

REFERENCES

- Abdul Gh, M.A., Defronzo, R.A., 2010. Pathogenesis of insulin resistance in skeletal muscle. *J. Biomed. Biotechnol.* 2010:47-79
- Algaidi, S.A., Eldomiatiy, M.A., Elbastwisy, Y.M., Almasry, S.M., Desouky, M.K., Elnaggar, A.M., 2019. Effect of voluntary running on expression of myokines in brains of rats with depression. *Int. J. Immunopathol. Pharmacol.* 3:20-33
- Allen DL, Hittel DS, McPherron AC. 2011. Expression and function of myostatin in obesity, diabetes, and exercise adaptation. *Med Sci Sports Exerc.* 43(10). 1828-1835
- American Diabetes Association, 2005. Diagnosis and Classification of Diabetes Mellitus. Retrieved from https://care.diabetesjournals.org/content/37/Supplement_1/S81.full-text.pdf
- American Diabetes Association.,2010. Diagnosis and classification of diabetes mellitus [published correction appears in *Diabetes Care.* *Diabetes Care.* 33 (1)
- American diabetes association, 2020. Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes—2020. Retrieved from https://care.diabetesjournals.org/content/43/Supplement_1/S14
- Artasensi A, Pedretti A, Vistoli G, Fumagalli L, 2020. Type 2 Diabetes Mellitus: A Review of Multi-Target Drugs. *Molecules.* 25(8):1987
- Asiimwe, D., Mauti, G.O., Kiconco, R., 2020. Prevalence and Risk Factors Associated with Type 2 Diabetes in Elderly Patients Aged 45-80 Years at Kanungu District. *J. Diabetes Res.* 2020:146-152
- Azad, M., Khaledi, N., Hedayati, M., 2016. Effect of acute and chronic eccentric exercise on FOXO1 mRNA expression as fiber type transition factor in rat skeletal muscles. *Gene.*

Universitate de Barcelona, 2018. New tool to improve studies on exercise physiology - Universitat

de Barcelona. Retrieved from

https://www.ub.edu/web/ub/en/menu_eines/noticies/2019/07/033.html

Bassi, D., Bueno, P. de G., Nonaka, K.O., Selistre-Araujo, H.S., Leal, A.M. de O., 2015. Exercise alters myostatin protein expression in sedentary and exercised streptozotocin-diabetic rats.

Arch. Endocrinol. Metab. 59(2): 148–153

Barrientos, G. *et al.* (2015) ‘Cholesterol removal from adult skeletal muscle impairs excitation-contraction coupling and aging reduces caveolin-3 and alters the expression of other triadic proteins’, *Frontiers in Physiology*, 6(MAR), pp. 1111–1115

Biglari, S., Afousi, A.G., Mafi, F., Shabkhiz, F., 2020. High-intensity interval training-induced hypertrophy in gastrocnemius muscle via improved IGF-I/Akt/FoxO and myostatin/Smad signaling pathways in rats. *Physiol. Int*

Bogdanovich, S., Perkins, K.J., Krag, T.O.B., Whittemore, L., Khurana, T.S., 2005. Myostatin propeptide-mediated amelioration of dystrophic pathophysiology. *FASEB J.* 19(6):543-549

Bois, P.R.J., Grosveld, G.C., 2003. FKHR (FOXO1a) is required for myotube fusion of primary mouse myoblasts. *EMBO J.* 22(5):47-57

Bonaldo, P., Sandri, M., 2013. Cellular and molecular mechanisms of muscle atrophy. *DMM Dis. Model. Mech.* 6(1): 25–39.

Bordoni B, V.M., 2021. Anatomy, Bony Pelvis and Lower Limb, Gastrocnemius Muscle. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK532946/>

Busquets, S., Toledo, M., Marmonti, E., Orpí, M., Capdevila, E., Betancourt, A., López-Soriano, F.J., Argilés, J.M., 2012. Formoterol treatment downregulates the myostatin system in

skeletal muscle of cachectic tumour-bearing rats. *Oncol. Lett.* 3(1): 185–189.

