

Bibliografia

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ROZDZIAŁ

Fizjologia erekcji

Piśmiennictwo

1. Anatomia człowieka. Tom II. Bochenek A., Reicher M. (red.). Wydawnictwo Lekarskie PZWL, Warszawa 2022.
2. Giuliano F., Clement P. Physiology of ejaculation: emphasis on serotonergic control. *Eur. Urol.* 2005; 48 (3): 408–417. doi: 10.1016/j.eururo.2005.05.017.
3. Holstege G., Georgiadis J.R., Paans A.M. i wsp. Brain activation during human male ejaculation. *J. Neurosci.* 2003; 23 (27): 9185–9193. doi: 10.1523/JNEUROSCI.23-27-09185.2003.
4. Hsu G.L., Hsieh C.H., Wen H.S. i wsp. Anatomy of the human penis: the relationship of the architecture between skeletal and smooth muscles. *J. Androl.* 2004; 25 (3): 426–431. doi: 10.1002/j.1939-4640.2004.tb02810.x.
5. Karacan I., Aslan C., Hirshkowitz M. Erectile mechanisms in man. *Science* 1983; 220 (4601): 1080–1082. doi: 10.1126/science.6844930.
6. Karacan I., Moore C., Sahmay S. Measurement of pressure necessary for vaginal penetration. *Sleep. Res.* 1985; 14: 269.
7. Kim N., Vardi Y., Padma-Nathan H. i wsp. Oxygen tension regulates the nitric oxide pathway. Physiological role in penile erection. *J. Clin. Invest.* 1993; 91 (2): 437–442. doi: 10.1172/JCI116220.



8. Lavoisier P., Courtois F., Barres D., Blanchard M. Correlation between intracavernous pressure and contraction of the ischiocavernosus muscle in man. *J. Urol.* 1986; 136 (4): 936–939. doi: 10.1016/S0022-5347(17)45135-4.
9. Lew-Starowicz M., Lew-Starowicz Z. Znaczenie utlenowania krwi w patofizjologii i leczeniu zaburzeń erekcji. *Przegląd Seksuologiczny*, wyd. specjalne. 2006; 8: 3–10.
10. Meehan J.P., Goldstein A.M. High pressure within corpus cavernosum in man during erection. Its probable mechanism. *Urology* 1983; 21 (4): 385–387. doi: 10.1016/0090-4295(83)90158-9.
11. Padmanabhan P., Telegrafi S., McCullough A. A cross-sectional study of the effects of vascular disease on corporal oxygen saturation (STO₂) in the flaccid and erect penis. *Eur. Urol. Suppl.* 2006; 5 (2): 101. doi: 10.1016/S1569-9056(06)60320-5.
12. Poirier P., Charpy A. *Traite d'anatomie humaine*. Masson, Paris 1901.
13. Przepływ krwi w niektórych obszarach naczyńowych i regulacja ciśnienia tętniczego krwi. W: Traczyk W., Trzebski A. (red.). *Fizjologia człowieka z elementami fizjologii stosowanej i klinicznej*. Wydawnictwo Lekarskie PZWL, Warszawa 2015.
14. Saenz de Tejada I., Angulo J., Celtek S. i wsp. Physiology of erectile function. *J. Sex. Med.* 2004; 1 (3): 254–265. doi: 10.1111/j.1743-6109.04038.x.
15. Shafik A., El Sibai O., Shafik A.A., Shafik I.A. Cavernosus muscle contraction during erection: is it voluntary or reflex, given the striated nature of

- the muscles? *J. Androl.* 2006; 27 (5): 695–699. doi: 10.2164/jandrol.106.000513.
16. Udelson D., Nehra A., Hatzichristou D.G. i wsp. Engineering analysis of penile hemodynamic and structural-dynamic relationships. Part I: Clinical implications of penile tissue mechanical properties. *Int. J. Impot. Res.* 1998; 10 (1): 15–24. doi: 10.1038/sj.ijir.3900310.
 17. Udelson D., Nehra A., Hatzichristou D.G. i wsp. Engineering analysis of penile hemodynamic and structural-dynamic relationships. Part II: Clinical implications of penile buckling. *Int. J. Impot. Res.* 1998; 10 (1): 25–35. doi: 10.1038/sj.ijir.3900311.
 18. Womperski K. Ocena wpływu aktywności ruchowej na obecność i natężenie zaburzeń erekcji u pacjentów z chorobą wieńcową. Praca doktorska. Uniwersytet Medyczny we Wrocławiu. Wrocław 2020.
 19. Yang C.C., Jiang X. Clinical autonomic neurophysiology and the male sexual response: an overview. *J. Sex. Med.* 2009; 6 (Suppl. 3): 221–228. doi: 10.1111/j.1743-6109.2008.01180.x.
 20. Zbrojkiewicz M., Sliwinski L. Cyclic guanosine monophosphate in the regulation of the cell function. *Postepy Hig. Med. Dosw. (online)*. 2016; 70: 1276–1285. PMID: 28026830.

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ROZDZIAŁ

Definicja i podział zaburzeń erekcji

Piśmiennictwo

1. Ayta I.A., McKinlay J.B., Krane R.J. The likely worldwide increase in erectile dysfunction between 1995 and 2025 and some possible policy consequences. *BJU Int.* 1999; 84 (1): 50–56. doi: 10.1046/j.1464-410x.1999.00142.x.
2. Diagnostic and Statistical Manual of Mental Disorders (DSM-5). American Psychiatric Association, Washington DC 2022.
3. Kalka D., Karpinski L., Gebala J. i wsp. Sexual health of male cardiac patients – present status and expectations of patients with coronary heart disease. *Arch. Med. Sci.* 2017; 13 (2): 302–310. doi: 10.5114/aoms.2017.65332.
4. Lew-Starowicz Z. Raport Seksualność Polaków 2016. Termedia, Poznań 2017.
5. Lindau S.T., Schumm L.P., Laumann E.O. i wsp. A study of sexuality and health among older adults in the United States. *N. Engl. J. Med.* 2007; 357 (8): 762–774. doi: 10.1056/NEJMoa067423.
6. Montorsi P., Ravagnani P.M., Galli S. i wsp. Common grounds for erectile dysfunction and coronary artery disease. *Curr. Opin. Urol.* 2004; 14 (6): 361–365. doi: 10.1097/00042307-200411000-00012.
7. Rosen R.C., Fisher W.A., Eardley I. i wsp. The multinational Men's Attitudes to Life Events and Sexuality (MALES) study: I. Prevalence of erectile dysfunction and related health concerns in the



general population. *Curr. Med. Res. Opin.* 2004; 20 (5): 607–617. doi: 10.1185/030079904125003467.

