). Free-radical chemistry of cigarette smoke and its toxicological implications. *Environmental Health Perspectives* Vol. 64, pp. 111-126, <https://doi.org/10.1289/ehp.8564111>
- Comhair, S.A.A., Thomassen, M.J., & Erzurum, S.C. (2000). Differential induction of extracellular glutathione peroxidase and nitric oxide

synthase 2 in airways of healthy individuals exposed to 100% o<sub>2</sub> or cigarette smoke. *American Journal of Respiratory Cell and Molecular Biology*, Vol.23, No.3. <https://doi.org/10.1165/ajrcmb.23.3.4076>

Dahlan, M.S., 2011. *Statistik untuk kedokteran dan kesehatan*. Edisi kelima. Salemba Medika: Jakarta.

Dahlan, M.S., 2010. *Besar sampel dan cara pengambilan sampel*. Edisi ketiga. Salemba Medika: Jakarta.

Davies, K.J.A., Quintanilha, A.T., Brooks, G.A, et.al. (1982). Free radicals and tissue damage produced by exercise. *Biochemical and Biophysical Research Communications*, Vol.107, Issue 4, pp. 1198-1205, [https://doi.org/10.1016/S0006-291X\(82\)80124-1](https://doi.org/10.1016/S0006-291X(82)80124-1)

Davies, K.J.A., Packer, L., & Brooks, G.A. (1981). Biochemical adaptation of mitochondria, muscle, and whole-animal respiration to endurance training. *Archives of Biochemical and Biophysics*, Vol. 209, Issue 2, pp. 539-554, [https://doi.org/10.1016/0003-9861\(81\)90312-X](https://doi.org/10.1016/0003-9861(81)90312-X)

Davies, K.J.A. (2016). Adaptive homeostasis. *Molecular Aspects of Medicine*, Vol. 49, pp. 1-7.

Del Rio, D., Stewart, A.J., & Pellegrini, N. (2005). A review of recent studies on malondialdehyde as toxic molecule and biological marker of oxidative stress. *Nutrition, Metabolism, and Cardiovascular Diseases*, Vol 15, pp. 316-328, doi:10.1016/j.numecd.2005.05.003.

Denzler, K.L., Borchers, M.T., Crosby, J.R., et al. (2001). Ovalbumin-challenge model of pulmonary proteins do not occur in a mouse peroxidase-mediated oxidation of airway extensive eosinophil degranulation and inflammation. *J Immunol*, Vol. 167, pp. 1672-168, doi: 10.4049/jimmunol.167.3.1672

Derave, W., Mertens, A., Muls, E. et al. (2007). Effects of Post-absorptive and postprandial exercise on glucoregulation in metabolic syndrome. *Obesity*, Vol. 15, Issue 3, pp. 704-711, <https://doi.org/10.1038/oby.2007.548>

Derynck, R., Zhang, Y.E. (2003). Smad-dependent and Smad-independent pathways in TGF- $\beta$  family signalling. *Nature*, Vol. 425, pp. 577–584, <https://doi.org/10.1038/nature02006>

Derynck, R., Akhurst, R.J., and Balmain, A. (2001). TGF- $\beta$  signaling in tumor suppression and cancer progression. *Nature Genetic*, Vol. 29.

Deschenes, M.R. (2004). Effects of aging on muscle fibre type and size. *Sports Med*, 34 (12): 809-824.

- Dix, T.A., & Aikens, J. (1993). Mechanisms and biological relevance of lipid peroxidation initiation. *Chem, Res, Toxicol* 1993, pp. 612-618, <https://doi.org/10.1021/tx00031a001>
- Dolgener, F.A., Hensley, L.D., Marsh, J.J., and Fjelstul, J.K. (1994). Validation of the rockport fitness walking test in college males and females. *Journal Research Quarterly for Exercise and Sport*, Volume 65, 1994, Issue 2, <https://doi.org/10.1080/02701367.1994.10607610>
- Dons, E., Rueda, D.R., Boig, E.A., et al., (2018). Transport mode choice and body mass index: Cross-sectional and longitudinal evidence from a European-wide study. *Environment International*, 119, 109-116, <https://doi.org/10.1016/j.envint.2018.06.023>.
- Droge, W. (2002). Free Radicals in the Physiological Control of Cell Function. *Physiological Reviews*, Vol. 82, No.1, <https://doi.org/10.1152/physrev.00018.2001>
- Ebbeling, C.B., Ward, A., Puleo, E.M., et al. (1991). Development of a single-stage submaximal treadmill walking test. *Medicine and Science in Sports and Exercise*, 23(8):966-973
- Elmagd, M. A., Sami, M.M., ElMarsafawy, T.S., et al. (2016). The effect of socio-economic status on the effective students' participation in physical activity: A cross sectional study from Ras Alkhaimah Medical and Health Sciences University-UAE. *International Journal of Physical Education, Sports and Health* 16; 3(2): 151-155
- Eime, R.M., Harvey, J.T., Charity, M.J., et al. (2016). Age profiles of sport participants. *BMC Sports Science, Medicine and Rehabilitation*, Vol. 8, No.6, DOI 10.1186/s13102-016-0031-3.
- Eiserich, J.P., Baldus, S., Brennan, M.L., et al. (2002). Myeloperoxidase, a leukocyte-derived vascular NO oxidase. *Science*, Vol. 296, Issue 5577, pp. 2391-2394, DOI: 10.1126/science.1106830
- Erdeve, O., Siklar, Z., Kocaturk P.A., et al. (2004). Antioxidant superoxide dismutase activity in obese children. *Biol Trace Elem Res*, Vol. 98, pp. 219–228.
- Evans, W.J., and Campbell, W.W. (1993). Sarcopenia and age-related changes in body composition and functional capacity. *Symposium: Aging and Body Composition: Technological Advances and Physiological Interrelationships*. Downloaded from [https://academic.oup.com/jn/article-bstract/123/suppl\\_2/465/4723843](https://academic.oup.com/jn/article-bstract/123/suppl_2/465/4723843)