- Capozza, F., Combs, T.P., Cohen, A.W., Cho, Y., Park, S., Schubert, W., Williams, T.M., Brasaemle, D.L., Jelicks, L.A., Scherer, P.E., Kim, J.K., Lisanti, M.P., Combs, T.P., Cohen, A.W., Park, S., Schubert, W., Williams, T.M., Brasaemle, D.L., Jelicks, L.A., Scherer, P.E., Kim, J.K., Caveolin-, M.P.L., 2021. Caveolin-3 knockout mice show increased adiposity and whole body insulin resistance , with ligand-induced insulin receptor instability in skeletal muscle. *Am J Physiol Cell Physiol.* 288(6): 1317–1331
- CARL J. CASPERSEN, KENNETH E. POWELL, GREGORY M. CHRISTENSON, 1985. Physical Activity, Exercise, and Physical Fitness: Definitions and Distinctions for Health-Related Research Synopsis. *Public Health Rep.* 100(2): 126–131.
- Carnac, G., Vernus, B., Bonnieu, A., 2007. Myostatin in the Pathophysiology of Skeletal Muscle. *Curr Genomics.* 8(7):415-422
- Chavanelle, V. *et al.* (2017) ‘Effects of high-intensity interval training and moderate-intensity continuous training on glycaemic control and skeletal muscle mitochondrial function in db/db mice’, *Scientific Reports*, 7(1), pp. 1–10
- CDC, 2021. Diabetes Risk Factors. Retrieved from <https://www.cdc.gov/diabetes/basics/risk-factors.html>
- Chavanelle, V., Boisseau, N., Otero, Y.F., Combaret, L., 2017. Effects of high-intensity interval training and moderate-intensity continuous training on glycaemic control and skeletal muscle mitochondrial function in db / db mice. *Sci Rep.* 7(1): 204
- Cho, J.E., Fournier, M., Da, X., Lewis, M.I., 2010. Time course expression of Foxo transcription factors in skeletal muscle following corticosteroid administration. *J. Appl. Physiol.* 108(1): 137–145

- Cohen, A.W., Combs, T.P., Scherer, P.E., Lisanti, M.P., 2003. Role of caveolin and caveolae in insulin signaling and diabetes. *Am. J. Physiol. - Endocrinol. Metab.* 285(6):1151-1160
- Colberg, S.R., Sigal, R.J., Fernhall, B., Regensteiner, J.G., Blissmer, B.J., Rubin, R.R., Chasan-Taber, L., Albright, A.L., Braun, B., 2010. Exercise and type 2 diabetes: The American College of Sports Medicine and the American Diabetes Association: Joint position statement. *Diabetes Care.* 33(12):147-167
- Colberg, S.R., Sigal, R.J., Yardley, J.E., Riddell, M.C., Dunstan, D.W., Dempsey, P.C., Horton, E.S., Castorino, K., Tate, D.F., 2016. Physical activity/exercise and diabetes: A position statement of the American Diabetes Association. *Diabetes Care* 39(11): 2065–2079
- Corrotte, M., Almeida, P.E., Tam, C., Castro-Gomes, T., Fernandes, M.C., Millis, B.A., Cortez, M., Miller, H., Song, W., Mangel, T.K., Andrews, N.W., 2013. Caveolae internalization repairs wounded cells and muscle fibers. *Elife* 2: 1–30
- Dalmau-Pastor, M., Fargues-Polo, B.J., Casanova-Martínez, D.J., Vega, J., Golanó, P., 2014. Anatomy of the triceps surae: a pictorial essay. *Foot Ankle Clin.* 19(4): 603–635.
- Diabetes UK, 2019. The risk factors of Type 2 diabetes. Retrived from <https://www.diabetes.org.uk/preventing-type-2-diabetes/diabetes-risk-factors>
- Dumitru, A. and Radu, M. (2018) ‘Section II Basic aspects of muscle atrophy 4 . Muscle changes during atrophy’, (February 2019)
- Draznin, B., 2006. Molecular mechanisms of insulin resistance: Serine phosphorylation of insulin receptor substrate-1 and increased expression of p85 α : The two sides of a coin. *Diabetes* 55(8): 2392–2397
- Edgerton, V.R., Smith, J.L., Simpson, D.R., 1975. Muscle fibre type populations of human leg muscles. *Histochem. J.* 7(3): 259–266