8. World Health Organization. International Statistical Classification of Diseases and Related Health Problems. 10th Revision (ICD-10). World Health Organization. Geneva 1992.

3

ROZDZIAŁ

**Choroby układu
sercowo-naczyniowego
a zaburzenia erekcji**

Piśmiennictwo

1. Dahabreh I.J., Paulus J.K. Association of episodic physical and sexual activity with triggering of acute cardiac events: systematic review and meta-analysis. *JAMA* 2011; 305 (12): 1225–1233. doi: 10.1001/jama.2011.336. 
2. Hatzimouratidis K., Amar E., Eardley I. i wsp. Guidelines on male sexual dysfunction: erectile dysfunction and premature ejaculation. *Eur. Urol.* 2010; 57 (5): 804–814. doi: 10.1016/j.eururo.2010.02.020.
3. Kalka D., Domagala Z., Rakowska A. i wsp. Modifiable risk factors for erectile dysfunction: an assessment of the awareness of such factors in patients suffering from ischaemic heart disease. *Int. J. Impot. Res.* 2016; 28 (1): 14–19. doi: 10.1038/ijir.2015.26.
4. Kalka D., Domagala Z., Rusiecki L. i wsp. Heart rate recovery, cardiac rehabilitation and erectile dysfunction in males with ischaemic heart disease. *Anatol. J. Cardiol.* 2016; 16 (4): 256–263. doi: 10.5152/anatoljcardiol.2015.6122.
5. Kalka D., Gebala J., Smolinski R. i wsp. Low-energy shock wave therapy-a novel treatment option for erectile dysfunction in men with cardiovascular disease. *Urology* 2017; 109: 19–26. doi: 10.1016/j.urology.2017.05.030.
6. Kalka D., Karpinski L., Gebala J. i wsp. Sexual health of male cardiac patients – present status and expectations of patients with coronary heart

- disease. *Arch. Med. Sci.* 2017; 13 (2): 302–310. doi: 10.5114/aoms.2017.65332.
7. Kałka D. Choroby układu krążenia a zaburzenia erekcji. W: Słowikowska-Hilczer J. (red.). *Andrologia. Zdrowie mężczyzny od fizjologii do patologii*. PZWL, Warszawa 2020.
 8. Kałka D. Editorial commentary: Cardiosexology – let’s talk about sex. *Trends Cardiovasc. Med.* 2019; 29 (8): 466–467. doi: 10.1016/j.tcm.2019.01.005.
 9. Kałka D., Domagała Z., Dworak J. i wsp. Association between physical exercise and quality of erection in men with ischaemic heart disease and erectile dysfunction subjected to physical training. *Kardiol. Pol.* 2013; 71 (6): 573–580. doi: 10.5603/KP.2013.0120.
 10. Kałka D., Gebala J., Rusiecki L. i wsp. Relation of postexercise reduction of arterial blood pressure and erectile dysfunction in patients with coronary heart disease. *Am. J. Cardiol.* 2018; 122 (2): 229–234. doi: 10.1016/j.amjcard.2018.03.368.
 11. Levine G.N., Steinke E.E., Bakaeen F.G. i wsp. Sexual activity and cardiovascular disease: a scientific statement from the American Heart Association. *Circulation* 2012; 125 (8): 1058–1072. doi: 10.1161/CIR.0b013e3182447787.
 12. Meldrum D.R., Gambone J.C., Morris M.A. i wsp. The link between erectile and cardiovascular health: the canary in the coal mine. *Am. J. Cardiol.* 2011; 108 (4): 599–606. doi: 10.1016/j.amjcard.2011.03.093.
 13. Nehra A., Jackson G., Miner M. i wsp. The Princeton III Consensus recommendations for the management of erectile dysfunction and cardiovascular

- disease. *Mayo Clin. Proc.* 2012; 87 (8): 766–778. doi: 10.1016/j.mayocp.2012.06.015
14. Orimoloye O.A., Feldman D.I., Blaha M.J. Erectile dysfunction links to cardiovascular disease-defining the clinical value. *Trends Cardiovasc Med.* 2019; 29 (8): 458–465. doi: 10.1016/j.tcm.2019.01.002.
 15. Rusiecki L., Zdrojowy R., Gebala J. i wsp. Sexual health in Polish elderly men with coronary artery disease: importance, expectations, and reality. *Asian J. Androl.* 2020; 22 (5): 526–531. doi: 10.4103/aja.aja_131_19.

4

ROZDZIAŁ

Zaburzenia erekcji jako wczesny symptom choroby wieńcowej

Piśmiennictwo

1. Kaiser D.R., Billups K., Mason C. i wsp. Impaired brachial artery endothelium-dependent and -independent vasodilation in men with erectile dysfunction and no other clinical cardiovascular disease. *J. Am. Coll. Cardiol.* 2004; 43 (2): 179–184. doi: 10.1016/j.jacc.2003.07.042.
2. Meldrum D.R., Gambone J.C., Morris M.A. i wsp. The link between erectile and cardiovascular health: the canary in the coal mine. *Am. J. Cardiol.* 2003; 15 (3): 185–191. doi: 10.1038/sj.ijir.3900996.
3. Montorsi F., Briganti A., Salonia A. i wsp. Erectile dysfunction prevalence, time of onset and association with risk factors in 300 consecutive patients with acute chest pain and angiographically documented coronary artery disease. *Eur. Urol.* 2003; 44 (3): 360–364. doi: 10.1016/s0302-2838(03)00305-1.



