

DAFTAR PUSTAKA

- Aguiar, A.S., Duzzioni, M., Remor, A.P., Tristão, F.S.M., Matheus, F.C., Raisman-Vozari, R., Latini, A., Prediger, R.D., 2016. Moderate-intensity physical exercise protects against experimental 6-hydroxydopamine-induced hemiparkinsonism through Nrf2-antioxidant response element pathway. *Neurochemical Research* 41, 64–72. doi:10.1007/s11064-015-1709-8
- Ahmetov, I.I., Fedotovskaya, O.N., Allele, A.G., 2015. *Current Progress in Sports Genomics*, 1st ed, *Advances in Clinical Chemistry*. Elsevier Inc. doi:10.1016/bs.acc.2015.03.003
- Alper Yilmaz, E.G., 2010. Components and Mechanisms of Regulation of Gene Expression. *Methods in Molecular Biology* 674. doi:10.1007/978-1-60761-854-6_2
- Arora, S., Yang, J.M., Kinzy, T.G., Utsumi, R., Okamoto, T., Kitayama, T., Ortiz, P.A., Hait, W.N., 2003. Identification and Characterization of an Inhibitor of Eukaryotic Elongation Factor 2 Kinase against Human Cancer Cell Lines. *Cancer Research* 63, 6894–6899. doi:10.1152/advan.00052.2006.
- Asia, S., Mediterranean, E., 2010. Burden: mortality, morbidity and risk factors. *Handbook of Disease Burdens and Quality of Life Measures* 1–31. doi:10.1007/978-0-387-78665-0_5231
- Baar, K., 2004. Involvement of PPAR γ co-activator-1, nuclear respiratory factors 1 and 2, and PPAR α in the adaptive response to endurance exercise. *Proceedings of the Nutrition Society* 63, 269–273. doi:10.1079/pns2004334
- Baar, K., 2002. Adaptations of skeletal muscle to exercise: rapid increase in the transcriptional coactivator PGC-1. *The FASEB Journal* 16, 1879–1886. doi:10.1096/fj.02-0367com
- Baker, J.S., McCormick, M.C., Robergs, R.A., 2010. Interaction among skeletal muscle metabolic energy systems during intense exercise. *Journal of Nutrition and Metabolism* 2010, 1–12. doi:10.1155/2010/905612
- Barajas, B., Che, N., Yin, F., Rowshanrad, A., Orozco, L.D., Gong, K.W., Wang, X., Castellani, L.W., Reue, K., Lusic, A.J., Araujo, J.A., 2011. NF-E2-related factor 2 promotes atherosclerosis by effects on plasma lipoproteins and cholesterol transport that overshadow antioxidant protection. *Arteriosclerosis, Thrombosis, and Vascular Biology* 31, 58–66. doi:10.1161/ATVBAHA.110.210906
- Barbieri, E., Agostini, D., Polidori, E., Potenza, L., Guescini, M., Lucertini, F., Annibalini, G., Stocchi, L., De Santi, M., Stocchi, V., 2015. The pleiotropic effect of physical exercise on mitochondrial dynamics in aging skeletal muscle. *Oxidative Medicine and Cellular Longevity* 2015. doi:10.1155/2015/917085
- Billat, V.L., Hamard, L., Koralsztein, J.P., 2002. The Influence of Exercise Duration at $\dot{V}O_2$ max on the Offtransient Pulmonary Oxygen Uptake Phase During High Intensity Running Activity. *Archives of Physiology and Biochemistry* 110, 383–

392. doi:10.1076/apab.110.5.383.11831

- Bonora, M., Patergnani, S., Rimessi, A., de Marchi, E., Suski, J.M., Bononi, A., Giorgi, C., Marchi, S., Missiroli, S., Poletti, F., Wieckowski, M.R., Pinton, P., 2012. ATP synthesis and storage. *Purinergic Signalling* 8. doi:10.1007/s11302-012-9305-8
- Bouchard, C., 2000. Genomic scan for maximal oxygen uptake and its response to training in the HERITAGE Family Study. *Journal of Applied Physiology* 88.
- Bowtell, J., Kelly, V., 2019. Fruit-Derived Polyphenol Supplementation for Athlete Recovery and Performance. *Sports Medicine*. doi:10.1007/s40279-018-0998-x
- Calvo, S.E., Clauser, K.R., Mootha, V.K., 2016. MitoCarta2.0: An updated inventory of mammalian mitochondrial proteins. *Nucleic Acids Research* 44, D1251–D1257. doi:10.1093/nar/gkv1003
- Canning, P., Sorrell, F.J., Bullock, A.N., 2015. Structural basis of Keap1 interactions with Nrf2. *Free Radical Biology and Medicine* 88, 101–107. doi:10.1016/j.freeradbiomed.2015.05.034
- Cao, Q., Mak, K.M., Ren, C., Lieber, C.S., 2004. Leptin stimulates tissue inhibitor of metalloproteinase-1 in human hepatic stellate cells. Respective roles of the JAK/STAT and JAK-mediated H₂O₂-dependent MAPK pathways. *Journal of Biological Chemistry* 279, 4292–4304. doi:10.1074/jbc.M308351200
- Carro, E., Nunez, A., Busiguina, S., 2000. Circulating insulin-like growth factor 1 mediates effects of exercise on the brain. *The Journal of Neuroscience* 20, 2926–2933. doi:10.1016/j.tins.2006.06.011
- Cerrito, C., 2016. Factors Influencing VO₂ max. *Carla Cantrell* 1, 1.
- Chen, P.B., Yang, J.S., Park, Y., 2018. Adaptations of Skeletal Muscle Mitochondria to Obesity, Exercise, and Polyunsaturated Fatty Acids. *Lipids* 53, 271–278. doi:10.1002/lipd.12037
- Coffey, V.G., Hawley, J. a, 2007. The Molecular Basis of Training Adaptation. *Sports Medicine* 37, 737–763. doi:10.2165/00007256-200737090-00001
- Craig, I., Meyersfeld, D., 2017. The Genetics of Athletic Performance 1–31.
- Crilly, M.J., Tryon, L.D., Erlich, A.T., Hood, D.A., 2016. The role of Nrf2 in skeletal muscle contractile and mitochondrial function. *Journal of Applied Physiology* 121, 730–740. doi:10.1152/jappphysiol.00042.2016
- D'Souza, A.R., Minczuk, M., 2018. Mitochondrial transcription and translation: Overview. *Essays in Biochemistry* 62, 309–320. doi:10.1042/EBC20170102
- Damirchi, A., Babaei, P., Gholamali, M., Ranjbar, K., 2012. Mitochondrial Biogenesis in Skeletal Muscle: Exercise and Aging. *Skeletal Muscle - From Myogenesis to Clinical Relations* 10, 220–237. doi:10.5772/47292
- Darren E.R. Warburton, Crystal Whitney Nicol, S.S.D.B.A., 2006. Review Health benefits of physical activity: the evidence Darren. *Family Medicine and Primary Care Review* 8, 1110–1115. doi:10.1503/cmaj.051351