El-Kawy Tayel, S. G. A. *et al.* (2021) 'Histological structure of skeletal muscle in disuse muscle

atrophy and role of exercise', *Egyptian Journal of Histology*, 44(1), pp. 1–7

Escribano, O., Beneit, N., Rubio-Longás, C., López-Pastor, A.R., Gómez-Hernández, A., 2017.

The Role of Insulin Receptor Isoforms in Diabetes and Its Metabolic and Vascular Complications. *J. Diabetes Res.* 2017

Fargion, S., Dongiovanni, P., Guzzo, A., Colombo, S., Valenti, L., Fracanzani, A.L., 2005. Iron

and insulin resistance. *Aliment. Pharmacol. Ther. Suppl. 2*: 61–63

Fathi Hamouda, A., 2018. Ethical to using Rats in the Scientific Researches. *Pharm. Pharmacol.*

Int. J. 6(1): 23–25

Fiala GJ, Minguet S. Caveolin-1, 2018. The Unnoticed Player in TCR and BCR Signaling. *Adv*

Immunol. 137:83-133

Food and drugs administration, 2019. Retrived from [https://www.fda.gov/consumers/consumer-](https://www.fda.gov/consumers/consumer-updates/how-safely-use-glucose-meters-and-test-strips-diabetes)

[updates/how-safely-use-glucose-meters-and-test-strips-diabetes](https://www.fda.gov/consumers/consumer-updates/how-safely-use-glucose-meters-and-test-strips-diabetes)

Frontera, W.R., Ochala, J., 2015. Skeletal Muscle: A Brief Review of Structure and Function.

Behav. Genet. 96(3): 183–195

Frush, T.J., Noyes, F.R., 2015. Baker's Cyst: Diagnostic and Surgical Considerations. *Sports*

Health 7(4): 359–365.

Galbiati, F., Volonté, D., Chu, J.B., Li, M., Fine, S.W., Fu, M., Bermudez, J., Pedemonte, M.,

Weidenheim, K.M., Pestell, R.G., Minetti, C., Lisanti, M.P., 2000. Transgenic overexpression of caveolin-3 in skeletal muscle fibers induces a Duchenne-like muscular dystrophy phenotype. *Proc. Natl. Acad. Sci. U. S. A.* 97(17): 9689–9694

Gazzerro, E., Sotgia, F., Bruno, C., Lisanti, M.P., Minetti, C., 2010. Caveolinopathies: From the