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ROZDZIAŁ

Aktywność fizyczna a zaburzenia erekcji

Piśmiennictwo

1. Ahtiainen J.P., Hulmi J.J., Kraemer W.J. i wsp. Heavy resistance exercise training and skeletal muscle androgen receptor expression in younger and older men. *Steroids*. 2011; 76 (1–2): 183–92. doi: 10.1016/j.steroids.2010.10.012.
2. Allen M.S. Physical activity as an adjunct treatment for erectile dysfunction. *Nat. Rev. Urol.* 2019; 16 (9): 553–562. doi: 10.1038/s41585-019-0210-6.
3. Allen M.S., Walter E.E. Erectile dysfunction: an umbrella review of meta-analyses of risk-factors, treatment, and prevalence outcomes. *J. Sex. Med.* 2019; 16 (4): 531–541. doi: 10.1016/j.jsxm.2019.01.314.
4. Finkelstein J.S., Lee H., Burnett-Bowie S-A.M. i wsp. Gonadal steroids and body composition, strength, and sexual function in men. *N. Engl. J. Med* 2013; 369 (11): 1011–1022. doi: 10.1056/NEJMoa1206168.
5. Hooper D.R., Kraemer W.J., Focht B.C. i wsp. Endocrinological roles for testosterone in resistance exercise responses and adaptations. *Sports Med.* 2017; 47 (9): 1709–1720. doi: 10.1007/s40279-017-0698-y.
6. Kalka D., Domagala Z.A., Kowalewski P. i wsp. Effect of endurance cardiovascular training intensity on erectile dysfunction severity in men with ischemic heart disease. *Am. J. Mens Health* 2015; 9 (5): 360–369. doi: 10.1177/1557988314544156.



7. Khera M., Bhattacharyya S., Miller L.E. Effect of aerobic exercise on erectile function: systematic review and meta-analysis of randomized controlled trials. *J. Sex. Med.* 2023; 20 (10): 1369–1375. doi: 10.1093/jsxmed/qdad130.
8. Michiels M., Van der Aa F. Bicycle riding and the bedroom: can riding a bicycle cause erectile dysfunction? *Urology.* 2015; 85 (4): 725–730. doi: 10.1016/j.urology.2014.12.034.
9. Salvador A., Costa R. Coping with competition: neuroendocrine responses and cognitive variables. *Neurosci. Biobehav. Rev.* 2009; 33 (2): 160–170. doi: 10.1016/j.neubiorev.2008.09.005.
10. Sommer F., Goldstein I., Korda J.D. Bicycle riding and erectile dysfunction: a review. *J. Sex. Med.* 2010; 7 (7): 2346–2358. doi: 10.1111/j.1743-6109.2009.01664.x.
11. Wood R.I., Stanton S.J. Testosterone and sport: current perspectives. *Horm. Behav.* 2012; 61 (1): 147–155. doi: 10.1016/j.yhbeh.2011.09.010.

6

ROZDZIAŁ

Alkohol a zaburzenia erekcji

Piśmiennictwo

1. Brien S.E., Ronksley P.E., Turner B.J. i wsp. Effect of alcohol consumption on biological markers associated with risk of coronary heart disease: systematic review and meta-analysis of interventional studies. *BMJ* 2011; 342: d636. doi: 10.1136/bmj.d636.
2. Fernandez-Sola J., Estruch R., Grau J.M. i wsp. The relation of alcoholic myopathy to cardiomyopathy. *Ann. Intern. Med.* 1994; 120 (7): 529–536. doi: 10.7326/0003-4819-120-7-199404010-00001.
3. Jiann B.-P. Effect of alcohol consumption on the risk of erectile dysfunction. *Urol. Sci.* 2010; 21 (4): 163–168. doi: 10.1016/S1879-5226(10)60037-1.
4. Kannel W.B., Ellison R.C. Alcohol and coronary heart disease: the evidence for a protective effect. *Clin. Chim. Acta* 1996; 246 (1–2): 59–76. doi: 10.1016/0009-8981(96)06227-4.
5. Karunakaran A., Michael J.P. The impact of abstinence from alcohol on erectile dysfunction: a prospective follow up in patients with alcohol use disorder. *J. Sex. Med.* 2022; 19 (4): 581–589. doi: 10.1016/j.jsxm.2022.01.517.
6. Li S., Song J.-M., Zhang K., Zhang Ch.-L. A meta-analysis of erectile dysfunction and alcohol consumption. *Urol. Int.* 2021; 105 (11–12): 969–985. doi: 10.1159/000508171.
7. Wang X.-M., Bai Y.-J., Yang Y.-B. i wsp. Alcohol intake and risk of erectile dysfunction: a dose-response meta-analysis of observational studies. *Int. J. Impot. Res.* 2018; 30 (6): 342–351. doi: 10.1038/s41443-018-0022-x.



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ROZDZIAŁ

Cukrzyca a zaburzenia erekcji

Piśmiennictwo

1. Blaivas J.G., Zayed A.A., Labib K.B. The bulbocavernosus reflex in urology: a prospective study of 299 patients. *J. Urol.* 1981; 126 (2): 197–199. doi: 10.1016/s0022-5347(17)54445-6.
2. Cayetano-Alcaraz A.A., Tharakan T., Chen R., Sofikitis N., Minhas S. The management of erectile dysfunction in men with diabetes mellitus unresponsive to phosphodiesterase type 5 inhibitors. *Andrology* 2023; 11 (2): 257–269. doi: 10.1111/andr.13257.
3. Defeudis G., Mazzilli R., Tenuta M. i wsp. Erectile dysfunction and diabetes: a melting pot of circumstances and treatments. *Diabetes Metab. Res. Rev.* 2021; 38 (2): e3494. doi: 10.1002/dmrr.3494.
4. Kałka D., Domagała Z., Rakowska A. i wsp. Modifiable risk factors for erectile dysfunction: an assessment of the awareness of such factors in patients suffering from ischaemic heart disease. *Int. J. Impot. Res.* 2016; 28 (1): 14–19. doi: 10.1038/ijir.2015.26.
5. Kouidrat Y., Pizzol D., Cosco T. i wsp. High prevalence of erectile dysfunction in diabetes: a systematic review and meta-analysis of 145 studies. *Diabet. Med.* 2017; 34 (9): 1185–1192. doi: 10.1111/dme.13403.



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ROZDZIAŁ

Nadciśnienie tętnicze a zaburzenia erekcji

Piśmiennictwo

1. Brixius K., Middeke M., Lichtenthal A., Jahn E., Schwinger R.H.G. Nitric oxide, erectile dysfunction and beta-blocker treatment (MR NOED study): benefit of nebivolol versus metoprolol in hypertensive men. *Clin. Exp. Pharmacol. Physiol.* 2007; 34 (4): 327–331. doi: 10.1111/j.1440-1681.2007.04551.x.
2. Cai J., Hong Y., Weng C. i wsp. Androgen stimulates endothelial cell proliferation via an androgen receptor/VEGF/cyclin A-mediated mechanism. *Am. J. Physiol. Heart Circ. Physiol.* 2011; 300 (4): H1210–H1221. doi: 10.1152/ajpheart.01210.2010.
3. Foresta C., Caretta N., Lana A. i wsp. Reduced number of circulating endothelial progenitor cells in hypogonadal men. *J. Clin. Endocrinol. Metab.* 2006; 91 (11): 4599–4602. doi: 10.1210/jc.2006-0763.
4. Kałka D., Gebala J., Rusiecki L. i wsp. Relation of postexercise reduction of arterial blood pressure and erectile dysfunction in patients with coronary heart disease. *Am. J. Cardiol.* 2018; 122 (2): 229–234. doi: 10.1016/j.amjcard.2018.03.368.
5. Khera M., Adaikan G., Buvat J. i wsp. Diagnosis and treatment of testosterone deficiency: recommendations from the Fourth International Consultation for Sexual Medicine (ICSM 2015). *J. Sex. Med.* 2016; 13 (12): 1787–1804. doi: 10.1016/j.jsxm.2016.10.009.