- Denicola, G.M., Karreth, F.A., Humpton, T.J., Gopinathan, A., Wei, C., Frese, K., Mangal, D., Yu, K.H., Yeo, C.J., Calhoun, E.S., Scrimieri, F., Winter, J.M., Hruban, R.H., Iacobuzio-Donahue, C., Kern, S.E., Blair, I.A., Tuveson, D.A., 2011. Oncogene-induced Nrf2 transcription promotes ROS detoxification and tumorigenesis. *Nature* 475, 106–110. doi:10.1038/nature10189
- Depkes RI, 2017. Pemeriksaan Dan Pembinaan Kesehatan Haji Mencapai Istithaah Kesehatan Jemaah Haji Untuk Menuju Keluarga Sehat, in: *Petunjuk Teknis Permenkes Nomor 15 Tahun 2016*. p. 119.
- Depkes RI, 2009. Undang Undang No. 36 Tahun 2009 Tentang Kesehatan.
- Di, W., Lv, J., Jiang, S., Lu, C., Yang, Z., Ma, Z., Hu, W., Yang, Y., Xu, B., 2018. PGC-1: The energetic regulator in cardiac metabolism. *Current Issues in Molecular Biology* 28, 29–46. doi:10.21775/cimb.028.029
- Domingo, D.R., Arbelo, T.F., 2007. Síndrome de vómitos cíclicos. *Revista Cubana de Pediatría* 79, 111–131. doi:10.1007/s10648-007-9057-0.Exercise
- Done, A.J., Traustadóttir, T., 2016. Nrf2 mediates redox adaptations to exercise. *Redox Biology* 10, 191–199. doi:10.1016/j.redox.2016.10.003
- Dong, J., Sulik, K.K., Chen, S.Y., 2008. Nrf2-mediated transcriptional induction of antioxidant response in mouse embryos exposed to ethanol in vivo: Implications for the prevention of fetal alcohol spectrum disorders. *Antioxidants and Redox Signaling* 10, 2023–2033. doi:10.1089/ars.2007.2019
- DR, L., PJ, M., Callister, R., CE, C., 2008. The relationship between pedometer step counts and estimated VO₂Max as determined by a submaximal fitness test in adolescents. *Pediatric Exercise Science* 20, 273–284. doi:10.1123/pes.20.3.273
- Drake, J.C., Wilson, R.J., Yan, Z., 2015. Molecular mechanisms for mitochondrial adaptation to exercise training in skeletal muscle. *FASEB Journal* 1–10. doi:10.1096/fj.15-276337
- Du, S., Cao, Y., Zhou, T., Setiawan, A., Thandar, M., Koy, V., Nurumal, M.S. Bin, Anh, H., Kunaviktikul, W., Hu, Y., 2019. The knowledge, ability, and skills of primary health care providers in SEANERN countries: A multi-national cross-sectional study. *BMC Health Services Research* 19, 1–8. doi:10.1186/s12913-019-4402-9
- Effects, S., Encyclopedia, T.I., Reactions, A.D., Edition, S., 2002. Identification of the interactive interface and phylogenetic conservation of the Nrf2-Keap1 system 1, 807–820.
- Erlich, A.T., Brownlee, D.M., Beyfuss, K., Hood, D.A., 2018. Exercise induces TFEB expression and activity in skeletal muscle in a pgc-1 α -dependent manner. *American Journal of Physiology - Cell Physiology* 314, C62–C72. doi:10.1152/ajpcell.00162.2017
- Eynon, N., Hanson, E.D., Lucia, A., Houweling, P.J., Garton, F., North, K.N., Bishop, D.J., 2013. Genes for elite power and sprint performance: ACTN3 leads the way. *Sports Medicine* 43, 803–817. doi:10.1007/s40279-013-0059-4
- Eynon, N., Sagiv, M., Meckel, Y., Duarte, J.A., Alves, A.J., Yamin, C., Sagiv, M.,