biology of caveolin-3 to human diseases. *Eur. J. Hum. Genet.* 18: 137–145

- González Coraspe, J.A., Weis, J., Anderson, M.E., Münchberg, U., Lorenz, K., Buchkremer, S., Carr, S., Zahedi, R.P., Brauers, E., Michels, H., Sunada, Y., Lochmüller, H., Campbell, K.P., Freier, E., Hathazi, D., Roos, A., 2018. Biochemical and pathological changes result from mutated Caveolin-3 in muscle. *Skelet. Muscle* 8(1): 1–19
- Groussard, C. *et al.* (2020) ‘Tissue-specific oxidative stress modulation by exercise: A comparison between MICT and HIIT in an obese rat model’, *Oxidative Medicine and Cellular Longevity*, 2019
- Gross, D.N., Van Den Heuvel, A.P.J., Birnbaum, M.J., 2008. The role of FoxO in the regulation of metabolism. *Oncogene* 9(3):208-214.
- Gu, X., Reagan, A.M., McClellan, M.E., Elliott, M.H., 2017. Caveolins and caveolae in ocular physiology and pathophysiology. *Prog. Retin. Eye Res.* 56: 84–106.
- Greaves P, Chouinard L, Ernst H, Mecklenburg L, Pruijboom-Brees IM, Rinke M, Rittinghausen S, Thibault S, von Erichsen J, Yoshida T. 2013. Proliferative and non-proliferative lesions of the rat and mouse soft tissue, skeletal muscle, and mesothelium. *J Toxicol Pathol* 26(3 suppl):1S-26S. Abstract: <http://www.ncbi.nlm.nih.gov/pubmed/25035576>
- Hagiwara, Y., Sasaoka, T., Araishi, K., Imamura, M., Yorifuji, H., Nonaka, I., Ozawa, E., Kikuchi, T., 2000. Caveolin-3 deficiency causes muscle degeneration in mice. *Hum. Mol. Genet.* 9: 3047–3054.
- Harvard Medical School, 2018. Type 2 Diabetes Mellitus. Retrived from https://www.health.harvard.edu/a_to_z/type-2-diabetes-mellitus-a-to-z
- Hernández-Deviez, D.J., Howes, M.T., Laval, S.H., Bushby, K., Hancock, J.F., Parton, R.G., 2008. Caveolin regulates endocytosis of the muscle repair protein, dysferlin. *J. Biol. Chem.*

- Hittel, D. S. *et al.* (2009) 'Increased secretion and expression of myostatin in skeletal muscle from extremely obese women', *Diabetes*, 58(1), pp. 30–38
- Huang Y, Deng Y, Shang L, Yang L, Huang J, Ma J, Liao X, Zhou H, Xian J, Liang G, Huang Q, 2019. Effect of type 2 diabetes mellitus caveolin-3 K15N mutation on glycometabolism. *Exp Ther Med*. 18(4):2531-2539
- Jørgensen, S.B., Wojtaszewski, J.F.P., Viollet, B., Andreelli, F., Birk, J.B., Hellsten, Y., Schjerling, P., Vaulont, S., Neufer, P.D., Richter, E.A., Pilegaard, H., 2005. Effects of alpha-AMPK knockout on exercise-induced activation in mouse skeletal muscle. *FASEB J*. 19(9):1146-1148
- Kamei, Y., Hattori, M., Hatazawa, Y., Kasahara, T., Kanou, M., Kanai, S., Yuan, X., Suganami, T., Lamers, W.H., Kitamura, T., Ogawa, Y., 2014. FOXO1 activates glutamine synthetase gene in mouse skeletal muscles through a region downstream of 3'-UTR: Possible contribution to ammonia detoxification. *Am. J. Physiol. - Endocrinol. Metab*. 307(6): 485–493
- Kamei, Y., Miura, S., Suzuki, M., Kai, Y., Mizukami, J., Taniguchi, T., Mochida, K., Hata, T., Matsuda, J., Aburatani, H., Nishino, I., Ezaki, O., 2004. Skeletal muscle FOXO1 (FKHR) transgenic mice have less skeletal muscle mass, down-regulated type I (slow twitch/red muscle) fiber genes, and impaired glycemic control. *J. Biol. Chem*. 279(39): 41114–41123
- Kasuga, M., 1984. Structure and function of the insulin receptor. *Tanpakushitsu Kakusan Koso*.29(7):533-550
- Kazi, A.A., Blonde, L., 2001. Classification of diabetes mellitus. *Clin. Lab. Med*. 21(1):1-13
- Kharroubi AT, Darwish HM., 2015. Diabetes mellitus: The epidemic of the century. *World J*