- Foss, M.L., Kateyian S.J., 1998. *Fox's Physiological Basic for Exercise and Sport*. 6<sup>th</sup> Edition, New York: Mc. Graw Hill Companies Inc.
- Fox, E.L. 1984. *Sport Physiology*. 2<sup>nd</sup> Edition, Philadelphia: Saunders College Publishers.
- Giriwijoyo, S., Muchtamaji, H. 2005. *Ilmu Faal Olahraga; Fungsi Tubuh Manusia pada Olahraga*. Bandung: Fakultas Ilmu Olahraga.
- Gledhill, N. (1985). The influence of altered blood volume and oxygen transport capacity on aerobic performance. *Exerc. Sport Sci. Rev.* 13:75–93.
- Gleizes, P.E., Munger, J.S., Nunes, I., et al. (1997). TGF- $\beta$  Latency: biological significance and mechanisms of activation. *Stem Cells Journal*, Volume 15, Issue 3, pp. 190-197. <https://doi.org/10.1002/stem.150190>
- George, J.D., Vehrs, P.R., Allsen, P.E., et al. (1993). VO<sub>2</sub>max estimation from a submaximal 1-mile track jog for fit college-age individuals. *Medicine and Science in Sports and Exercise*, 25(3):401-406
- Gohil, K., Viguie, C., Stanley, W.C., et al. (1988). Blood glutathione oxidation during human exercise. *Journal of Applied Physiology*, Vol. 64, No. 1 <https://doi.org/10.1152/jappl.1988.64.1.115>
- Gomez, E.C., Silva, A.N., & Oliviera, M.R. (2012). Oxidants, Antioxidants, and the Beneficial Roles of Exercise-Induced Production of Reactive Species. *Oxidative Medicine and Cellular Longevity*, Vol. 2012, Article ID 756132, pp. 1-12, doi:10.1155/2012/756132
- Granger, D.N. (1988). Role of xanthine oxidase and granulocytes in ischemia-reperfusion injury. *American Journal of Physiology-Heart and Circulatory Physiology* Vol. 255, No. 6, <https://doi.org/10.1152/ajpheart.1988.255.6.H1269>
- Groussard, C., Rannou-Bekono, F., & Machefer, G. (2002). Changes in blood lipid peroxidation markers and antioxidants after a single sprint anaerobic exercise. *Eur J Appl Physiol*, Vol. 89, Issue 14–20, DOI 10.1007/s00421-002-0767-1
- Guyton, A.C. dan Hall, J.E. 2007. *Fisiologi Kedokteran* (Terjemahan). Jakarta: Penerbit Buku Kedokteran EGC.
- Hakkinen, K., Alen, M., Kraemer, W.J., et al. (2003). Neuromuscular adaptations during concurrent strength and endurance training versus strength training. *Eur J Appl Physiol*, Vol. 89, pp. 42–52 DOI 10.1007/s00421-002-0751-9

- Halliwell, B. (1996). Free radicals, proteins and DNA: oxidative damage versus redox regulation. *Biochemical Society Transaction*, Vol. 24.
- Halliwell, B. (1994). Free radicals and antioxidants: A Personal View *Nutrition Reviews*, Volume 52, Issue 8, pp. 253–265, <https://doi.org/10.1111/j.1753-4887.1994.tb01453.x>
- Halliwell, B. (1991). Reactive oxygen species in living systems: Source, Biochemistry, and role in human disease. *The American Journal of Medicine*, Volume 91, Issue 3, Supplement 3, pp. 514-522
- Hawkins, S.A., and Wiswell, R.A. (2007). Rate and mechanism of maximal oxygen consumption decline with aging implications for exercise training. *Sports Med*, 33 (12): 877-888.
- Heinemeier, K., Langberg, H., Olesen, J.L., & Kjaer, M. (2003). Role of TGF- $\beta$ 1 in relation to exercise-induced type I collagen synthesis in human tendinous tissue. *J Appl Physiol*, Vol. 95. No. 6, pp. 2390–2397. <https://doi.org/10.1152/jappphysiol.00403.2003>
- Heunks, L.M.A., & Dikhuizen, P.N.R. (2000). Respiratory muscle function and free radicals: from cell to COPD. *Thorax*, Vol. 55, pp. 704–716
- Hiltermann, J.T.N., Lapperre, T.S., Bree, L.V., et al. (1999). Ozone-induced inflammation assessed in sputum and bronchial lavage fluid from asthmatics: A new noninvasive tool in epidemiologic studies on air pollution and asthma. *Free Radical Biology and Medicine*, Vol. 27, Issues 11-12, pp. 1448-1454, [https://doi.org/10.1016/S0891-5849\(99\)00191-4](https://doi.org/10.1016/S0891-5849(99)00191-4)
- Honig, C.R., Connett, R.J., & Gayeski, T.E. (1992). O<sub>2</sub> transport and its interaction with metabolism; a systems view of aerobic capacity. *Medicine and Science in Sports and Exercise*, 24(1):47-53
- Ighodaro, O.M., & Akinloye, O.A. (2011). First line defence antioxidants-superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase (GPX): Their fundamental role in the entire antioxidant defence grid. *Alexandria Journal of Medicine*, Vol. 54, pp. 287-293, <https://doi.org/10.1016/j.ajme.2017.09.001>
- Inal, M.E., Kanbak, G., and Sunal, E. (2001). Antioxidant enzyme activities and malondialdehyde levels related to aging. *Clinica Chimica Acta*, Vol. 305, pp. 75–80
- Iwasaki, K., Zhang, R., Zuckerman, J. H., & Levine, B. D. (2003). Dose-response relationship of the cardiovascular adaptation to endurance

- training in healthy adults: how much training for what benefit? *Journal of Applied Physiology*, 95(4), 1575–1583. <https://doi.org/10.1152/jappphysiol.00482.2003>
- Janero, D.R. (1990). Malondialdehyde and thiobarbituric acid-reactivity as diagnostic indices of lipid peroxidation and peroxidative tissue injury. *Free Radical Biology & Medicine*, Vol. 9, pp. 515-540,
- Jansen, I., Katzmarzyk, P.T., and Ross, R. (2002). Body mass index, waist circumference, and health risk. *Arch Intern Med*, 162, 2074-2079
- Ji, L., L. (1999). Antioxidant and oxidative stress in exercise. *Society for Experimental Biology and Medicine*.
- Ji, L. L. (1995). Oxidative stress during exercise: implication of antioxidant nutrients. *Free Radical Biology & Medicine*, Vol. 18, No. 6, pp. 1079-1086
- Ji, L. L. (1993). Antioxidant enzyme response to exercise and aging. *Medicine and Science in Sports and Exercise*, Vol. 25, No. 2. pp. 225-231
- Jenkins, R. R. (1988). Free radical chemistry. *Sports Medicine*, Vol. 5, Issue 3, pp. 156-170, <https://doi.org/10.2165/00007256-198805030-00003>
- Kanter, M. (1998). Free radicals, exercise and antioxidant supplementation. *Proceeding of The Nutrition Society*, Vol. 57, Issue 1, pp. 9-13, DOI: <https://doi.org/10.1079/PNS19980004>
- Kanter, M., Nolte, L.A., & Holloszy, J.O. (1993). Effects of an antioxidant vitamin mixture on lipid peroxidation at rest and postexercise. *Journal of Applied Physiology*, Vol. 74, No. 2, <https://doi.org/10.1152/jappl.1993.74.2.965>
- Kasapoglu, M., and Ozben, T. (2000). Alterations of antioxidant enzymes and oxidative stress markers in aging. *Experimental Gerontology*, Vol. 36, pp. 209-220
- Kemi, O. J., Haram, P. M., Loennechen, J. P., Osnes, J. B., Skomedal, T., Wisløff, U., & Ellingsen, Ø. (2005). Moderate vs. high exercise intensity: Differential effects on aerobic fitness, cardiomyocyte contractility, and endothelial function. *Cardiovascular Research*, 67(1), 161–172. <https://doi.org/10.1016/j.cardiores.2005.03.010>
- Kessler S., H., Sisson B., S., & Short R., K. (2012). The potential for high-intensity interval training to reduce cardiometabolic disease risk. *Sports*



*Medicine*, 42(6), 489–509. <https://doi.org/10.2165/11630910-000000000-00000>

Kingwell, B.A. and Jennings, G.L. (1993). Effect of walking and other exercise programs upon blood pressure in normal subjects. *The Medical Journal of Australia*, 158, 234-238.