- Goldhammer, E., Oliveira, J., 2009. NRF2 intron 3 A/G polymorphism is associated with endurance athletes' status. *Journal of Applied Physiology* (Bethesda, Md. : 1985) 107, 76–9. doi:10.1152/jappphysiol.00310.2009
- Fabel, K., Fabel, K., Tam, B., Kaufer, D., Baiker, A., Simmons, N., Kuo, C.J., Palmer, T.D., Elisa, S., 2003. 5_First-experimental-results-comparing-a-photolytic-versus-photocatalytic-reactor-working-in-real-indoor-air-conditions_2011_12th-International-Conference-on-Indoor-Air-Quality-and-Climate-2011 18. doi:10.1046/j.1460-9568.2003.03041.x
- Fikenzer, K., Fikenzer, S., Laufs, U., Werner, C., 2018. Effects of endurance training on serum lipids. *Vascular Pharmacology* 101, 9–20. doi:10.1016/j.vph.2017.11.005
- Firstbeat Technologies, L., 2014. Automated Fitness Level (VO 2 max) Estimation with Heart Rate and Speed Data. *Firstbeat* 1–9. doi:doi:10.2514/6.2009-3382
- Fl, M., Hoppeler, H., 2003. Molecular basis of skeletal muscle plasticity-from gene to form and function 159–216. doi:10.1007/s10254-002-0004-7
- Fox, R.J., Miller, D.H., Phillips, J.T., Hutchinson, M., Havrdova, E., Kita, M., Yang, M., Raghupathi, K., Novas, M., Sweetser, M.T., Vigiuetta, V., Dawson, K.T., 2012. Placebo-Controlled Phase 3 Study of Oral BG-12 or Glatiramer in Multiple Sclerosis. *New England Journal of Medicine* 367, 1087–1097. doi:10.1056/NEJMoa1206328
- Fumiki Katsuokaa,* and Masayuki Yamamotoa, B., 2016. Small Maf proteins (MafF, MafG, MafK): History, structure and function. *HHS Public Access* 586, 1–24. doi:10.1016/j.gene.2016.03.058.
- Garnier, A., Veksler, V., 2008. Transcriptional control of mitochondrial biogenesis : the central role of PGC-1 a 208–217. doi:10.1093/cvr/cvn098
- Gureev, A.P., Shaforostova, E.A., Popov, V.N., 2019. Regulation of mitochondrial biogenesis as a way for active longevity: Interaction between the Nrf2 and PGC-1 α signaling pathways. *Frontiers in Genetics* 10, 1–12. doi:10.3389/fgene.2019.00435
- Hammack-Brown, L.Z.K.N.B., 2016. Analyzing data from a pretest-posttest control group design: Understanding the importance of statistical assumptions. *European Journal of Training and Development* 40, 1–39. doi:10.1108/EJTD-08-2015-0066
- He, Z., Hu, Y., Feng, L., Li, Y., Liu, G., Xi, Y., Wen, L., Lucia, A., 2008. NRF-1 genotypes and endurance exercise capacity in young Chinese men. *British Journal of Sports Medicine* 42, 361–366. doi:10.1136/bjism.2007.042945
- He, Z., Hu, Y., Feng, L., Lu, Y., Liu, C., Xi, Y., Wen, L., McNaughton, L.R., 2007. NRF2 genotype improves endurance capacity in response to training. *International Journal of Sports Medicine* 28, 717–721. doi:10.1055/s-2007-964913
- He, Z., Hu, Y., Feng, L., Lu, Y., Liu, G., Xi, Y., Wen, L., Mcnaughton, L.R., Science, E., Kingdom, U., 2007. NRF2 Genotype Improves Endurance Capacity in Response to Training 717–721. doi:10.1055/s-2007-964913

- Heden, T.D., Johnson, J.M., Ferrara, P.J., Eshima, H., Verkerke, A.R.P., Wentzler, E.J., Siripoksup, P., Narowski, T.M., Coleman, C.B., Lin, C. Te, Ryan, T.E., Reidy, P.T., de Castro Brás, L.E., Karner, C.M., Burant, C.F., Alan Maschek, J., Cox, J.E., Mashek, D.G., Kardon, G., Boudina, S., Zeczycki, T.N., Rutter, J., Shaikh, S.R., Vance, J.E., Drummond, M.J., Darrell Neuffer, P., Funai, K., 2019. Mitochondrial PE potentiates respiratory enzymes to amplify skeletal muscle aerobic capacity. *Science Advances* 5, 1–11. doi:10.1126/sciadv.aax8352
- Hershey, J.W.B., Sonenberg, N., Mathews, M.B., 2012. Principles of translational control: An overview. *Cold Spring Harbor Perspectives in Biology* 4, 1–10. doi:10.1101/cshperspect.a009829
- Hoppeler, H., Flu, M., 2003. Plasticity of Skeletal Muscle Mitochondria: 95–104. doi:10.1249/01.MSS.0000043292.99104.12
- Horner, F.E., Slade, J., Bilzon, J.L.J., 2013. The Effect of Anatomical Placement and Trunk Adiposity on the Reliability and Validity of Triaxial Accelerometer Output During Treadmill Exercise. *Physical Activity & Health* 1, 1193–1200.
- Hyochol Ahn, et al, 2017, 2017. Understanding D-Ribose and Mitochondrial Function. *Physiology & Behavior* 176, 139–148. doi:10.1016/j.physbeh.2017.03.040
- I, M.J.E., Scarpulla, R.C., 1990. NRF-1: a trans-activator of nuclear- encoded respiratory genes in animal cells.
- Indonesia, P.K.H., 2018. www.puskeshaji.kemkes.go.id [WWW Document]. PKHI.
- Irene Gallego Romero, Ilya Ruvinsky, and Y.G. 1Department, 2014. Comparative studies of gene expression and the evolution of gene regulatio. *National Institutes of Health* 13, 1–27. doi:10.1038/nrg3229.
- Itoh, K., Tong, K.I., Yamamoto, M., 2004. Molecular mechanism activating Nrf2-Keap1 pathway in regulation of adaptive response to electrophiles. *Free Radical Biology and Medicine* 36, 1208–1213. doi:10.1016/j.freeradbiomed.2004.02.075
- Jakobsen, M.D., Sundstrup, E., Brandt, M., Jay, K., Aagaard, P., Andersen, L.L., 2015. Physical exercise at the workplace prevents deterioration of work ability among healthcare workers: Cluster randomized controlled trial. *BMC Public Health* 15, 1–9. doi:10.1186/s12889-015-2448-0
- James, C.A., Hayes, M., Willmott, A.G.B., Gibson, O.R., Flouris, A.D., Schlader, Z.J., Maxwell, N.S., 2017. Defining the determinants of endurance running performance in the heat. *Temperature* 4, 314–329. doi:10.1080/23328940.2017.1333189
- Jarmi, T., Agarwal, A., 2009. Heme oxygenase and renal disease. *Current Hypertension Reports* 11, 56–62. doi:10.1007/s11906-009-0011-z
- Jiang, T., Harder, B., Rojo De La Vega, M., Wong, P.K., Chapman, E., Zhang, D.D., 2015. P62 links autophagy and Nrf2 signaling. *Free Radical Biology and Medicine* 88, 199–204. doi:10.1016/j.freeradbiomed.2015.06.014
- Jones, A.M., Carter, H., 2000. The Effect of Endurance Training on Parameters of

Aerobic Fitness. *Sports Med* 29, 374–383.