- Konopka, A. R. *et al.* (2010) 'Molecular adaptations to aerobic exercise training in skeletal muscle of older women', *Journals of Gerontology - Series A Biological Sciences and Medical Sciences*, 65 A(11), pp. 1201–1207
- Lenk, K., Schur, R., Linke, A., Erbs, S., Matsumoto, Y., Adams, V., Schuler, G., 2009. Impact of exercise training on myostatin expression in the myocardium and skeletal muscle in a chronic heart failure model. *Eur. J. Heart Fail.* 11(4): 342–348
- Little, J.P., Gillen, J.B., Percival, M.E., Safdar, A., Tarnopolsky, M.A., Punthakee, Z., Jung, M.E., Gibala, M.J., 2011. Low-volume high-intensity interval training reduces hyperglycemia and increases muscle mitochondrial capacity in patients with type 2 diabetes. *J Appl Physiol* 111: 1554–1560
- Louis, E. *et al.* (2007) 'Time course of proteolytic, cytokine, and myostatin gene expression after acute exercise in human skeletal muscle', *Journal of Applied Physiology*, 103(5), pp. 1744–1751
- Machrina, Y., Damanik, H.A.-R., Purba, A., Lindarto, D., 2018. Effect various type of exercise to Insr gene expression, skeletal muscle insulin receptor and insulin Resistance on Diabetes Mellitus Type-2 model Rats. *Int. J. Heal. Sci.* 6: 50–56
- Machrina, Y., Purba, A., Lindarto, D., Maskoen, A.M., 2019. Exercise intensity alter insulin receptor gene expression in diabetic type-2 rat model. *Open Access Maced. J. Med. Sci.* 7(20): 3370–3375
- MacInnis, M.J., Gibala, M.J., 2017. Physiological adaptations to interval training and the role of exercise intensity. *J. Physiol.* 595(9): 2915–2930
- Mangmool, S., Denkaew, T., Parichatikanond, W., Kurose, H., 2017. β -Adrenergic receptor and

insulin resistance in the heart. *Biomol. Ther.* 25(1): 44–56

Mann, S., Beedie, C. and Jimenez, A. (2014) ‘Differential effects of aerobic exercise, resistance training and combined exercise modalities on cholesterol and the lipid profile: review, synthesis and recommendations’, *Sports Medicine*, 44(2), pp. 211–221

Matsakas, A. *et al.* (2006) ‘Effect of swimming on myostatin expression in white and red gastrocnemius muscle and in cardiac muscle of rats’, *Experimental Physiology*, 91(6), pp. 983–994

Mayo Clinic, 2021. Type 2 diabetes - Symptoms and causes. Retrived from <https://www.mayoclinic.org/diseases-conditions/type-2-diabetes/symptoms-causes/syc-20351193>

Mayo Clinic, 2019. Diabetes prevention: 5 tips for taking control. Retrived from <https://www.mayoclinic.org/diseases-conditions/type-2-diabetes/in-depth/diabetes-prevention/art-20047639>

Mayo Clinic, 2011. Type 2 diabetes - Diagnosis and treatment. Retrived from <https://www.mayoclinic.org/diseases-conditions/type-2-diabetes/diagnosis-treatment/drc-20351199>

McKinnell, I.W., Rudnicki, M.A., 2004. Molecular mechanisms of muscle atrophy. *Cell*. 119(7): 907-910

McNally, E.M., De Sá Moreira, E., Duggan, D.J., Bönnemann, C.G., Lisanti, M.P., Lidov, H.G.W., Vainzof, M., Passos-Bueno, M.R., Hoffman, E.P., Zatz, M., Kunkel, L.M., 1998. Caveolin-3 in muscular dystrophy. *Hum. Mol. Genet.* 7(5): 871–877

Melissa Dewulf., 2018. Role of caveolin-3 and caveolae mechanics in muscle pathophysiology. *Cellular Biology. Université Paris-Saclay English*. NNT: 2018SACLS067