Klebanoff, S.J. (2005). Myeloperoxidase: friend and foe. *Journal of Leucocyte Biology*, Vol. 77, No.5, pp. 598-625, <https://doi.org/10.1189/jlb.1204697>

Kohen, R., & Nyska, A. (2002). Oxidation of biological systems: oxidative stress phenomena, antioxidants, redox reactions, and methods for their quantification. *Toxicologic Pathology*, Vol. 30, Issue 6, <https://doi.org/10.1080/01926230290166724>

Kojda, G. and Hambrecht, R. (2005). Molecular mechanisms of vascular adaptations to exercise. Physical activity as an effective antioxidant therapy?. *Cardiovascular Research*, Vol. 67, pp. 187-197, doi:10.1016/j.cardiores.2005.04.032

Krstic, J., Trivanovic, D., Mojsilovic, S., & Santibanez, J.F. (2015). Transforming growth factor-beta and oxidative stress interplay: implications in tumorigenesis and cancer progression. *Oxidative Medicine and Cellular Longevity* Vol. 2015, Article ID 654594, <http://dx.doi.org/10.1155/2015/654594>

Kuntaraf. 1992. Olahraga Sumber Kesehatan Indonesia. Bandung: Publishing House. *Jurnal IPTEK Olahraga*. Vol. 14, No. 2, Mei-Agustus 2012: 160-181.

Kunwar, A & Priyadarsini, K.I. (2011). Free radicals, oxidative stress and importance of antioxidants in human health. *J Med Allied Sci*, 1(2), 53-60.

Lakatta, E.G., and Levy, D. (2003). Arterial and cardiac aging: major shareholders in cardiovascular disease enterprises. *Circulation*, 107:346-354, DOI: 10.1161/01.CIR.0000048893.62841.F7

Laye, M.J., Nielsen, M.B., Hansen, L.S., et al. (2015). Physical activity enhances metabolic fitness independently of cardiorespiratory fitness in marathon runners. *Disease Markers*, Volume 2015, Article ID 806418, 11 pages, <http://dx.doi.org/10.1155/2015/806418>

- Lekhi, C., Gupta, P.H., Singh, B. (2007). Influence of exercise on oxidant stress product in elite Indian cyclist. *Br J Sports Med*, Volume 41, 691-693, doi: 10.1136/bjism.2007.037663
- Leelarugrayub, N., Suthabaha, D., Pothongsunun, P., and Chanarat, N. (2005). Exhaustive exercise test and oxidative stress response in athletic and sedentary subjects. *CMU Journal*, Vol. 4, No. 2, pp. 183-190.
- Leung, L.C.K., Sung, R.Y.T., So, H.K., et al. (2011). Prevalence and risk factors for hypertension in Hong Kong Chinese adolescents: waist circumference predicts hypertension, exercise decreases risk. *Arch Dis Child*, 96, 804–809, doi:10.1136/804 adc.2010.202770.
- Li, M.O., & Flavell, R.A. (2008). TGF- $\beta$ : A Master of all T cell trades. *Cell*, Vol. 134, Issue 3, pp. 392-404, <https://doi.org/10.1016/j.cell.2008.07.025>
- Lin, Y., Nakachi, K., Ito, Y., et al. (2009). Variations in serum transforming growth factor- $\beta$ 1 levels with gender, age and lifestyle factors of healthy Japanese adults. *Disease Markers*, Vol. 27, pp. 23–28, DOI 10.3233/DMA-2009-0643
- Liu, R. M., and Desai, L.P. (2015). Reciprocal regulation of TGF- $\beta$  and reactive oxygen species: A perverse cycle for fibrosis. *Redox Biology*, Vol. 6, pp. 265-277. <http://dx.doi.org/10.1016/J.Redox.2015.09.009>.
- Liu, R.M., & Pravia, K.A.G. (2010). Oxidative stress and glutathione in TGF- $\beta$  mediated fibrogenesis. *Free Radical Biology and Medicine*, Vol. 48, Issue 1, pp. 1-15, <https://doi.org/10.1016/j.freeradbiomed.2009.09.026>
- Lovlin, R., Cottle, W., Pyke, I., et al. (1987). Are indices of free radical damage related to exercise intensity. *European Journal of Applied Physiology and Occupational Physiology*, Volume 56, Issue 3, pp. 313–316, <https://doi.org/10.1007/BF00690898>
- Maher, M.S., Voss, C., Ogunleye, A.A., et al. (2012). *Medicine & science in sports & exercise*, DOI: 10.1249/MSS.0b013e318235158a.
- Marnett, L.J. (1999). Lipid peroxidation—DNA damage by malondialdehyde. *Mutation Research*, Vol. 424, pp. 83-95.
- Margaritelis, N.V., Theodorou, A.A., Pachalis, V., et al. (2017). Adaptations to endurance training depend on exercise-induced oxidative stress: exploiting redox interindividual variability. *Acta Physiologica*, 2017, doi: 10.1111/apha.12898

- Marone, J.R., Falduto, M.T., Essig, D.A., Hickson, R.C. (1994). Effects of glucocorticoids and endurance training on cytochrome oxidase expression in skeletal muscle. *Journal of Applied Physiology*, Vol. 77, pp. 1685-1690.
- Massague, J., & Gomis, R.R. (2006). The logic of TGF  $\beta$  signalling. *Federation of European Biochemical Societies, Letters* 580 (2006) pp. 2811–2820, doi:10.1016/j.febslet.2006.04.033
- Massague, J. (1990). The transforming growth factor- $\beta$  family. *Annual Review of Cell Biology*, Vol. 6, pp. 597-641, <https://doi.org/10.1146/annurev.cb.06.110190.003121>
- Mates, J.M. (2000). Effects of antioxidant enzymes in the molecular control of reactive oxygen species toxicology. *Toxicology*, Vol. 153, Issue 1-3, pp. 83-104, [https://doi.org/10.1016/S0300-483X\(00\)00306-1](https://doi.org/10.1016/S0300-483X(00)00306-1)
- Matsuo, T., Saotome, K., Seino, S., Shimojo, N., Matsushita, A., et al., (2013). *Medicine & Science in Sports & Exercise*. DOI: 10.1249/MSS.0b013e3182a38da8.
- McArdle, W. D., F. I. Katch, and V. L. Katch. (2001). *Exercise Physiology: Energy, Nutrition, and Human Performance*. 5th ed. Baltimore: Lippincott Williams & Wilkins.
- Menai, M., Charreire, H., Galan, P., et al. (2018). Differential Associations of Walking and Cycling with Body Weight, Body Fat and Fat Distribution – the ACTI-Cités Project. *Obes Facts*, 11, 221-231, DOI: 10.1159/000488532.
- Miller, M.M., Buettner, G.R., & Aust, S.D. (1990). Transition metals as catalysts of "autoxidation" reactions. *Free Radical Biology and Medicine*, Vol. 8, Issue 1, pp. 95-108, [https://doi.org/10.1016/0891-5849\(90\)90148-C](https://doi.org/10.1016/0891-5849(90)90148-C)
- Miyazaki, H., Oh-ishi, S., Ookawara, T., et al. (2001). Strenuous endurance training in humans reduces oxidative stress following exhausting exercise. *European Journal of Applied Physiology*, Vol. 84, Issue 1-2, pp. 1-6, <https://doi.org/10.1007/s004210000342>
- Moldoveanu, A. I., Shephard, R.J., & Shek, P.N. (2000). Exercise elevates plasma levels but not gene expression of IL-1b, IL-6, and TNF-a in blood mononuclear cells. *Journal of Applied Physiology* Vol. 89, No. 4, <https://doi.org/10.1152/jappl.2000.89.4.1499>
- Montuschi, P., Corradi, M., Ciabattini, G., et al. (1999). Increased 8-Isoprostane, a marker of oxidative stress, in exhaled condensate of

asthma patients. *American Journal of Respiratory and Critical Care Medicine*, Vol.160, No.1, <https://doi.org/10.1164/ajrccm.160.1.9809140>

Murias, J.M., Kowalchuk, J.M., and Paterson, D.H. (2010). Time course and mechanisms of adaptations in cardiorespiratory fitness with endurance training in older and young men. *J Appl Physiol*, 108: 621–627, doi:10.1152/jappphysiol.01152.2009.