- Jones, C.M., Baker-Groberg, S.M., Cianchetti, F.A., Glynn, J.J., Healy, L.D., Lam, W.Y., Nelson, J.W., Parrish, D.C., Phillips, K.G., Scott-Drechsel, D.E., Tagge, I.J., Zelaya, J.E., Hinds, M.T., McCarty, O.J.T., 2014. Measurement science in the circulatory system. *Cellular and Molecular Bioengineering* 7, 1–14. doi:10.1007/s12195-013-0317-4
- Jornayvaz, F.R. and S.G.I., 2014. Regulation of mitochondrial biogenesis. *Essays Biochem.* 47, 1–15. doi:10.1042/bse0470069.Regulation
- Kang, I., Chu, C.T., Kaufman, B.A., Protein, C., 2019. The mitochondrial transcription factor TFAM in neurodegeneration: Emerging evidence and mechanisms. *FEBS Lett* 592, 793–811. doi:10.1002/1873-3468.12989
- Kasai, S., Shimizu, S., Tatara, Y., Mimura, J., Itoh, K., 2020. Regulation of Nrf2 by mitochondrial reactive oxygen species in physiology and pathology. *Biomolecules* 10, 1–21. doi:10.3390/biom10020320
- Kaspar, J.W., Niture, S.K., Jaiswal, A.K., 2009. Nrf2:Keap1 signaling in oxidative stress. *Free Radical Biology and Medicine* 47, 1304–1309. doi:10.1016/j.freeradbiomed.2009.07.035
- Kemenag RI, 2018. www.kemenag.go.id [WWW Document]. Data Jumlah Jamaah Haji Indonesia.
- Kementerian Agama, 2008. Undang Undang Republik Indonesia Nomor 13 Tahun 2008. Penyelenggaraan Kesehatan Haji 1, 1–32.
- Kobayashi, A., Kang, M.-I., Okawa, H., Ohtsuji, M., Zenke, Y., Chiba, T., Igarashi, K., Yamamoto, M., 2004. Oxidative Stress Sensor Keap1 Functions as an Adaptor for Cul3-Based E3 Ligase To Regulate Proteasomal Degradation of Nrf2. *Molecular and Cellular Biology* 24, 7130–7139. doi:10.1128/MCB.24.16.7130-7139.2004
- Kobayashi, A., Kang, M.-I., Watai, Y., Tong, K.I., Shibata, T., Uchida, K., Yamamoto, M., 2006. Oxidative and Electrophilic Stresses Activate Nrf2 through Inhibition of Ubiquitination Activity of Keap1. *Molecular and Cellular Biology* 26, 221–229. doi:10.1128/mcb.26.1.221-229.2006
- Kobayashi, M., Li, L., Iwamoto, N., Nakajima-Takagi, Y., Kaneko, H., Nakayama, Y., Eguchi, M., Wada, Y., Kumagai, Y., Yamamoto, M., 2009. The Antioxidant Defense System Keap1-Nrf2 Comprises a Multiple Sensing Mechanism for Responding to a Wide Range of Chemical Compounds. *Molecular and Cellular Biology* 29, 493–502. doi:10.1128/mcb.01080-08
- Kobayashi, M., Yamamoto, M., 2006. Nrf2-Keap1 regulation of cellular defense mechanisms against electrophiles and reactive oxygen species. *Advances in Enzyme Regulation* 46, 113–140. doi:10.1016/j.advenzreg.2006.01.007
- Kumar, A., Katz, L.S., Schulz, A.M., Kim, M., Honig, L.B., Li, L., Davenport, B., Homann, D., Garcia-Ocaña, A., Herman, M.A., Haynes, C.M., Chipuk, J.E., Scott, D.K., 2018. Activation of Nrf2 is required for normal and ChREBPA-augmented glucose-stimulated B-cell proliferation. *Diabetes*. doi:10.2337/db17-0943

- Lockie, R.G., Dawes, J.J., Moreno, M.R., Cesario, K.A., Balfany, K., Stierli, M., Dulla, J.M., Orr, R.M., 2019. Relationship Between the 20-m Multistage Fitness Test and 2.4-km Run in Law Enforcement Recruits. *Journal of Strength and Conditioning Research* 1. doi:10.1519/jsc.0000000000003217
- Ma, Q., 2013. Role of Nrf2 in oxidative stress and toxicity. *Annual Review of Pharmacology and Toxicology* 53, 401–426. doi:10.1146/annurev-pharmtox-011112-140320
- Maclejewska-Karłowska, A., Leońska-Duniec, A., Ciężczyk, P., Sawczuk, M., Eider, J., Ficek, K., Sawczyn, S., 2012. The GABPB1 gene A/G polymorphism in polish rowers. *Journal of Human Kinetics* 31, 115–120. doi:10.2478/v10078-012-0012-x
- Macinnis, M., 2018. Note . This article will be published in a forthcoming issue of the *International Journal of Sports Physiology and Performance* . The article appears here in its accepted , peer-reviewed form , as it was provided by the submitting author . It has not been .
- MacInnis, M.J., Gibala, M.J., 2017. Physiological adaptations to interval training and the role of exercise intensity. *Journal of Physiology* 595, 2915–2930. doi:10.1113/JP273196
- Maher, J.M., Dieter, M.Z., Aleksunes, L.M., Slitt, A.L., Guo, G., Tanaka, Y., Scheffer, G.L., Chan, J.Y., Manautou, J.E., Chen, Y., Dalton, T.P., Yamamoto, M., Klaassen, C.D., 2007. Oxidative and electrophilic stress induces multidrug resistance-associated protein transporters via the nuclear factor-E2-related factor-2 transcriptional pathway. *Hepatology* 46, 1597–1610. doi:10.1002/hep.21831
- Mairböurl, H., 2013. Red blood cells in sports: Effects of exercise and training on oxygen supply by red blood cells. *Frontiers in Physiology* 4 NOV, 1–13. doi:10.3389/fphys.2013.00332
- Mangiola, A., Vigo, V., Anile, C., De Bonis, P., Marziali, G., Lofrese, G., 2015. Role and Importance of IGF-1 in Traumatic Brain Injuries. *BioMed Research International* 2015, 1–11. doi:10.1155/2015/736104
- Martínez-Pinilla, E., Varani, K., Reyes-Resina, I., Angelats, E., Vincenzi, F., Ferreiro-Vera, C., Oyarzabal, J., Canela, E.I., Lanciego, J.L., Nadal, X., Navarro, G., Borea, P.A., Franco, R., 2017. Binding and signaling studies disclose a potential allosteric site for cannabidiol in cannabinoid CB2 receptors. *Frontiers in Pharmacology* 8, 1–10. doi:10.3389/fphar.2017.00744
- McMahon, M., Thomas, N., Itoh, K., Yamamoto, M., Hayes, J.D., 2004. Redox-regulated turnover of Nrf2 is determined by at least two separate protein domains, the redox-sensitive Neh2 degron and the redox-insensitive Neh6 degron. *Journal of Biological Chemistry* 279, 31556–31567. doi:10.1074/jbc.M403061200
- Menshikova, E. V., Ritov, V.B., Fairfull, L., Ferrell, R.E., Kelley, D.E., Goodpaster, B.H., 2006. Effects of exercise on mitochondrial content and function in aging human skeletal muscle. *Journals of Gerontology - Series A Biological Sciences and Medical Sciences* 61, 534–540. doi:10.1093/gerona/61.6.534