- Mengarelli, A., Gentili, A., Strazza, A., Burattini, L., Fioretti, S., Di Nardo, F., 2018. Co-activation patterns of gastrocnemius and quadriceps femoris in controlling the knee joint during walking. *J. Electromyogr.* 42:117-122
- Milan, G., Romanello, V., Pescatore, F., Armani, A., Paik, J.H., Frasson, L., Seydel, A., Zhao, J., Abraham, R., Goldberg, A.L., Blaauw, B., DePinho, R.A., Sandri, M., 2015. Regulation of autophagy and the ubiquitin-proteasome system by the FoxO transcriptional network during muscle atrophy. *Nat. Commun*
- Mirzaeyan, E., Roozbani, M., Shirvani, H., 2020. The Effect of High Intensity Interval Training on the Expression of Enolase3, Caveolin 3 Genes and Plasma Levels of SGOT Enzyme in the Cardiac Tissue of Male Rats with Fatty Liver (Steatosis). *Yafteh* 22(3): 108–117
- Moreno-Villanueva, M. *et al.* (2019) ‘Influence of acute exercise on dna repair and parp activity before and after irradiation in lymphocytes from trained and untrained individuals’, *International Journal of Molecular Sciences*, 20(12)
- Motiani, K. K. *et al.* (2017) ‘Two weeks of moderate-intensity continuous training, but not high-intensity interval training, increases insulin-stimulated intestinal glucose uptake’, *Journal of Applied Physiology*, 122(5), pp. 1188–1197
- Muñoz, P., Mora, S., Sevilla, L., Kaliman, P., Tomàs, E., Gumà, A., Testar, X., Palacín, M., Zorzano, A., 1996. Expression and insulin-regulated distribution of caveolin in skeletal muscle: Caveolin does not colocalize with glut4 in intracellular membranes. *J. Biol. Chem.* 271(14): 8133–8139
- Myers, J., Kokkinos, P., Nyelin, E., 2019. Physical activity, cardiorespiratory fitness, and the metabolic syndrome. *Nutrients* 11(7): 1–13
- Nair, A. K. *et al.* (2012) ‘Association analysis of common variants in FOXO3 with type 2 diabetes in a South Indian Dravidian population’, *Gene*, 491(2), pp. 182–18
- Nayak, N.K., Khedkar, G.D., Khedkar, C.C., Khedkar, C.D., 2015. *Skeletal Muscle*, 1st ed,

- Nijhuis, T.H.J., de Boer, S.A.S., Wahegaonkar, A.L., Bishop, A.T., Shin, A.Y., Hovius, S.E.R., Selles, R.W., 2013. A New Approach to Assess the Gastrocnemius Muscle Volume in Rodents Using Ultrasound; Comparison with the Gastrocnemius Muscle Index. *PLoS One*. 10(7):133-144
- Ohsawa, Y., Hagiwara, H., Nakatani, M., Yasue, A., Moriyama, K., Murakami, T., Tsuchida, K., Noji, S., Sunada, Y., 2006. Muscular atrophy of caveolin-3-deficient mice is rescued by myostatin inhibition. *J. Clin. Invest.* 116(14): 2924–2934
- Oshikawa, J., Otsu, K., Toya, Y., Tsunematsu, T., Hankins, R., Kawabe, J., Minamisawa, S., Umemura, S., Hagiwara, Y., Ishikawa, Y., 2004. Insulin resistance in skeletal muscles of caveolin-3-null mice. *Proc Natl Acad Sci U S A*. 101(34):12670-12675
- Park, S., Hong, Yunkyung, Lee, Y., Won, J., Chang, K.-T., Hong, Yonggeun, 2012. Differential expression of caveolins and myosin heavy chains in response to forced exercise in rats. *Lab. Anim. Res.* 28(1):1-9
- Pearson, S.J., 2015. High Intensity Interval Training Vs Moderate Intensity Continuous Training in the Management of Metabolic Type Disease. *MOJ Anat. Physiol.* 1(5):00027
- Peng, S. *et al.* (2015) ‘HDAC2 selectively regulates FOXO3a-mediated gene transcription during oxidative stress-induced neuronal cell death’, *Journal of Neuroscience*, 35(3), pp. 1250–1259
- Perry, B.D., Caldow, M.K., Brennan-Speranza, T.C., Sbaraglia, M., Jerums, G., Garnham, A., Wong, C., Levinger, P., Haq, M.A. ul, Hare, D.L., Price, S.R., Levinger, I., 2016. Muscle atrophy in patients with T2DM role of inflammatory pathways, physical activity and exercise. *Exerc Immunol Rev* 22: 94–109

Pradhan BS., Prószyński TJ., 2020. A Role for Caveolin-3 in the Pathogenesis of Muscular

Dystrophies. *Int J Mol Sci.* 21(22):8736

Prescott, E., 2018. 18 - Lifestyle Interventions, in: de Lemos, J.A., Omland, T.B.T.-C.C.A.D.