6. Kloner R.A. Cardiovascular effects of the 3 phosphodiesterase-5 inhibitors approved for the treatment of erectile dysfunction. *Circulation* 2004; 110 (19): 3149–3155. doi: 10.1161/01.CIR.0000146906.42375.D3.
7. Prejbisz A., Dobrowolski P., Doroszko A. i wsp. Guidelines for the management of hypertension in Poland 2024 – the position of the Polish Society of Hypertension/Polish Cardiac Society Experts. *Arterial Hypertension* 2024; 28 (2): 91–146. doi: 10.5603/ah.103916.
8. Scragg J.L., Jones R.D., Channer K.S., Jones T.H., Peers Ch. Testosterone is a potent inhibitor of L-type Ca^{2+} channels. *Biochem. Biophys. Res. Commun.* 2004; 318 (2): 503–506. doi: 10.1016/j.bbrc.2004.04.054.
9. Torkler S., Wallaschofski H., Baumeister S.E. i wsp. Inverse association between total testosterone concentrations, incident hypertension and blood pressure. *Aging Male* 2011; 14 (3): 176–182. doi: 10.3109/13685538.2010.529194.
10. Yaron M., Greenman Y., Rosenfeld J.B. i wsp. Effect of testosterone replacement therapy on arterial stiffness in older hypogonadal men. *Eur. J. Endocrinol.* 2009; 160 (5): 839–846. doi: 10.1530/EJE-09-0052.

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ROZDZIAŁ

Otyłość a zaburzenia erekcji

Piśmiennictwo

1. Araujo A.B., Esche G.R., Kupelian V. i wsp. Prevalence of symptomatic androgen deficiency in men. *J. Clin. Endocrinol. Metab.* 2007; 92 (11): 4241–4247. doi: 10.1210/jc.2007-1245.
2. Belladelli F., Boeri L., Fallara G. i wsp. Hyperestrogenism is associated with sexual function impairment in men-findings from a cross-sectional, real-life study. *Andrology* 2024; 12 (1): 179–185. doi: 10.1111/andr.13470.
3. Biernikiewicz M., Sobieszczańska M., Szuster E. i wsp. Erectile dysfunction as an obesity-related condition in elderly men with coronary artery disease. *J. Clin. Med.* 2024; 13 (7): 2087. doi: 10.3390/jcm13072087.
4. Biernikiewicz M., Szuster E., Pawlikowska-Gorzelańczyk A., Kałka D. Prevalence and incidence of erectile dysfunction in men with overweight and obesity: a systematic literature review. *Obesity Reviews*, 2025; 27 (4): e70053, doi:10.1111/obr.70053.
5. Brown R., Pedowitz R., Rydevik B. i wsp. Effects of acute graded strain on efferent conduction properties in the rabbit tibial nerve. *Clin. Orthop. Relat. Res.* 1993; 296: 288–294.
6. Centrum Badania Opinii Społecznej: Czy Polacy mają problem z nadwagą? Komunikat z badań. https://www.cbos.pl/SPISKOM.POL/2019/K_103_19.PDF (dostęp: 29.07.2025).



7. Dandona P., Dhindsa S., Ghanim H., Saad F. Mechanisms underlying the metabolic actions of testosterone in humans: a narrative review. *Diabetes Obes. Metab.* 2021; 23 (1): 18–28. doi: 10.1111/dom.14206.
8. Huxley R., Mendis S., Zheleznyakov E. i wsp. Body mass index, waist circumference and waist: hip ratio as predictors of cardiovascular risk – a review of the literature. *Eur. J. Clin. Nutr.* 2010; 64 (1): 16–22. doi: 10.1038/ejcn.2009.68.
9. Khera M., Adaikan G., Buvat J. i wsp. Diagnosis and treatment of testosterone deficiency: Recommendations from the Fourth International Consultation for Sexual Medicine (ICSM 2015). *J. Sex. Med.* 2016; 13 (12): 1787–1804. doi: 10.1016/j.jsxm.2016.10.009.
10. O'Donnell A.B., Araujo A.B., McKinlay J.B. The health of normally aging men: the Massachusetts Male Aging Study (1987–2004). *Exp. Gerontol.* 2004; 39 (7): 975–984. doi: 10.1016/j.exger.2004.03.023.
11. Zalecenia kliniczne dotyczące postępowania u chorych na otyłość 2024. Stanowisko Polskiego Towarzystwa Leczenia Otyłości. *Medycyna Praktyczna – wydanie specjalne* 2024.
12. Xu Z.-H., Xu X.-H., Pan D. i wsp. Effect of estradiol on penile erection: a cross-sectional study. *Transl. Androl. Urol.* 2019; 8 (6): 574–582. doi: 10.21037/tau.2019.10.15.
13. Zhang P., Wang B., Zhang X. i wsp. Suprapubic Liposuction With a Modified Devine's Technique for Buried Penis Release in Adults. *Plast. Surg. (Oakv)*. 2020; 28 (3): 172–178. doi: 10.1177/2292550320903440.

14. Zhu S., Wang Z., Heshka S. i wsp. Waist circumference and obesity-associated risk factors among whites in the third National Health and Nutrition Examination Survey: clinical action thresholds. *Am. J. Clin. Nutr.* 2002; 76 (4): 743–749. doi: 10.1093/ajcn/76.4.743.