- Merry, T.L., Ristow, M., 2016. Nuclear factor erythroid-derived 2-like 2 (NFE2L2, Nrf2) mediates exercise-induced mitochondrial biogenesis and the anti-oxidant response in mice. *Journal of Physiology* 594, 5195–5207. doi:10.1113/JP271957
- Meyrat, A., von Ballmoos, C., 2019. ATP synthesis at physiological nucleotide concentrations. *Scientific Reports* 9, 1–10. doi:10.1038/s41598-019-38564-0
- Michelle, Lopez, C., 2011. Tahapan Ekspresi Gen. *Riview Article* 32 2.
- Mihl, C., Dassen, W.R.M., Kuipers, H., 2008. Cardiac remodelling: Concentric versus eccentric hypertrophy in strength and endurance athletes. *Netherlands Heart Journal* 16, 129–133. doi:10.1007/BF03086131
- Ministerio de Energía y Minas (MINEM), 2017. The Carboxy-Terminal Neh3 Domain of Nrf2 Is Required for Transcriptional Activation 25, 10895–10906. doi:10.1128/MCB.25.24.10895
- Moi, P., Asunis, I., Cao, A., 1994. Isolation of NF-E2-related factor 2 (Nrf2), a NF-E2-like basic leucine zipper transcriptional activator that binds to the tandem NF-E2/AP1 repeat of the β -globin locus control region 91, 9926–9930.
- Morrissy, S., Strom, J., Purdom-Dickinson, S., Chen, Q.M., 2012. NAD(P)H: Quinone oxidoreductase 1 is induced by progesterone in cardiomyocytes. *Cardiovascular Toxicology* 12, 108–114. doi:10.1007/s12012-011-9144-9
- Morton, R.H., Billat, V., 2000. Maximal endurance time at VO₂max. *Medicine and Science in Sports and Exercise* 32, 1496–1504. doi:10.1097/00005768-200008000-00020
- Motohashi, H., Katsuoka, F., Engel, J.D., Yamamoto, M., 2004. Small Maf proteins serve as transcriptional cofactors for keratinocyte differentiation in the Keap1-Nrf2 regulatory pathway. *Proceedings of the National Academy of Sciences* 101, 6379–6384. doi:10.1073/pnas.0305902101
- Motohashi, H., Yamamoto, M., 2004. Nrf2-Keap1 defines a physiologically important stress response mechanism. *Trends in Molecular Medicine* 10, 549–557. doi:10.1016/j.molmed.2004.09.003
- Moyes, C.D., 2003. Controlling muscle mitochondrial content. *Journal of Experimental Biology* 206, 4385–4391. doi:10.1242/jeb.00699
- Mul, J.D., Stanford, K.I., Hirshman, M.F., Goodyear, L.J., 2015. Exercise and Regulation of Carbohydrate Metabolism. *Progress in Molecular Biology and Translational Science* 135, 17–37. doi:10.1016/bs.pmbts.2015.07.020
- Muller, M., Mentel, M., van Hellemond, J.J., Henze, K., Woehle, C., Gould, S.B., Yu, R.-Y., van der Giezen, M., Tielens, A.G.M., Martin, W.F., 2012. Biochemistry and Evolution of Anaerobic Energy Metabolism in Eukaryotes. *Microbiology and Molecular Biology Reviews* 76, 444–495. doi:10.1128/mubr.05024-11
- Naito, Y., Uchiyama, K., Takagi, T., 2018. Dual antiplatelet therapy does not affect the Society for Free Radical Research Japan 10.3164/j6cb .18-16 1880 50860912-0009 JJCBN Original Article Kyj bn18-1 c oto, Japan urnal of Clinical Biochemistry and Nutrition the incidence of low?dose aspirin?ind. *Journal of Clinical Biochemistry and Nutrition* 64, 2016–2019.