Navarro, A., Gomez, C., Lopez-Cepero, J.M., et al. (2004). Beneficial effects of moderate exercise on mice aging: survival, behavior, oxidative stress, and mitochondrial electron transfer. *American Journal of Physiology*, Vol. 286, Issue 3, pp. 505-511, <https://doi.org/10.1152/ajpregu.00208.2003>

Oberg, W. (2007). Physical activity prescription: our best medicine. *Integrative Medicine*, Vol. 6, No. 5, pp. 18-22

Olusi, S.O. (2002). Obesity is an independent risk factor for plasma lipid peroxidation and depletion of erythrocyte cytoprotective enzymes in humans. *Int J Obes Relat Metab Disord.*, Vol. 26, pp. 1159–1164.

Ozata, M., Mergen, M., Oktenli, C. et al., (2002). Increased oxidative stress and hypozincemia in male obesity. *Clin Biochem*, Vol. 35, pp. 627–631.

Ozdamar, B., Bose, R., Barrios-Rodiles, M., et al. (2005). Regulation of the polarity protein Par6 by TGF $\beta$  receptors controls epithelial cell plasticity. *Science*, Vol. 307, Issue 5715, pp. 1603-1609. DOI: 10.1126/science.1105718

Packer, L. (1997). Oxidants, antioxidant nutrients and the athlete. *Journal of Sports Sciences*, Vol. 15, Issue 3, pp. 353-363, <https://doi.org/10.1080/026404197367362>

Pfeilschifter, J., Bonewald, L., & Mundy, G.R. (1990). Characterization of the latent transforming growth factor  $\beta$  complex in bone. *Journal of Bone and Mineral Research*, Vol. 5, Np. 1, pp. 49-58, <https://doi.org/10.1002/jbmr.5650050109>

Petibois, C., & Deleris, G. (2005). Evidence that erythrocytes are highly susceptible to exercise oxidative stress: FT-IR spectrometric studies at the molecular level. *Cell Biology International*, Vol. 29, Issue 8, pp. 709-716, <https://doi.org/10.1016/j.cellbi.2005.04.007>

- Plowman, S.A. and Smith, D.L. (2008). *Exercise Physiology for Health, Fitness and Performance*. 2<sup>nd</sup> Edition. Philadelphia: Lippincott Williams & Wilkins.
- Pociask, D.A., Sime, P.J., and Brody, A.R. (2004). Asbestos-derived reactive oxygen species activate TGF- $\beta$ 1. *Laboratory Investigation*, Vol. 84, pp. 1013–1023
- Pomatto, L.C.D. and Davies, K.J.A. (2018). Adaptive homeostasis and the free radical theory of ageing. *Free Radical Biology and Medicine*, <https://doi.org/10.1016/j.freeradbiomed.2018.06.016>.
- Pomatto, L.C.D. and Davies, K.J.A. (2017). The role of declining adaptive homeostasis in ageing. *Journal of Physiology*, doi: 10.1113/JP275072.
- Powers, S.K., Criswell, D., Lawler, J., et al. (1994). Influence of exercise and fiber type on antioxidant enzyme activity in rat skeletal muscle. *The American Physiological Society*, Downloaded from [www.physiology.org/journal/ajpregu](http://www.physiology.org/journal/ajpregu)
- Powers, S.K., Lawler, J., Dempsey, J.A., et al. (1989). Effects of incomplete pulmonary gas exchange on  $\dot{V}O_{2\max}$ . *Journal of Applied Physiology*, Vol. 66, No. 6. <https://doi.org/10.1152/jappl.1989.66.6.2491>
- Prieto, J.A., Gonzales, V., Del Valle, M., and Nistal, P. (2013). The influence of age on aerobic capacity and health indicators of three rescue groups. *International Journal of Occupational Safety and Ergonomics*, 19:1, 19-27, DOI: 10.1080/10803548.2013.11076963
- Pryor, W.A. (1986). Oxy-radicals and related species: their formation, lifetimes, and reactions. *Annu. Rev. Physiol.*, Vol. 48, pp. 657-667.
- Pugh, L.G.C.E. (1974). The relation of oxygen intake and speed in competition cycling and comparative observations on the bicycle ergometer. *Journal of Physiology*, Vol. 241, pp. 795 - 808.
- Quindry, J.C., Stone, W.L., King, J. and Broeder, C.E. (2003). The Effects of Acute Exercise on Neutrophils and Plasma Oxidative Stress. *Medicine & Science in Sports & Exercise*. DOI: 10.1249/01.MSS.0000074568.82597.0B
- Radak, Z., and Taylor, A. W. (2019). *Exercise and Hormesis. The Science of Hormesis in Health and Longevity*. Elsevier Inc. <https://doi.org/10.1016/b978-0-12-814253-0.00005-x>

- Radak, Z., Zhao, Z., Koltai, E., et al. (2013). Oxygen consumption and usage during physical exercise: the balance between oxidative stress and ROS-dependent adaptive signaling. *Antioxidants and Redox Signaling*, Vol.18, No.10, pp.1208-1246, DOI: 10.1089/ars.2011.4498
- Radak, Z., Chung, H. Y., & Goto, S. (2007). Systemic adaptation to oxidative challenge induced by regular exercise. *Free Radical Biology & Medicine* 44 (2008) 153–159, doi:10.1016/j.freeradbiomed.2007.01.029
- Radak, Z., Naito, H., Kaneko, T., et al. (2002). Exercise training decrease DNA damage and increases DNA repair and resistance against oxidative stress of protein in aged rat skeletal muscle. *European Journal of Physiology*, Vol. 445, Issue 2, pp. 273-278, <https://doi.org/10.1007/s00424-002-0918-6>
- Radak, Z., Taylor, A.W., Ohno, H., and Goto, S. (2001). Adaptations to exercise-induced oxidative stress: from muscle to brain. *Exercise Immunology Review*, Vol. 7, pp. 90-107
- Ramel, A., Wagner, K.H., & Elmadfa, I. (2004). *Eur J Nutr*, Vol. 43, Issue 2–6, DOI 10.1007/s00394-004-0432-z
- Reichert, F. F., Barros, A. J. D., Domingues, M. R., & Hallal, P. C. (2007). The role of perceived personal barriers to engagement in leisure-time physical activity. *American Journal of Public Health*, 97(3), 515–519. <https://doi.org/10.2105/AJPH.2005.070144>
- Rifkin, D.B. (2004). Latent transforming growth factor- $\beta$  (TGF- $\beta$ ) binding proteins: orchestrators of TGF- $\beta$  availability. *The Journal of Biological Chemistry*, Vol. 280, No. 9, Issue 4, pp. 7409–7412, DOI 10.1074/jbc.R400029200
- Rizvi, S.I., and Maurya, P.K. (2007). Alterations in antioxidant enzymes during aging in humans. *Molecular Biotechnology*, Vol. 37, pp. 58-61, DOI 10.1007/s12033-007-0048-7
- Rogers, M.A., Hagberg, J.M., Martin III, W.H., et al. (1990). Decline in  $\text{VO}_2$  max with aging in master athletes and sedentary men. *American Physiological Society*. Downloaded from [www.physiology.org/journal/jappl](http://www.physiology.org/journal/jappl)
- Sachdev, S & Davies, K.J.A. (2008). Production, detection, and adaptive responses to free radicals in exercise. *Free Radical Biology & Medicine*, Vol. 44, pp. 15-223, doi:10.1016/j.freeradbiomed.2007.07.019.