(Eds.). Elsevier, pp. 250–269. doi:<https://doi.org/10.1016/B978-0-323-42880-4.00018-2>

Renna, L.V., Bosè, F., Brignonzi, E., Fossati, B., Meola, G., Cardani, R., 2019. Aberrant insulin

receptor expression is associated with insulin resistance and skeletal muscle atrophy in myotonic dystrophies. *PLoS One* 14(3): 1–18

Roostaei, mehdi, pirani, hossein, rashidlamir, amir, 2020. High intensity interval training induces

the expression of Myostatin and Follistatin isoforms in rat muscle: differential effects on fast and slow twitch skeletal muscles. *Med. Lab. J.* 14: 48–53

Russell, S.J., Schneider, M.F., 2020. Alternative signaling pathways from IGF1 or insulin to AKT

activation and FOXO1 nuclear efflux in adult skeletal muscle fibers. *J. Biol. Chem.* 295: 15292–15306.

Saeedi, P., Petersohn, I., Salpea, P., Malanda, B., Karuranga, S., Unwin, N., Colagiuri, S.,

Guariguata, L., Motala, A.A., Ogurtsova, K., Shaw, J.E., Bright, D., Williams, R., 2019.

Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9th edition.

Diabetes Res. Clin. Pract. 157: 107843

Sanchez, A.M.J., Candau, R.B., Bernardi, H., 2014. FoxO transcription factors: Their roles in the

maintenance of skeletal muscle homeostasis. *Cell. Mol. Life Sci.* 71(9): 1657–1671

Sandri, M. *et al.* (2004) 'Foxo transcription factors induce the atrophy-related ubiquitin ligase

atrogin-1 and cause skeletal muscle atrophy', *Cell*, 117(3), pp. 399–412

Schwencke, C., Braun-Dullaeus, R.C., Wunderlich, C., Strasser, R.H., 2006. Caveolae and

caveolin in transmembrane signaling: Implications for human disease. *Cardiovasc. Res.*

- Senf, S. M., Dodd, S. L. and Judge, A. R. (2010) 'FOXO signaling is required for disuse muscle atrophy and is directly regulated by Hsp70', *American Journal of Physiology - Cell Physiology*, 298(1), pp. 38–45
- Shah, Dinesh S, Nisar, R.B., Stretton, C., Krasteva-christ, G., Hundal, H.S., 2020. Caveolin- 3 deficiency associated with the dystrophy P 104 L mutation impairs skeletal muscle mitochondrial form and function. *J Cachexia Sarcopenia Muscle*. 11(3): 838–858
- Shanazari, Z., Faramarzi, M., Banitalebi, E., Hemmati, R., 2019. Effect of moderate and high-intensity endurance and resistance training on serum concentrations of MSTN and IGF-1 in old male Wistar rats. *Horm. Mol. Biol. Clin. Investig.* 38
- Shang, L., Chen, T., Deng, Y., Huang, Yiyuan, Huang, Yuanheng, Xian, J., Lu, W., Yang, L., Huang, Q., 2017. Caveolin-3 promotes glycometabolism, growth and proliferation in muscle cells. *PLoS One* 12(12): 1–12
- Slopack, D., Roudier, E., Liu, S.T.K., Nwadozi, E., Birot, O., Haas, T.L., 2014. Forkhead BoxO transcription factors restrain exercise-induced angiogenesis. *J. Physiol.* 592(18): 4069–4082
- Srinivasan, K., Viswanad, B., Asrat, L., Kaul, C.L., Ramarao, P., 2005. Combination of high-fat diet-fed and low-dose streptozotocin-treated rat: A model for type 2 diabetes and pharmacological screening. *Pharmacol. Res.* 52(4): 313–320
- Stefanetti, R. J. *et al.* (2018) 'Recent advances in understanding the role of FOXO3 [version 1; referees: 4 approved]', *F1000Research*, 7(0), pp. 1–8
- Talukder, M.A.H., Preda, M., Ryzhova, L., Prudovsky, I., Pinz, I.M., 2016. Heterozygous caveolin-3 mice show increased susceptibility to palmitate-induced insulin resistance. *Physiol Rep.* 4(6): 1–14