doi:10.3164/jcbrn.18

- Neumann, C.A., Cao, J., Manevich, Y., 2009. Peroxiredoxin 1 and its role in cell signaling. *Cell Cycle* 8, 4072–4078. doi:10.4161/cc.8.24.10242
- Nystoriak, M.A., Bhatnagar, A., 2018. Cardiovascular Effects and Benefits of Exercise. *Frontiers in Cardiovascular Medicine* 5, 1–11. doi:10.3389/fcvm.2018.00135
- Oliveira, A.N., Hood, D.A., 2019. Exercise is mitochondrial medicine for muscle. *Sports Medicine and Health Science* 1, 11–18. doi:10.1016/j.smhs.2019.08.008
- Ostrander, E.A., Huson, H.J., Ostrander, G.K., 2009. Genetics of Athletic Performance. *Annual Review of Genomics and Human Genetics* 10, 407–429. doi:10.1146/annurev-genom-082908-150058
- Park, M., Ko, Y., Song, S.H., Kim, S., Yoon, H.J., 2013. Association of low aerobic fitness with hyperfiltration and albuminuria in men. *Medicine and Science in Sports and Exercise* 45, 217–223. doi:10.1249/MSS.0b013e318271b39f
- Pearson School and FE Colleges, 2006. Chapter 3: factors that contribute to successful endurance performance learning outcomes, in: *A2 PE for AQA*. pp. 29–38.
- Pedersen, B.K., Saltin, B., 2015. Exercise as medicine - Evidence for prescribing exercise as therapy in 26 different chronic diseases. *Scandinavian Journal of Medicine and Science in Sports* 25, 1–72. doi:10.1111/sms.12581
- Petter I, et al, 1997. The UDP glycosyltransferase gene superfamily recommended nomenclature update based on evolutionary divergence. 1997.pdf.
- Plank, J.L., Dean, A., 2014. Enhancer function: Mechanistic and genome-wide insights come together. *Molecular Cell* 55, 5–14. doi:10.1016/j.molcel.2014.06.015
- Psilander; Niklas, 2014. From the Department of Physiology and the effect of Different Exercise Regimens on Mitochondrial Biogenesis and Performance. Karolinska Institutet, Sweden.
- Puigserver, P., Spiegelman, B.M., 2003. Peroxisome proliferator-activated receptor- γ coactivator 1 α (PGC-1 α): Transcriptional coactivator and metabolic regulator. *Endocrine Reviews* 24, 78–90. doi:10.1210/er.2002-0012
- Pusat Kesehatan Haji Kemenkes RI, 2008. Pedoman Rekrutmen Petugas Kesehatan Haji Indonesia 1–26.
- Qiu, S., Bosnyák, E., Treff, G., Steinacker, J.M., Nieß, M., Krüger, K., Mooren, F.C., Zügel, M., Qiu, S., Bosnyák, E., Treff, G., 2018. Acute exercise-induced irisin release in healthy adults: Associations with training status and exercise mode. *European Journal of Sport Science* 0. doi:10.1080/17461391.2018.1478452
- Radak, Z., Torma, F., Berkes, I., Goto, S., Mimura, T., Posa, A., Balogh, L., Boldogh, I., Suzuki, K., Higuchi, M., Koltai, E., 2018. Exercise effects on physiological function during aging. *Free Radical Biology and Medicine* 1.

doi:S0891584918322731

- Radak, Z., Zhao, Z., Koltai, E., Ohno, H., Atalay, M., 2013. Oxygen consumption and usage during physical exercise: The balance between oxidative stress and ROS-dependent adaptive signaling. *Antioxidants and Redox Signaling* 18, 1208–1246. doi:10.1089/ars.2011.4498
- Ramachandran, B., Yu, G., Gulick, T., 2008. Nuclear respiratory factor 1 controls myocyte enhancer factor 2A transcription to provide a mechanism for coordinate expression of respiratory chain subunits. *Journal of Biological Chemistry* 283, 11935–11946. doi:10.1074/jbc.M707389200
- Ranković, G., Mutavdžić, V., Toskić, D., Preljević, A., Kocić, M., Nedin-Ranković, G., Damjanović, N., 2010. Aerobic capacity as an indicator in different kinds of sports. *Bosnian Journal of Basic Medical Sciences* 10, 44–48. doi:10.17305/bjbms.2010.2734
- Rao, X., Huang, X., Zhou, Z., Lin, X., 2013. An improvement of the $2^{-\Delta\Delta CT}$ method for quantitative real-time polymerase chain reaction data analysis. *Biostatistics, Bioinformatics and Biomathematics* 3, 71–85.
- Ratko Pavlović, Mensur Vrcić, Sid Solaković, Martin Pupiš, N.R., 2017. THE VALUES OF FITNESS INDEX AND VO₂max OF STUDENTS USING THE VALUES OF FITNESS INDEX AND VO₂max OF STUDENTS. *European Journal of Physical Education and Sport Science* 8620, 138–154. doi:10.5281/zenodo.1031979
- Reisman, S.A., Csanaky, I.I., Aleksunes, L.M., Klaassen, C.D., 2009. Altered disposition of acetaminophen in Nrf2-null and keap1-knockdown mice. *Toxicological Sciences* 109, 31–40. doi:10.1093/toxsci/kfp047
- Richards, C.E., Magin, P.J., Callister, R., 2009. Is your prescription of distance running shoes evidence-based? *British Journal of Sports Medicine* 43, 159–162. doi:10.1136/bjsm.2008.046680
- Rohani, 2017a. Gambaran Tingkat Kebugaran Peserta Pelatihan Tim Petugas Kesehatan Haji Indonesia (TKHI) Embarkasi Lombok Tahun 1438/2017M Dengan Metode Rockport di Balai Pelatihan Kesehatan Mataram Provinsi Nusa Tenggara Barat. *Media Bina Ilmiah* 53. doi:10.1017/CBO9781107415324.004
- Rohani, 2017b. Gambaran Tingkat Kebugaran Peserta Pelatihan Tim Petugas Kesehatan Haji Indonesia (TKHI) Embarkasi Lombok Tahun 1438H/2017M Dengan Metode Rockport Di Balai Pelatihan Kesehatan Mataram Provinsi Nusa Tenggara Barat. *Media Bina Ilmiah* 11, 82–90.
- Rush, B., 2002. Concepts and terms in genetic research--a primer. *Alcohol Research & Health: The Journal of the National Institute on Alcohol Abuse and Alcoholism* 26, 165–171. doi:PMC6683844
- Ryoo, I. geun, Kwak, M.K., 2018. Regulatory crosstalk between the oxidative stress-related transcription factor Nfe2l2/Nrf2 and mitochondria. *Toxicology and Applied Pharmacology* 359, 24–33. doi:10.1016/j.taap.2018.09.014
- S. M. Dyrstad, S. A. Anderssen, E. Edvardsen, B.H.H., 2015. Cardiorespiratory