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ROZDZIAŁ

Palenie tytoniu a zaburzenia erekcji

Piśmiennictwo

1. El-Shahawy O., Shah T., Obisesan O.H. i wsp. Association of e-cigarettes with erectile dysfunction: the population assessment of Tobacco and Health Study. *Am. J. Prev. Med.* 2022; 62 (1): 26–38. doi:10.1016/j.amepre.2021.08.004.
2. Grana R., Benowitz N., Glantz S.A. E-cigarettes: a scientific review. *Circulation* 2014; 129 (12): 1972–1986. doi:10.1161/CIRCULATIONAHA.114.007667.
3. Green J.S.A., Holden S.T.R., Ingram P. i wsp. An investigation of erectile dysfunction in Gwent, Wales. *BJU Int.* 2001; 88 (6): 551–553. doi:10.1046/j.1464-4096.2001.01274.x.
4. Jeremy J.Y., Mikhailidis D.P. Cigarette smoking and erectile dysfunction. *J. R. Soc. Promot. Health* 1998; 118 (3): 151–155. doi:10.1177/146642409811800305.
5. Lyngdorf P., Hemmingsen L. Epidemiology of erectile dysfunction and its risk factors: a practice-based study in Denmark. *Int. J. Impot. Res.* 2004; 16 (2): 105–111. doi:10.1038/sj.ijir.3901184.
6. Margham J., McAdam K., Forster M. i wsp. Chemical composition of aerosol from an e-cigarette: a quantitative comparison with cigarette smoke. *Chem. Res. Toxicol.* 2016; 29 (10): 1662–1678. doi:10.1021/acs.chemrestox.6b00188.
7. Van Dulken S. The patents for e-cigarettes. <http://stephenvandulken.blogspot.com/2014/01/the-patents-for-e-cigarettes.html> (dostęp: 24.08.2025).



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ROZDZIAŁ

Diagnostyka zaburzeń erekcji

Piśmiennictwo

1. Goldstein I., Mulhall J.P., Bushmakin A.G. i wsp. The erection hardness score and its relationship to successful sexual intercourse. *J. Sex. Med.* 2008; 5 (10): 2374–2380. doi: 10.1111/j.1743-6109.2008.00910.x.
2. Mulhall J.P., Goldstein I., Bushmakin A.G., Cappelleri J.C., Hvidsten K. Validation of the erection hardness score. *J. Sex. Med.* 2007; 4 (6): 1626–1634. doi:10.1111/j.1743-6109.2007.00600.x.
3. Parisot J., Yiou R., Salomon L. i wsp. Erection hardness score for the evaluation of erectile dysfunction: further psychometric assessment in patients treated by intracavernous prostaglandins injections after radical prostatectomy. *J. Sex. Med.* 2018; 11 (8): 2109–2118. doi: 10.1111/jsm.12584.
4. Porst H., Burnett A., Brock G. i wsp. SOP conservative (medical and mechanical) treatment of erectile dysfunction. *J. Sex. Med.* 2013; 10 (1): 130–171. doi: 10.1111/jsm.12023.
5. Rhoden E.L., Telöken C., Sogari P.R., Vargas Souto C.A. The use of the simplified International Index of Erectile Function (IIEF-5) as a diagnostic tool to study the prevalence of erectile dysfunction. *Int. J. Impot. Res.* 2002; 14 (4): 245–250. doi: 10.1038/sj.ijir.3900859.
6. Rosen R.C., Cappelleri J.C., Smith M.D., Lipsky J., Peña B.M. Development and evaluation of an



abridged, 5-item version of the International Index of Erectile Function (IIEF-5) as a diagnostic tool for erectile dysfunction. *Int. J. Impot. Res.* 1999; 11 (6): 319–326. doi: 10.1038/sj.ijir.3900472.

7. Rosen R.C., Riley A., Wagner G. i wsp. The international index of erectile function (IIEF): a multi-dimensional scale for assessment of erectile dysfunction. *Urology* 1997; 49 (6): 822–830. doi: 10.1016/s0090-4295(97)00238-0.

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ROZDZIAŁ

**Inhibitory
fosfodiesterazy typu 5
w leczeniu
zaburzeń erekcji**

Piśmiennictwo

1. Ahn T.Y., Lee S.W., Kim S.-W. i wsp. Treatment preferences in men with erectile dysfunction: an open label study in Korean men switching from sildenafil citrate to tadalafil. *Asian J. Androl.* 2007; 9 (6): 760–770. doi: 10.1111/j.1745-7262.2007.00319.x. 
2. Barbagallo F., Campolo F., Franceschini E. i wsp. PDE5 Inhibitors in type 2 diabetes cardiovascular complications. *Endocrines* 2020; 1 (2): 90–101. doi: 10.3390/endocrines1020009.
3. Carvalheira A.A., Pereira N.M., Maroco J., Forjaz V. Dropout in the treatment of erectile dysfunction with PDE5: a study on predictors and a qualitative analysis of reasons for discontinuation. *J. Sex. Med.* 2012; 9 (9): 2361–2369. doi: 10.1111/j.1743-6109.2012.02787.x.
4. Conaglen H.M., Conaglen J.V. Investigating women's preference for sildenafil or tadalafil use by their partners with erectile dysfunction: the partners' preference study. *J. Sex. Med.* 2008; 5 (5): 1198–1207. doi: 10.1111/j.1743-6109.2008.00774.x.
5. Dean J., de Boer B.-J., Graziottin A. i wsp. Partner satisfaction and successful treatment outcomes for men with erectile dysfunction (ED). *Eur. Urol. Suppl.* 2006; 5 (13): 779–785. doi: 10.1016/j.eur-sup.2006.06.006.

6. Dean J., Hackett G.J., Gentile V. i wsp. Psychosocial outcomes and drug attributes affecting treatment choice in men receiving sildenafil citrate and tadalafil for the treatment of erectile dysfunction: results of a multicenter, randomized, open-label, crossover study. *J. Sex. Med.* 2006; 3 (4): 650–661 doi: 10.1111/j.1743-6109.2006.00261.x.
7. Fisher W.A., Rosen R.C., Eardley I., Sand M., Goldstein I. Sexual experience of female partners of men with erectile dysfunction: the female experience of men's attitudes to life events and sexuality (FEMALES) study. *J. Sex. Med.* 2005; 2 (5): 675–684. doi: 10.1111/j.1743-6109.2005.00118.x.
8. Hackett G.I. What do patients expect from erectile dysfunction therapy? *Eur. Urol. Suppl.* 2002; 1 (8): 4–11. [https://doi.org/10.1016/S1569-9056\(02\)00112-4](https://doi.org/10.1016/S1569-9056(02)00112-4).
9. Hatzimouratidis K. Sildenafil in the treatment of erectile dysfunction: an overview of the clinical evidence. *Clin. Interv. Aging* 2006; 1 (4): 403–414. doi: 10.2147/ciia.2006.1.4.403.
10. Hatzimouratidis K., Hatzichristou D.G. A comparative review of the options for treatment of erectile dysfunction: which treatment for which patient? *Drugs* 2005; 65 (12): 1621–1650. doi: 10.2165/00003495-200565120-00003.
11. Porst H., Giuliano F., Glina S. i wsp. Evaluation of the efficacy and safety of once-a-day dosing of tadalafil 5mg and 10mg in the treatment of erectile dysfunction: results of a multicenter, randomized, double-blind, placebo-controlled trial. *Eur Urol.* 2006;