- Sacheck, J.M., & Blumberg, J.B. (2001). Role of vitamin E and oxidative stress in exercise. *Nutrition*, Vol. 17, Issue 10, pp. 809-814, [https://doi.org/10.1016/S0899-9007\(01\)00639-6](https://doi.org/10.1016/S0899-9007(01)00639-6)
- Sahlqvist, S, Goodman, A, Simmons, RK, Khaw, KT, Cavill, N, Foster, C, Ogilvie, D. (2013). The association of cycling with all-cause, cardiovascular and cancer mortality: Findings from the population-based EPIC-Norfolk cohort. *BMJ Open*, 3(11), e003797
- Scheerder, J and Vos, S. (2016). Social stratification in adults' sports participation from a time-trend perspective Results from a 40-year household study. *European Journal for Sport and Society*, 8 (1-2), 31-44, DOI: 10.1080/16138171.2011.11687868.
- Schnohr, P, Marott, J.L., Jensen, J.S., & Jensen, G.B., (2012). Intensity versus duration of cycling, impact on all-cause and coronary heart disease mortality: The Copenhagen City Heart Study. *European Journal of Preventive Cardiology*, 19(1), 73-80.
- Schreck, R & Baeuerle, P.A. (1991). A role for oxygen radicals as second messengers. *Trends in Cell Biology*, Vol. 1, Issues 1-3, pp. 39-42, [https://doi.org/10.1016/0962-8924\(91\)90072-H](https://doi.org/10.1016/0962-8924(91)90072-H)
- Sealy, R.C., Sarna, T., Wanner, E.J., & Reszka, K. (1984). Photosensitization of melanin: An electron spin resonance study of sensitized radical production and oxygen consumption. *Photochemistry and Photobiology*, Vol. 40, No. 4. pp. 453 - 459
- Selvakumar, C., Maheshwari, U., Suganthi, and Arcana. (2012). Oxidant-Antioxidant disturbance in men classified as obese according to the preliminary WHO guidelines for Asians. *Journal of Stress Physiology & Biochemistry*, Vol. 8 No. 1, pp. 172-181.
- Sen, C. K., (1995). Oxidants and antioxidants in exercise. *Journal of Applied Physiology*, Vol. 79, No. 3, <https://doi.org/10.1152/jappl.1995.79.3.675>
- Shi, Y., & Massague, J. (2003). Mechanisms of TGF  $\beta$  signaling from cell membrane to the nucleus. *Cell*, Vol. 113, Issue 6, pp. 685–700, [https://doi.org/10.1016/S0092-8674\(03\)00432-X](https://doi.org/10.1016/S0092-8674(03)00432-X)
- Silva, A.N., and Lima, L.C.F. (2015). The association between physical exercise and reactive oxygen species (ROS) production. *Journal of Sports Medicine & Doping Studies*. Vol. 5, No. 1, DOI: 10.4172/2161-0673.1000152

- Sjodin, B., Westing, Y. H., & Apple, F. S. (1990). Biochemical Mechanisms for Oxygen Free Radical Formation During Exercise, *Sports Medicine*, 10(4), 236–254.
- Stefanetti, R.J., Lamon, S., & Wallace, M., et al., (2014). Regulation of ubiquitin proteasome pathway molecular markers in response to endurance and resistance exercise and training. *Pflügers Archiv - European Journal of Physiology*. Volume 467, Issue 7, pp 1523–1537. <https://doi.org/10.1007/s00424-014-1587-y>
- Stohs, S.J., & Bagchi, D. (1995). Oxidative mechanism in the toxicity of metal ions. *Free Radical Biology & Medicine*, Vol. 18, No. 2, pp. 321–336, [https://doi.org/10.1016/0891-5849\(94\)00159-H](https://doi.org/10.1016/0891-5849(94)00159-H)
- Sumida, S., Tanaka, K., Kitao, H., Nakadomo, F. (1989). Exercise-induced lipid peroxidation and leakage of enzymes before and after vitamin E supplementation. *Int. J. Biochem*, 21 (8), 835-838.
- Taylor, A.G., Vincent, H.K., Bourguignon, C.M. (2006). Inflammation and oxidative stress are associated with a novel dietary “Phytochemical Index” in obese young adults. *North American Research Conference on Complementary and Alternative Medicine*, Edmonton, AB Canada.
- Tanaka, H., and Seals, D.R. (2008). Endurance exercise performance in Masters athletes: age-associated changes and underlying physiological mechanisms. *J Physiol* 586.1, pp 55–63, DOI: 10.1113/jphysiol.2007.141879
- Tauler, P., Aguilo, A., Gimeno, I. et al. (2003). Influence of vitamin C diet supplementation on endogenous antioxidant defenses during exhaustive exercise. *Pflugers Arch*, Vol. 446, pp. 658–664.
- Undang-undang Republik Indonesia No. 3 Tahun 2005 tentang Sistem Keolahragaan Nasional
- Van Dalen, C.J., Winterbourn, C.C., Santhilmohan, R., & Kettle, A.J. (2000). Nitrite as a substrate and inhibitor of myeloperoxidase: Implications for nitration and hypochlorous acid production at sites of inflammation. *The Journal of Biological Chemistry*, Vol. 275, No. 16, pp. 11638–11644
- Vincent, H.K., Innes, K.E., and Vincent, K.R. (2007). Oxidative stress and potential interventions to reduce oxidative stress in overweight and obesity. *Diabetes, Obesity, and Metabolism*, Vo. 9, pp. 813-839.