- fitness in groups with different physical activity levels. *Scand J Med Sci Sports* 1–8. doi:10.1111/sms.12425
- Salehi, S., Shekari, M.J., Shahpar, F.M., 2014. Factors affecting maximal aerobic capacity (VO₂Max) in Iranian non-athletic women. *Advances in Environmental Biology* 8, 1077–1081. doi:287477511
- SASAKI, H., SUZUKI, A., SHITARA, M., HIKOSAKA, Y., OKUDA, K., MORIYAMA, S., YANO, M., FUJII, Y., 2013. Polymorphisms of NRF2 gene correlated with decreased FEV1 in lung cancers of smokers. *Biomedical Reports* 1, 484–488. doi:10.3892/br.2013.83
- Scarpulla, R.C., 2012. Metabolic control of mitochondrial biogenesis through the PGC-1 family regulatory network. *Biochim Biophys Acta* 1813, 1–22. doi:10.1016/j.bbamcr.2010.09.019.Metabolic
- Scarpulla, R.C., 2008. Transcriptional paradigms in mammalian mitochondrial biogenesis and function. *Physiological Reviews* 88. doi:10.1152/physrev.00025.2007
- Sekhar, K.R., Rachakonda, G., Freeman, M.L., 2010. Cysteine-based regulation of the CUL3 adaptor protein Keap1. *Toxicology and Applied Pharmacology* 244, 21–26. doi:10.1016/j.taap.2009.06.016
- Sigal Ben-Zaken et All, 2013, 2013. Note . This article will be published in a forthcoming issue of the *International Journal of Sports Physiology and Performance* . The article appears here in its accepted , peer-reviewed form , as it was provided by the submitting author . It has not been. *International Journal of Physiology and Performance (Epub) Epub*. doi:10.1123/ijsp.2014-0539
- Simioni, C., Zauli, G., Martelli, A.M., Vitale, M., Gonelli, A., Neri, L.M., 2018. Oxidative stress: role of physical exercise and antioxidant nutraceuticals in adulthood and aging. *Oncotarget* 9, 17181–17198. doi:10.18632/oncotarget.24729
- Slipicevic, O., Masic, I., 2012. Management Knowledge and Skills Required in the Health Care System of the Federation Bosnia and Herzegovina. *Materia Socio Medica* 24, 106. doi:10.5455/msm.2012.24.106-111
- Solis, W.A., Dalton, T.P., Dieter, M.Z., Freshwater, S., Harrer, J.M., He, L., Shertzer, H.G., Nebert, D.W., 2002. Glutamate-cysteine ligase modifier subunit: Mouse Gclm gene structure and regulation by agents that cause oxidative stress. *Biochemical Pharmacology* 63, 1739–1754. doi:10.1016/S0006-2952(02)00897-3
- Soriano, F.X., Baxter, P., Murray, L.M., Sporn, M.B., Gillingwater, T.H., Hardingham, G.E., 2009. Transcriptional regulation of the AP-1 and Nrf2 target gene sulfiredoxin. *Molecules and Cells* 27, 279–282. doi:10.1007/s10059-009-0050-y
- Strassburg, C.P., Manns, M.P., Tukey, R.H., 1998. Expression of the UDP-glucuronosyltransferase 1A locus in human colon. Identification and characterization of the novel extrahepatic UGT1A8. *Journal of Biological*

Chemistry 273, 8719–8726. doi:10.1074/jbc.273.15.8719

Sul-Sel, D., 2018. Seksi Kesehatan Haji.

Sumanta, M., 2017. Bioenergetics. *Biochimica et Biophysica Acta - Bioenergetics* 2, 1–11. doi:10.13140/RG.2.2.25798.78406

Sylta, K., Tknnessen, E., Sandbakk, K., Hammarström, D., Danielsen, J., Skovereng, K., Rknnestad, B.R., Seiler, S., 2017. Effects of high-intensity training on physiological and hormonal adaptations in well-trained cyclists. *Medicine and Science in Sports and Exercise* 49, 1137–1146. doi:10.1249/MSS.0000000000001214

Taylor, R.C., Acquaah-Mensah, G., Singhal, M., Malhotra, D., Biswal, S., 2008. Network inference algorithms elucidate Nrf2 regulation of mouse lung oxidative stress. *PLoS Computational Biology* 4, 1–15. doi:10.1371/journal.pcbi.1000166

Tebay, L.E., Robertson, H., Durant, S.T., Vitale, S.R., Penning, T.M., Dinkova-Kostova, A.T., Hayes, J.D., 2015. Mechanisms of activation of the transcription factor Nrf2 by redox stressors, nutrient cues, and energy status and the pathways through which it attenuates degenerative disease. *Free Radical Biology and Medicine* 88, 108–146. doi:10.1016/j.freeradbiomed.2015.06.021

Tonelli, C., Chio, I.I.C., Tuveson, D.A., 2018. Transcriptional Regulation by Nrf2. *Antioxidants and Redox Signaling* 29, 1727–1745. doi:10.1089/ars.2017.7342

Tońska, J.R. & M.K. & E.B. & K., 2018. Nuclear genes involved in mitochondrial diseases caused by instability of mitochondrial DNA. *Journal of Applied Genetics* 59, 43–57. doi:10.1007/s13353-017-0424-3

TRISHA D. SCRIBBANS†, STEPHAN VECSEY*, PAUL B. HANKINSON*, WILLIAM S. FOSTER*, and B.J.G.‡, 2016. The Effect of Training Intensity on VO₂max in Young Healthy Adults: A Meta-Regression and Meta-Analysis. *International Journal of Exercise Science* 9, 230–247.