- Tennant, J.N., Amendola, A., Phisitkul, P., 2014. Endoscopic gastrocnemius release. *Foot Ankle Clin.* 19(4): 787–793.
- Thomas, C.M., Smart, E.J., 2008. Caveolae structure and function: Caveolae Review Series. *J. Cell. Mol. Med.* 12(3): 796–809
- Tosun, B., Selek, O., Gok, U., Tosun, O., 2017. Medial gastrocnemius muscle flap for the reconstruction of unhealed amputation stumps. *J. Wound Care* 26(8): 504–507
- Vermeulen, C., Grade, C., Mantovani, C.S., Alvares, L.E., 2019. Myostatin gene promoter : structure , conservation and importance as a target for muscle modulation. *Anim Sci Biotechnol.* 5: 1–19
- Wang, R., Tian, H., Guo, D., Tian, Q., Yao, T., Kong, X., 2020. Impacts of exercise intervention on various diseases in rats. *J. Sport Heal. Sci.* 9(3): 211–227
- WHO Global Report on Diabetes, 2016. Global Report on Diabetes. *Isbn* 978: 6–86.
- Wu, Y., Ding, Y., Tanaka, Y., Zhang, W., 2014. Risk factors contributing to type 2 diabetes and recent advances in the treatment and prevention. *Int. J. Med. Sci.* 11(11): 1185–1200
- Xavier, S., Sadanandan, J., George, N., Paulose, C.S., 2012. β 2-Adrenoceptor and insulin receptor expression in the skeletal muscle of streptozotocin induced diabetic rats: Antagonism by vitamin D 3 and curcumin. *Eur. J. Pharmacol.* 687(1-3): 14–20
- Yanling Wu, Yanping Ding, Yoshimasa Tanaka, Wen Zhang, 2014. Risk Factors Contributing to Type 2 Diabetes and Recent Advances in the Treatment and Prevention. *Int. J. Med. Sci.* 11(11):1185-1200
- Yasuko Hagiwara, Toshikuni Sasaoka, Kenji Araishi, Michihiro Imamura, Hiroshi Yorifuji, Ikuya Nonaka, Eijiro Ozawa, Tateki Kikuchi, Caveolin-3 deficiency causes muscle degeneration in mice, *Human Molecular Genetics.* 9 (20): 3047–3054



UNIVERSITAS
GADJAH MADA

THE EFFECT OF PHYSICAL EXERCISE (MICT AND HIIT) ON THE mRNA of CAVEOLIN-3, INSULIN RECEPTOR,

MYOSTATIN AND FOXO3 EXPRESSION IN MUSCLES of DIABETIC RATS' MODEL

Hamzah Sameeh Abd El-Qader AbuHilail, dr. Widya Wasityastuti, M.Sc, M.Med.Ed, Ph.D dr. Nur Arfian, Ph.D

Universitas Gadjah Mada, 2021 | Diunduh dari <http://etd.repository.ugm.ac.id/>

Yoon, S.O., Hyo, J.K., Sung, J.R., Cho, K.A., Young, S.P., Park, H., Kim, M.J., Chang, K.K.,

Sang, C.P., 2007. Exercise type and muscle fiber specific induction of caveolin-1 expression

for insulin sensitivity of skeletal muscle. *Exp. Mol. Med.* 39(3): 395–401

Zheng, L., Rao, Z., Guo, Y., Chen, P., Xiao, W., 2020. High-Intensity Interval Training Restores

Glycolipid Metabolism and Mitochondrial Function in Skeletal Muscle of Mice with Type 2

Diabetes. *Front. Endocrinol. (Lausanne)*. 11: 1–14