- Vincent, H.K., and Taylor, A.G. (2006). Biomarkers and potential mechanisms of obesity-induced oxidant stress in humans. *International Journal of Obesity*, Vol. 30, pp. 400-418.
- Vincent, H.K., Powers, S.K., Dirks, A.J., Scarpace, P.J. (2001). Mechanism for obesity-induced increase in myocardial lipid peroxidation. *Int J Obes Relat Metab Disord*, Vol. 25, pp. 378–388.
- Viru, A. and Viru, M. (2000). *Exercise and Sports Science*. Nature and training effects. edited by Garrett, W.E., and Kirkendall, D.T. Philadelphia: Lippincott Williams and Wilkins.
- Vollaard, N.B.J., Teodosiu, D.C., Frederiksson, K., et al. (2009). Systematic analysis of adaptations in aerobic capacity and submaximal energy metabolism provides a unique insight into determinants of human aerobic performance. *Journal of Applied Physiology*, Vol. 106, No. 5. <https://doi.org/10.1152/jappphysiol.91453.2008>
- Vollard, N.B.J., Shearman, J.P., and Cooper, C.E. (2005). Exercise-induced oxidative stress myths, realities and physiological relevance. *Sports Med*, 35(12), pp. 1045-1062.
- Wang, Y., Branicky, R., Noë, A., and Hekimi, S. (2018). Superoxide dismutases: Dual roles in controlling ROS damage and regulating ROS signaling. *J Cell Biol*. DOI: 10.1083/jcb.201708007
- Watson, T.A., Callister, R., Taylor, R.D. et al. (2005). Antioxidant restriction and oxidative stress in short-duration exhaustive exercise. *Med. Sci. Sports Exerc.*, Vol. 37, pp. 63 -71.
- Weydert, C., J., & Cullen, J., J. (2009). Measurement of superoxide dismutase, catalase and glutathione peroxidase in cultured cells and tissue. *Nature Protocols* | vol.5 no.1.
- Winterbourn, C.C., & Hampton, M.B. (2008). Thiol chemistry and specificity in redox signalling. *Free Radical Biology and Medicine*, Vol. 45, Issue 5, pp. 549-561, <https://doi.org/10.1016/j.freeradbiomed.2008.05.004>
- Wisloff U, Ellingson O, & Kemi O. (2009). High-Intensity Interval Training to Maximize Cardiac Benefit: Exercise and Sport Sciences Reviews. *Exercise and Sport Science Reviews*, 139–146. <https://doi.org/10.1097/JES.0b013e3181aa65fc>.
- Wood, L.G., Fitzgerald, D.A., Gibson, P.G., et al. (2000). Lipid peroxidation as determined by plasma isoprostanes is related to disease severity in mild asthma. *Lipids*, Vol. 35, No. 9, pp. 967-974

- Yamada, M., Suzuki, K., Kudo, S., et al. (2000). Effect of exhaustive exercise on human neutrophils in athletes. *Luminescence*, Vol. 15, pp. 15-20.
- Yoshikawa, T., & Naito, Y. (2002). What is oxidative stress? *JMAJ* 45(7): 271–276, 2002.
- Zelco, I.N., Mariani, T.J., & Folz, R.J. (2002). Superoxide dismutase multigene family: A comparison of the CuZn-SOD (SOD1), Mn-SOD (SOD2), and EC-SOD (SOD3) gene structures, evolution, and expression. *Free Radical Biology & Medicine*, Vol. 33, No. 3, pp. 337–349, 2002, [https://doi.org/10.1016/S0891-5849\(02\)00905-X](https://doi.org/10.1016/S0891-5849(02)00905-X)

## LAMPIRAN-LAMPIRAN

### Lampiran 1. Surat Rekomendasi Persetujuan Etik dari Komisi Etik Penelitian

 KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN UNIVERSITAS HASANUDDIN FAKULTAS KEDOKTERAN KOMITE ETIK PENELITIAN KESEHATAN 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, M.Med,Ph.D, SpCK. TELP. 081241850858, 0411 5780103. Fax : 0411-581431			
<b>REKOMENDASI PERSETUJUAN ETIK</b>			
Nomor : 51/UN4.6.4.5.31/ PP36/ 2020			
Tanggal: 22 Januari 2020			
Dengan ini Menyatakan bahwa Protokol dan Dokumen yang Berhubungan Dengan Protokol berikut ini telah mendapatkan Persetujuan Etik :			
No Protokol	UH19090666	No Sponsor Protokol	
Peneliti Utama	<b>dr. Ida Ayu Eka Widiastuti, M.Fis</b>	Sponsor	
Judul Peneliti	Analisis Kadar Malondialdehyde ( MDA ), Superoxide Dismutase (SOD) dan Transforming Growth Factor Beta- 1 (TGF-β1) Pada Pesepeda di Komunitas Sepeda Kota Mataram Nusa Tenggara Barat		
No Versi Protokol	2	Tanggal Versi	<b>19 Desember 2019</b>
No Versi PSP	2	Tanggal Versi	<b>19 Desember 2019</b>
Tempat Penelitian	<b>RS Universitas Hasanuddin Dan RS Universitas Mataram</b>		
Jenis Review	<input type="checkbox"/> Exempted <input checked="" type="checkbox"/> Expedited <input type="checkbox"/> Fullboard Tanggal	Masa Berlaku <b>22 Januari 2020</b> sampai <b>22 Januari 2021</b>	Frekuensi review lanjutan
Ketua Komisi Etik Penelitian Kesehatan FKUH	Nama <b>Prof.Dr.dr. Suryani As'ad, M.Sc.,Sp.GK (K)</b>	Tanda tangan 	
Sekretaris Komisi Etik Penelitian Kesehatan FKUH	Nama <b>dr. Agussalim Bukhari, M.Med.,Ph.D.,Sp.GK (K)</b>	Tanda tangan 	
Kewajiban Peneliti Utama:			
<ul style="list-style-type: none"> <li>Menyerahkan Amandemen Protokol untuk persetujuan sebelum di implementasikan</li> <li>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</li> <li>Menyerahkan Laporan Kemajuan (progress report) setiap 6 bulan untuk penelitian resiko tinggi dan setiap setahun untuk penelitian resiko rendah</li> <li>Menyerahkan laporan akhir setelah Penelitian berakhir</li> <li>Melaporkan penyimpangan dari protokol yang disetujui (protocol deviation / violation)</li> <li>Mematuhi semua peraturan yang ditentukan</li> </ul>			

## Lampiran 2. Penjelasan Sebelum Penelitian

Peneliti adalah mahasiswa program studi doktoral bidang Ilmu Kedokteran pada Universitas Hasanuddin Makassar. Kami sedang melakukan penelitian tentang “**Analisis Kadar Malondialdehyde (MDA), Superoxide Dismutase (SOD) dan Transforming Growth Factor Beta-1 (TGF- $\beta$ 1) pada Pesepeda di Komunitas Sepeda Kota Mataram Nusa Tenggara Barat**” Keterlibatan dan informasi yang Saudara berikan sangat berguna untuk perkembangan ilmu pengetahuan, khususnya Fisiologi Keolahragaan dan untuk mendapatkan manfaat optimal dari latihan bersepeda bagi kesehatan sebagai akibat adanya mekanisme adaptasi terhadap latihan (*training adaptation*). Semua hasil pengukuran bersifat rahasia.

Partisipasi Saudara sangat kami butuhkan. Kami akan melakukan: (1) pemeriksaan antropometrik, yang meliputi penimbangan berat badan, pengukuran tinggi badan, pengukuran lingkaran pinggang dan panggul, serta pengukuran persentase lemak, (2) pengukuran nilai  $VO_{2maks}$  dengan menggunakan alat *treadmill*, sekaligus tes pembebanan, dan (3) prosedur pengambilan darah vena di daerah lengan, sebanyak 6 cc, masing-masing 3 cc sebelum dan setelah tes pembebanan, **untuk pemeriksaan MDA, SOD, dan TGF- $\beta$ 1**, yang akan dilakukan secara aseptik oleh tenaga laboran yang terlatih, setelah sebelumnya Saudara melakukan puasa selama 10 jam. Apabila terjadi risiko efek samping akibat prosedur penelitian, maka Saudara akan mendapatkan tanggungan semua biaya pengobatan dan perawatan yang dibutuhkan sampai Saudara pulih. Sebagai kompensasi Saudara akan menerima souvenir berupa barang yang bermanfaat bagi Saudara.