- 50 (2): 351–359. doi: 10.1016/j.eururo.2006.02.052. Epub 2006 Mar 20.
12. Porst H., Rosen R., Padma-Nathan H. i wsp. The efficacy and tolerability of vardenafil, a new, oral, selective phosphodiesterase type 5 inhibitor, in patients with erectile dysfunction: the first at-home clinical trial. *Int. J. Impot. Res.* 2001; 13 (4): 192–199. doi: 10.1038/sj.ijir.3900713.
 13. Rajfer J., Aronson W.J., Bush P.A., Dorey F.J., Ignarro L.J. Nitric oxide as a mediator of relaxation of the corpus cavernosum in response to nonadrenergic, noncholinergic neurotransmission. *N. Engl. J. Med.* 1992; 326 (2): 90–94. doi: 10.1056/NEJM199201093260203.

13

ROZDZIAŁ

**Fala uderzeniowa
w leczeniu zaburzeń
erekcji**

Piśmiennictwo

1. Angulo J.C., Arance I., de Las Heras M.M. i wsp. Efficacy of low-intensity shock wave therapy for erectile dysfunction: a systematic review and meta-analysis. *Actas Urol. Esp.* 2017; 41 (8): 479–490. doi: 10.1016/j.acuro.2016.07.005.
2. Caspari G.H., Erbel R. Revascularization with extracorporeal shock wave therapy: first clinical results. *Circulation* 1999; 100: 84–89.
3. Gotte G., Amelio E., Russo S. i wsp. Short-time non-enzymatic nitric oxide synthesis from L-arginine and hydrogen peroxide induced by shock waves treatment. *FEBS Lett.* 2002; 520 (1–3): 153–155. doi: 10.1016/S0014-5793(02)02807-7.
4. Gruenwald I., Appel B., Vardi Y. Low-intensity extracorporeal shock wave therapy-a novel effective treatment for erectile dysfunction in severe ED patients who respond poorly to PDE5 inhibitor therapy. *J. Sex. Med.* 2012; 9 (1): 259–264. doi: 10.1111/j.1743-6109.2011.02498.x.
5. Kałka D., Biernikiewicz M., Gebala J. i wsp. Diagnosis of hypogonadism in patients treated with low energy shock wave therapy for erectile dysfunction: a narrative review. *Transl. Androl. Urol.* 2020; 9 (6): 2786–2796. doi: 10.21037/tau-20-796.
6. Kałka D., Biernikiewicz M., Gebala J. i wsp. Efficacy of low energy shock-wave therapy generated using an electrohydraulic device in the treatment of ED:



- a systematic review and meta-analysis of randomized controlled trials. *Arch. Esp. Urol.* 2021; 74 (6): 606–617.
7. Kałka D., Biernikiewicz M., Gebala J. Re: Electromagnetic low-intensity extracorporeal shock wave therapy in patients with erectile dysfunction: a sham-controlled, double-blind, randomized prospective study. *Eur. Urol.* 2020; 78 (1): 110–111. doi: 10.1016/j.eururo.2020.02.018.
 8. Kałka D., Gebala J., Smoliński R. i wsp. Fala uderzeniowa o niskiej energii w leczeniu zaburzeń erekcji. *Seksuologia Polska* 2018; 16: 20–35.
 9. Kim K.S., Jeong H.C., Choi S.W. i wsp. Electromagnetic low-intensity extracorporeal shock wave therapy in patients with erectile dysfunction: a sham-controlled, double-blind, randomized prospective study. *World J. Mens Health* 2020; 38 (2): 236–242. doi: 10.5534/wjmh.190130.
 10. Lu Z., Lin G., Reed-Maldonado A. i wsp. Low-intensity extracorporeal shock wave treatment improves erectile function: a systematic review and meta-analysis. *Eur. Urol.* 2017; 71 (2): 223–233. doi: 10.1016/j.eururo.2016.05.050.
 11. Müller T. Stoßwellentherapie: Jungbrunnen für den Penis? *Uro-News* 2017; 21: 50.
 12. Nishida T., Shimokawa H., Oi K. i wsp. Extracorporeal cardiac shock wave therapy markedly ameliorates ischemia-induced myocardial dysfunction in pigs in vivo. *Circulation* 2004; 110 (19): 3055–3061. doi: 10.1161/01.CIR.0000148849.51177.97.

13. Nurzynska D., Di Meglio F., Castaldo C. i wsp. Shock waves activate in vitro cultured progenitors and precursors of cardiac cell line-ages from the human heart. *Ultrasound Med. Biol.* 2008; 34 (2): 334–342. doi: 10.1016/j.ultrasmedbio.2007.07.017.
14. Sokolakis I., Hatzichristodoulou G. Clinical studies on low intensity extracorporeal shockwave therapy for erectile dysfunction: a systematic review and meta-analysis of randomised controlled trials. *Int. J. Impot. Res.* 2019; 31 (3): 177–194. doi: 10.1038/s41443-019-0117-z.
15. Vardi Y., Appel B., Jacob G., Massarwi O., Gruenwald I. Can low-intensity extracorporeal shockwave therapy improve erectile function? A 6-month follow-up pilot study in patients with organic erectile dysfunction. *Eur. Urol.* 2010; 58 (2): 243–248. doi: 10.1016/j.eururo.2010.04.004.
16. Wang C.J., Wang F.S., Yang K.D. i wsp. Shock wave therapy induces neovascularization at the tendon-bone junction. A study in rabbits. *J. Orthop. Res.* 2003; 21 (6): 984–989. doi: 10.1016/S0736-0266(03)00104-9.
17. Yao H., Wang X., Liu H. i wsp. Systematic review and meta-analysis of 16 randomized controlled trials of clinical outcomes of low-intensity extracorporeal shock wave therapy in treating erectile dysfunction. *Am. J. Mens Health* 2022; 16 (2): 15579883221087532. doi: 10.1177/15579883221087532.
18. Young S.R., Dyson M. Effect of therapeutic ultrasound on the healing of full-thickness excised skin lesions. *Ultrasonics* 1990; 28 (3): 175–180. doi: 10.1016/0041-624x(90)90082-y.