Van Praag, H., 2008. Neurogenesis and exercise: Past and future directions. *NeuroMolecular Medicine* 10, 128–140. doi:10.1007/s12017-008-8028-z

Vargas-Mendoza, N., Morales-González, Á., Madrigal-Santillán, E.O., Madrigal-Bujaidar, E., Álvarez-González, I., García-Melo, L.F., Anguiano-Robledo, L., Fregoso-Aguilar, T., Morales-Gonzalez, J.A., 2019. Antioxidant and adaptive response mediated by Nrf2 during physical exercise. *Antioxidants* 8, 1–27. doi:10.3390/antiox8060196

Virbasius, J. V., Scarpulla, R.C., 1994. Activation of the human mitochondrial transcription factor A gene by nuclear respiratory factors: A potential regulatory link between nuclear and mitochondrial gene expression in organelle biogenesis 91.

Wang, J., Doré, S., 2007. Heme oxygenase-1 exacerbates early brain injury after intracerebral haemorrhage. *Brain* 130, 1643–1652. doi:10.1093/brain/awm095

Wang, P., Li, C.G., Qi, Z., Cui, D., Ding, S., 2016. Acute exercise stress promotes Ref1/Nrf2 signalling and increases mitochondrial antioxidant activity in

- skeletal muscle. *Experimental Physiology* 101, 410–420. doi:10.1113/EP085493
- Wang, Z., Cheng, K., Wan, L., Yan, L., Jiang, H., Liu, S., Lei, Y., Liao, B., 2015. Genome-wide analysis of the basic leucine zipper (bZIP) transcription factor gene family in six legume genomes. *BMC Genomics* 16, 1–15. doi:10.1186/s12864-015-2258-x
- Watz, H., Pitta, F., Rochester, C.L., Garcia-Aymerich, J., ZuWallack, R., Troosters, T., Vaes, A.W., Puhan, M.A., Jehn, M., Polkey, M.I., Vogiatzis, I., Clini, E.M., Toth, M., Gimeno-Santos, E., Waschki, B., Esteban, C., Hayot, M., Casaburi, R., Porszasz, J., McAuley, E., Singh, S.J., Langer, D., Wouters, E.F.M., Magnussen, H., Spruit, M.A., 2014. An official European respiratory society statement on physical activity in COPD. *European Respiratory Journal* 44. doi:10.1183/09031936.00046814
- Williams, C.J., Williams, M.G., Eynon, N., Ashton, K.J., Little, J.P., Wisloff, U., Coombes, J.S., 2017. Genes to predict VO₂max trainability: A systematic review. *BMC Genomics* 18. doi:10.1186/s12864-017-4192-6
- Winter, B., Breitenstein, C., Mooren, F.C., Voelker, K., Fobker, M., Lechtermann, A., Krueger, K., Fromme, A., Korsukewitz, C., Floel, A., Knecht, S., 2007. High impact running improves learning. *Neurobiology of Learning and Memory* 87, 597–609. doi:10.1016/j.nlm.2006.11.003
- Wolfrz, C.R., 2000. The Nrf2 transcription factor contributes both to the basal expression of glutathione S-transferases in mouse liver and to their induction by the chemopreventive synthetic antioxidants, butylated hydroxyanisole and ethoxyquin 33–41. doi:10.1042/bst0280033
- Wood, J.J., Drahota, A., Sze, K., Van Dyke, M., Decker, K., Fujii, C., Bahng, C., Renno, P., Hwang, W.C., Spiker, M., 2009. Brief report: Effects of cognitive behavioral therapy on parent-reported autism symptoms in school-age children with high-functioning autism. *Journal of Autism and Developmental Disorders* 39, 1608–1612. doi:10.1007/s10803-009-0791-7
- Xiao, L., Zhao, Z., He, F., Du, Z., 2019. Multivariable regulation of gene expression plasticity in metazoans. *Open Biology* 9. doi:10.1098/rsob.190150
- Yang, C., Ko, B., Hensley, C.T., Jiang, L., Wasti, A.T., Kim, J., Sudderth, J., Calvaruso, M.A., Lumata, L., Mitsche, M., Rutter, J., Merritt, M.E., DeBerardinis, R.J., 2014. Glutamine oxidation maintains the TCA cycle and cell survival during impaired mitochondrial pyruvate transport. *Molecular Cell* 56. doi:10.1016/j.molcel.2014.09.025
- Yang, Z.-F., Drumea, K., Mott, S., Wang, J., Rosmarin, A.G., 2014. GABP Transcription Factor (Nuclear Respiratory Factor 2) Is Required for Mitochondrial Biogenesis. *Molecular and Cellular Biology* 34, 3194–3201. doi:10.1128/mcb.00492-12
- Yueh, M.F., Tukey, R.H., 2007. Nrf2-Keap1 Signaling pathway regulates human UGT1A1 expression in vitro and in transgenic UGT1 mice. *Journal of Biological Chemistry* 282, 8749–8758. doi:10.1074/jbc.M610790200

- Zampieri, S., Pietrangelo, L., Loeffler, S., Fruhmann, H., Vogelauer, M., Burggraf, S., Pond, A., Grim-Stieger, M., Cvecka, J., Sedliak, M., Tirpáková, V., Mayr, W., Sarabon, N., Rossini, K., Barberi, L., De Rossi, M., Romanello, V., Boncompagni, S., Musarò, A., Sandri, M., Protasi, F., Carraro, U., Kern, H., 2015. Lifelong physical exercise delays age-associated skeletal muscle decline. *Journals of Gerontology - Series A Biological Sciences and Medical Sciences* 70, 163–173. doi:10.1093/gerona/glu006
- Zhang, Y., Wang, Y., Gupta, P., Chen, Z., 2015. Multidrug Resistance Proteins (MRPs) and Cancer Therapy 17, 802–812. doi:10.1208/s12248-015-9757-1
- Zhao, X.Q., Zhang, Y.F., Xia, Y.F., Zhou, Z.M., Cao, Y.Q., 2015. Promoter demethylation of nuclear factor-erythroid 2-related factor 2 gene in drug-resistant colon cancer cells. *Oncology Letters* 10, 1287–1292. doi:10.3892/ol.2015.3468