Sekali lagi, perlu kami sampaikan, apapun hasil dari pengukuran ini tidak akan kami bocorkan ke orang lain atau pihak manapun tanpa persetujuan Saudara. Hasil penelitian ini akan kami seminarkan dengan tetap menjaga kerahasiaan Saudara, dan hak subjek tetap kami jaga serta rahasiakan.

Jika ada sesuatu hal yang Saudara ingin tanyakan atau masalah yang terjadi yang berhubungan dengan penelitian ini, silahkan menghubungi saya: Ida Ayu Eka Widiastuti, di nomor telepon: 081936747490

Sebelum menandatangani formulir izin ini, perlu diketahui bahwa:

- Saudara mempunyai hak berpartisipasi dalam penelitian ini dengan dasar kerahasiaan dijamin.
- Saudara berhak sewaktu-waktu untuk menarik izin dari partisipasi

kapanpun sebelum penelitian berakhir, tanpa perlu memberikan alasan. Bila Saudara memutuskan untuk berhenti berpartisipasi, tak seorangpun boleh memaksa Saudara untuk berubah pikiran dan tak seorangpun boleh melakukan tindakan diskriminasi apapun terhadap Saudara.

PENELITI

Ida Ayu Eka Widiastuti

### Lampiran 3. Formulir Persetujuan

#### **FORMULIR PERSETUJUAN SETELAH PENJELASAN**

Saya yang bertandatangan di bawah ini :

Nama : .....  
 Umur : .....  
 Masa Kerja : .....  
 Satuan : .....  
 Alamat : .....

Setelah mendengar/membaca dan mengerti penjelasan yang diberikan mengenai tujuan, manfaat, dan apa yang akan dilakukan pada penelitian ini, menyatakan setuju untuk ikut dalam penelitian ini secara sukarela tanpa paksaan.

Saya tahu bahwa keikutsertaan saya ini bersifat sukarela tanpa paksaan, sehingga saya bisa menolak ikut atau mengundurkan diri dari penelitian ini. Saya berhak bertanya atau meminta penjelasan pada peneliti bila masih ada hal yang belum jelas atau masih ada hal yang ingin saya ketahui tentang penelitian ini.

Saya juga mengerti bahwa semua biaya yang dikeluarkan sehubungan dengan penelitian ini, akan ditanggung oleh peneliti. Saya percaya bahwa keamanan dan kerahasiaan data penelitian akan terjamin dan saya dengan ini menyetujui semua data saya yang dihasilkan pada penelitian ini untuk disajikan dalam bentuk lisan maupun tulisan.

Dengan membubuhkan tandatangan saya di bawah ini, saya menegaskan keikutsertaan saya secara sukarela dalam studi penelitian ini.

	<b>Nama</b>	<b>Tanda tangan</b>	<b>Tgl/Bln/Thn</b>
Responden	.....	.....	.....
Saksi 1	.....	.....	.....
Saksi 2	.....	.....	.....

Penanggung Jawab Penelitian:

Nama : Ida Ayu Eka Widiastuti  
 Alamat : Jl. Merdeka Raya XVII/22, Pagesangan Mataram  
 Tlp : 081936747490

## Lampiran 4. Formulir Data Subjek Penelitian

No. Subjek
------------

### DATA SUBJEK PENELITIAN

#### I. Identitas Subjek

Nama :  
 Umur :  
 Jenis kelamin : laki-laki/perempuan\*  
 Nama klub sepeda :  
 Alamat :  
 No. Hp :  
 Tanggal pemeriksaan :

#### II. Data Antropometrik Subjek

Berat badan :  
 Tinggi badan :  
 Lingkar pinggang/perut :  
 Lingkar panggul :  
 Persentase lemak tubuh :

#### III. Nilai $VO_{2maks.}$ :

#### IV. Pola Hidup

Merokok : Ya / Tidak\*  
 Jika ya, lama merokok : .....tahun  
 Jumlah batang rokok/hari : .....batang  
 Minum minuman beralkohol : Ya / Tidak\*

**V. Riwayat penyakit**

Hipertensi : Ya / Tidak\*

Diabetes melitus : Ya / Tidak\*

Penyakit jantung : Ya / Tidak\*

Penyakit paru : Ya / Tidak\*

Penyakit keganasan : Ya / Tidak\*

**VI. Pemeriksaan Laboratorium**

- Kadar MDA serum sebelum tes pembebanan : .....  $\mu\text{mol/L}$
- Kadar TGF- $\beta$ 1 serum sebelum tes pembebanan : ..... pg/mL
- Kadar MDA serum setelah tes pembebanan : .....  $\mu\text{mol/L}$
- Kadar TGF- $\beta$ 1 serum setelah tes pembebanan : ..... pg/dL
- Kadar SOD eritrosit : .....  $\mu\text{g/ml}$



## Lampiran 5. Hasil Analisis Statistik

### 1. Karakteristik Subjek Penelitian

<b>Descriptive Statistics</b>					
	N	Minimum	Maximum	Mean	Std. Deviation
Umur	34	22.00	64.00	40.7059	10.79711
BMI	34	19.64	30.67	24.6786	2.89569
LP	34	72.00	102.00	85.5000	7.13931
SISTOLIK	34	100.00	140.00	121.9118	11.54797
DIASTOLIK	34	60.00	90.00	79.8529	7.43510
VO2maks	34	30.30	70.08	39.7674	7.33349
Kecepatan	34	19.00	36.40	26.9697	4.66581
Jaraktempuh	34	1223.00	10005.00	4315.6471	2450.02761
SOD	34	312.50	382187.50	19365.8088	64408.41041
MDA1	34	1.07	5.04	2.8426	.95267
TGF1	34	53.78	498.05	256.9663	107.93224
Valid N (listwise)	34				

## 2. Korelasi jarak tempuh bersepeda dan VO<sub>2</sub>maks.

### a. Usia <40 tahun

#### Correlations

			Jaraktempuh	VO2maks
Spearman's rho	Jaraktempuh	Correlation Coefficient	1.000	.508*
		Sig. (2-tailed)	.	.037
		N	17	17
	VO2maks	Correlation Coefficient	.508*	1.000
		Sig. (2-tailed)	.037	.
		N	17	17

\*. Correlation is significant at the 0.05 level (2-tailed).