19. Zou Z.-J., Tang L.-Y., Liu Z.-H. i wsp. Short-term efficacy and safety of low-intensity extracorporeal shock wave therapy in erectile dysfunction: a systematic review and meta-analysis. *Int. Braz. J. Urol.* 2017; 43 (5): 805–821. doi: 10.1590/S1677-5538.IBJU.2016.0245.

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ROZDZIAŁ

P-SHOT w leczeniu zaburzeń erekcji

Piśmiennictwo

1. Deabes M., Deameh M.G., Irshid B.A.B., wsp. Evaluating the efficacy and safety of platelet-rich plasma injection for erectile dysfunction: a systematic review and meta-analysis of randomized controlled trials. *Sex. Med. Rev.* 2024; 12 (4): 739–746. doi: 10.1093/sxmrev/qaee018.
2. Ding X.-G., Li S.-W., Zheng X.-M., wsp. The effect of platelet-rich plasma on cavernous nerve regeneration in a rat model. *Asian J. Androl.* 2009; 11 (2): 215–221. doi: 10.1038/aja.2008.37.
3. Du S., Sun S., Guo F., Liu H. Efficacy of platelet-rich plasma in the treatment of erectile dysfunction: a meta-analysis of controlled and single-arm trials. *PLoS ONE* 2024; 19 (11): e0313074. doi: 10.1371/journal.pone.0313074.
4. Gupta S., Paliczak A., Delgado D. Evidence-based indications of platelet-rich plasma therapy. *Expert. Rev. Hematol.* 2021; 14 (1): 97–108. doi: 10.1080/17474086.2021.1860002.
5. Jain N.K., Gulati M. Platelet-rich plasma: a healing virtuoso. *Blood Res.* 2016; 51 (1): 3–5. doi: 10.5045/br.2016.51.1.3.
6. Liao Ch.-H., Lee K.-H., Chung S.-D., wsp. Intracavernous injection of platelet-rich plasma therapy enhances erectile function and decreases the mortality rate in streptozotocin-induced



- diabetic rats. *Int. J. Mol. Sci.* 2022; 23 (6): 3017. doi: 10.3390/ijms23063017.
7. Mao Q., Yang Y., Liu Y., wsp. The efficacy of platelet rich plasma in the treatment of erectile dysfunction: a systematic review and meta-analysis of randomized controlled trials. *Aging Male* 2024; 27 (1): 2358944. doi: 10.1080/13685538.2024.2358944.
 8. Marx R.E. Platelet-rich plasma (PRP): what is PRP and what is not PRP? *Implant. Dent.* 2001; 10 (4): 225–228. doi: 10.1097/00008505-200110000-00002.
 9. Pochini A.C., Antonioli E., Bucci D.Z., wsp. Analysis of cytokine profile and growth factors in platelet-rich plasma obtained by open systems and commercial columns. *Einstein (Sao Paulo)* 2016; 14 (3): 391–397. doi: 10.1590/S1679-45082016AO3548.
 10. Reddy R.S.H., Reddy R., Babu N.Ch., Ashok G.N. Stem-cell therapy and platelet-rich plasma in regenerative medicines: a review on pros and cons of the technologies. *J. Oral. Maxillofac. Pathol.* 2018; 22 (3): 367–374. doi: 10.4103/jomfp. JOMFP_93_18.
 11. Rossi L.A., Murray I.R., Chu C.R., wsp. Classification systems for platelet-rich plasma. *Bone Joint J.* 2019; 101-B (8): 891–896. doi: 10.1302/0301-620X.101B8.BJJ-2019-0037.R1.
 12. Sharun K., Pawde A.M., Amarpal. Classification and coding systems for platelet-rich plasma (PRP): a peek into the history. *Expert Opin. Biol. Ther.* 2021; 21 (2): 121–123. doi: 10.1080/14712598.2021.1846715.
 13. Zhou Z., Wang Y., Chai Y., wsp. The efficacy of platelet-rich plasma (PRP) alone or in combination with low intensity shock wave therapy (Li-SWT) in

treating erectile dysfunction: a systematic review and meta-analysis of seven randomized controlled trials. *Aging Male* 2025; 28 (1): 2472786. doi: 10.1080/13685538.2025.2472786.

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ROZDZIAŁ

Terapia iniekcyjna w leczeniu zaburzeń erekcji

Piśmiennictwo

1. Heaton J.P., Lording D., Liu S.N., wsp. Intracavernosal alprostadil is effective for the treatment of erectile dysfunction in diabetic men. *Int. J. Impot. Res.* 2001; 13 (6): 317–321. doi: 10.1038/sj.ijir.3900760.
2. Leungwattanakij S., Flynn Jr V., Hellstrom W.J.G. Intracavernosal injection and intraurethral therapy for erectile dysfunction. *Urol. Clin. North Am.* 2001; 28 (2): 343–354. doi: 10.1016/S0094-0143(05)70143-9.
3. Linet O.I., Ogrinc F.G. Efficacy and safety of intracavernosal alprostadil in men with erectile dysfunction. The Alprostadil Study Group. *N. Engl. J. Med.* 1996; 334 (14): 873–877. doi: 10.1056/NEJM199604043341401.
4. Porst H. The rationale for prostaglandin E1 in erectile failure: a survey of worldwide experience. *J. Urol.* 1996; 155 (3): 802–815. PMID: 8583582.
5. Virag R. Intracavernous injection of papaverine for erectile failure. *Lancet.* 1982; 320 (8304): 938. doi: 10.1016/S0140-6736(82)90910-2.