### b. Usia 40-50 tahun

#### Correlations

			Jaraktempuh	VO2maks
Spearman's rho	Jaraktempuh	Correlation Coefficient	1.000	.285
		Sig. (2-tailed)	.	.425
		N	10	10
	VO2maks	Correlation Coefficient	.285	1.000
		Sig. (2-tailed)	.425	.
		N	10	10

### c. Usia >50 tahun

#### Correlations

		Jaraktempuh	VO2maks
Jaraktempuh	Pearson Correlation	1	.738
	Sig. (2-tailed)		.058
	N	7	7
VO2maks	Pearson Correlation	.738	1
	Sig. (2-tailed)	.058	
	N	7	7

### 3. Korelasi Jarak Tempuh Bersepeda dan SOD

#### a. Usia <40 tahun

			Jaraktempuh	SOD
Spearman's rho	Jaraktempuh	Correlation Coefficient	1.000	.191
		Sig. (2-tailed)	.	.462
		N	17	17
	SOD	Correlation Coefficient	.191	1.000
		Sig. (2-tailed)	.462	.
		N	17	17

#### b. Usia 40-50 tahun

			Jaraktempuh	SOD
Spearman's rho	Jaraktempuh	Correlation Coefficient	1.000	.079
		Sig. (2-tailed)	.	.829
		N	10	10
	SOD	Correlation Coefficient	.079	1.000
		Sig. (2-tailed)	.829	.
		N	10	10

#### c. Usia >50 tahun

		Jaraktempuh	SOD
Jaraktempuh	Pearson Correlation	1	-.125
	Sig. (2-tailed)		.789
	N	7	7
SOD	Pearson Correlation	-.125	1
	Sig. (2-tailed)	.789	
	N	7	7

#### 4. Korelasi Jarak Tempuh Bersepeda dan MDA

##### a. Usia <40 tahun

**Correlations**

		Jaraktempuh	MDA1
Jaraktempuh	Pearson Correlation	1	.373
	Sig. (2-tailed)		.141
	N	17	17
MDA1	Pearson Correlation	.373	1
	Sig. (2-tailed)	.141	
	N	17	17

##### b. Usia 40-50 tahun

**Correlations**

		Jaraktempuh	MDA1
Jaraktempuh	Pearson Correlation	1	-.241
	Sig. (2-tailed)		.502
	N	10	10
MDA1	Pearson Correlation	-.241	1
	Sig. (2-tailed)	.502	
	N	10	10

##### c. Usia >50 tahun

**Correlations**

		Jaraktempuh	MDA1
Jaraktempuh	Pearson Correlation	1	.562
	Sig. (2-tailed)		.189
	N	7	7
MDA1	Pearson Correlation	.562	1
	Sig. (2-tailed)	.189	
	N	7	7

## 5. Korelasi Jarak Tempuh Bersepeda dan TGF- $\beta$ 1

### a. Usia <40 tahun

#### Correlations

		Jaraktempuh	TGF1
Jaraktempuh	Pearson Correlation	1	-.125
	Sig. (2-tailed)		.631
	N	17	17
TGF1	Pearson Correlation	-.125	1
	Sig. (2-tailed)	.631	
	N	17	17

### b. Usia 40-50 tahun

#### Correlations

		Jaraktempuh	TGF1
Jaraktempuh	Pearson Correlation	1	-.030
	Sig. (2-tailed)		.934
	N	10	10
TGF1	Pearson Correlation	-.030	1
	Sig. (2-tailed)	.934	
	N	10	10

### c. Usia >50 tahun

#### Correlations

		Jaraktempuh	TGF1
Jaraktempuh	Pearson Correlation	1	.570
	Sig. (2-tailed)		.182
	N	7	7
TGF1	Pearson Correlation	.570	1
	Sig. (2-tailed)	.182	
	N	7	7

## 6. Korelasi Kecepatan Bersepeda dan VO<sub>2</sub>maks.

### a. Usia <40 tahun

#### Correlations

			Kecepatan	VO2maks
Spearman's rho	Kecepatan	Correlation Coefficient	1.000	.682**
		Sig. (2-tailed)	.	.003
		N	17	17
	VO2maks	Correlation Coefficient	.682**	1.000
		Sig. (2-tailed)	.003	.
		N	17	17

\*\* . Correlation is significant at the 0.01 level (2-tailed).

### b. Usia 40-50 tahun

#### Correlations

			Kecepatan	VO2maks
Spearman's rho	Kecepatan	Correlation Coefficient	1.000	.321
		Sig. (2-tailed)	.	.365
		N	10	10
	VO2maks	Correlation Coefficient	.321	1.000
		Sig. (2-tailed)	.365	.
		N	10	10

### c. Usia >50 tahun

#### Correlations

		Kecepatan	VO2maks
Kecepatan	Pearson Correlation	1	.191
	Sig. (2-tailed)		.682
	N	7	7
VO2maks	Pearson Correlation	.191	1
	Sig. (2-tailed)	.682	
	N	7	7

## 7. Korelasi Kecepatan Bersepeda dan SOD

### a. Usia <40 tahun

**Correlations**

			Kecepatan	SOD
Spearman's rho	Kecepatan	Correlation Coefficient	1.000	-.054
		Sig. (2-tailed)	.	.837
		N	17	17
	SOD	Correlation Coefficient	-.054	1.000
		Sig. (2-tailed)	.837	.
		N	17	17

### b. Usia 40-50 tahun

**Correlations**

			Kecepatan	SOD
Spearman's rho	Kecepatan	Correlation Coefficient	1.000	.139
		Sig. (2-tailed)	.	.701
		N	10	10
	SOD	Correlation Coefficient	.139	1.000
		Sig. (2-tailed)	.701	.
		N	10	10

### c. Usia >50 tahun

**Correlations**

		Kecepatan	SOD
Kecepatan	Pearson Correlation	1	.454
	Sig. (2-tailed)		.307
	N	7	7
SOD	Pearson Correlation	.454	1
	Sig. (2-tailed)	.307	
	N	7	7

## 8. Korelasi Kecepatan Bersepeda dan MDA

### a. Usia <40 tahun

**Correlations**

		Kecepatan	MDA1
Kecepatan	Pearson Correlation	1	-.061
	Sig. (2-tailed)		.817
	N	17	17
MDA1	Pearson Correlation	-.061	1
	Sig. (2-tailed)	.817	
	N	17	17

### b. Usia 40-50 tahun

**Correlations**

		Kecepatan	MDA1
Kecepatan	Pearson Correlation	1	.161
	Sig. (2-tailed)		.656
	N	10	10
MDA1	Pearson Correlation	.161	1
	Sig. (2-tailed)	.656	
	N	10	10

### c. Usia >50 tahun

**Correlations**

		Kecepatan	MDA1
Kecepatan	Pearson Correlation	1	.239
	Sig. (2-tailed)		.606
	N	7	7
MDA1	Pearson Correlation	.239	1
	Sig. (2-tailed)	.606	
	N	7	7



## 9. Korelasi Kecepatan Bersepeda dan TGF- $\beta$ 1

### a. Usia <40 tahun

**Correlations**

		Kecepatan	TGF1
Kecepatan	Pearson Correlation	1	-.143
	Sig. (2-tailed)		.584
	N	17	17
TGF1	Pearson Correlation	-.143	1
	Sig. (2-tailed)	.584	
	N	17	17

### b. Usia 40-50 tahun

**Correlations**

		Kecepatan	TGF1
Kecepatan	Pearson Correlation	1	-.177
	Sig. (2-tailed)		.625
	N	10	10
TGF1	Pearson Correlation	-.177	1
	Sig. (2-tailed)	.625	
	N	10	10

### c. Usia >50 tahun

**Correlations**

		Kecepatan	TGF1
Kecepatan	Pearson Correlation	1	-.102
	Sig. (2-tailed)		.828
	N	7	7
TGF1	Pearson Correlation	-.102	1
	Sig. (2-tailed)	.828	
	N	7	7