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ROZDZIAŁ

Aparaty próżniowe w leczeniu zaburzeń erekcji

Piśmiennictwo

1. Baltaci S., Aydos K., Kosar A., Anfarta K. Treating erectile dysfunction with a vacuum tumescence device: a retrospective analysis of acceptance and satisfaction. *Brit. J. Urol.* 1995; 76 (6): 757–760. doi: 10.1111/j.1464-410x.1995.tb00769.x.
2. Kava B.R. Advances in the management of post-radical prostatectomy erectile dysfunction: treatment strategies when PDE-5 inhibitors don't work. *Rev. Urol.* 2005; 7 (supl. 2): S39–S50. PMID: 16985897.
3. Lewis R.W., Witherington R. External vacuum therapy for erectile dysfunction. *World J. Urol.* 1997; 15: 78–82. doi: 10.1007/BF01275162.
4. Nadig P.W., Ware J.C., Blumoff R. Noninvasive device to produce and maintain an erection-like state. *Urology* 1986; 27 (2): 126–131. doi: 10.1016/0090-4295(86)90368-7.
5. Price D.E., Cooksey G., Jehu D., wsp. The management of impotence in diabetic men by vacuum therapy. *Diab. Med.* 1991; 8 (10): 964–967. doi: 10.1111/j.1464-5491.1991.tb01538.x.
6. Savoie M., Kim S.S., Soloway M.S. A prospective study measuring penile length in men treated with radical prostatectomy for prostate cancer. *J. Urol.* 2003; 169 (4): 1462–1464. doi: 10.1097/01.ju.0000053720.93303.33.
7. Sidi A.A., Becher E.F., Zhang G., Lewis J.H. Patient acceptance of and satisfaction with



- anexternal negative pressure device for impotence. *J. Urol.* 1990; 144 (5): 1154–1146. doi: 10.1016/s0022-5347(17)39679-9.
8. Turner L.A., Althof S.E., Levine S.B., wsp. External vacuum devices in the treatment of erectile dysfunction: a one-year study of sexual and psychosocial impact. *J. Sex Marital. Ther.* 1991; 17 (2): 81–93. doi: 10.1080/00926239108404950.
 9. Witherington R. Vacuum constriction devices for management of erectile impotence. *J. Urol.* 1989; 141 (2):: 320–322. DOI: 10.1016/s0022-5347(17)40752-x.
 10. Zippe C.D., Raina R., Thukral M., wsp. Management of erectile dysfunction following radical prostatectomy. *Curr. Urol. Reports* 2001; 2 (6): 495–503. doi: 10.1007/s11934-001-0045-5.

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ROZDZIAŁ

Mięśnie dna miednicy

Piśmiennictwo

1. Cristina R.T., Hanganu F., Dumitrescu E., wsp. The impact of exogenic testosterone and nortestosterone-decanoate toxicological evaluation using a rat model. PLoS One 2014; 9 (10): e109219. doi: 10.1371/journal.pone.0109219. 
2. Gupta N., Carvajal M., Jurewicz M., wsp. Bulbocavernosus muscle area as a novel marker for hypogonadism. Asian J. Urol. 2017; 4 (1): 3–9. doi: 10.1016/j.ajur.2016.11.002.
3. Hsu G.L., Hsieh C.H., Wen H.S., wsp. Anatomy of the human penis: the relationship of the architecture between skeletal and smooth muscles. J. Androl. 2004; 25 (3): 426–431. doi: 10.1002/j.1939-4640.2004.tb02810.x.
4. Kałka D. Terapia zastępcza testosteronem u hipogonadalnych pacjentów z chorobą otyłościową i cukrzycą typu 2. Świat Medycyny i Farmacji 2025; 4 (283).
5. Lavoisier P., Proulx J., Courtois F. Reflex contractions of the ischiocavernosus muscles following electrical and pressure stimulations. J. Urol. 1988; 139 (2): 396–399. doi: 10.1016/s0022-5347(17)42442-6.
6. Shafik A. Response of the urethral and intracorporeal pressures to cavernosus muscle stimulation: role of the muscles in erection and ejaculation. Urology 1995; 46 (1): 85–88. doi: 10.1016/S0090-4295(99)80165-4.

7. Ye F., McCoy S.C., Ross H.H., wsp. Transcriptional regulation of myotrophic actions by testosterone and trenbolone on androgen-responsive muscle. *Steroids* 2014; 87: 59–66. doi: 10.1016/j.stero-ids.2014.05.024.

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ROZDZIAŁ

**Trening mięśni
dna miednicy
w leczeniu zaburzeń
erekcji**

Piśmiennictwo

1. Begot I., Peixoto T.C.A., Gonzaga L.R.A., wsp. A home-based walking program improves erectile dysfunction in men with an acute myocardial infarction. *Am. J. Cardiol.* 2015; 115 (5): 571–575. doi: 10.1016/j.amjcard.2014.12.007.
2. Clavell-Hernandez J., Wang R. Penile rehabilitation following prostate cancer treatment: review of current literature. *Asian J. Androl.* 2015; 17 (6): 916–922. doi: 10.4103/1008-682X.150838.
3. Dorey G., Speakman M.J., Feneley R.C.L., wsp. Pelvic floor exercises for erectile dysfunction. *BJU Int.* 2005; 96 (4): 595–597. doi: 10.1111/j.1464-410X.2005.05690.x.
4. Hall L.M., Aljuraifani R., Hodges P.W. Design of programs to train pelvic floor muscles in men with urinary dysfunction: systematic review. *Neurourol. Urodyn.* 2018; 37 (7): 2053–2087. doi: 10.1002/nau.23593.
5. Kalka D., Domagala Z.A., Kowalewski P., wsp. Effect of endurance cardiovascular training intensity on erectile dysfunction severity in men with ischemic heart disease. *Am. J. Mens Health* 2015; 9 (5): 360–369. doi: 10.1177/1557988314544156.
6. Kałka D., Domagała Z., Dworak J., wsp. Association between physical exercise and quality of erection in men with ischaemic heart disease and erectile



- dysfunction subjected to physical training. *Kardiol. Pol.* 2013; 71 (6): 573–580. doi: 10.5603/KP.2013.0120.
7. Kim J.K., Lee Y.J., Kim H., wsp. A prospectively collected observational study of pelvic floor muscle strength and erectile function using a novel personalized extracorporeal perineometer. *Sci. Rep.* 2021; 11 (1): 18389. doi: 10.1038/s41598-021-97230-6.
 8. Lavoisier P., Proulx J., Courtois F. Reflex contractions of the ischiocavernosus muscles following electrical and pressure stimulations. *J. Urol.* 1988; 139 (2): 396–399. doi: 10.1016/s0022-5347(17)42442-6.
 9. Lavoisier P., Roy P., Dantony E., wsp. Pelvic-floor muscle rehabilitation in erectile dysfunction and premature ejaculation. *Phys. Ther.* 2014; 94 (12): 1731–1743. doi: 10.2522/ptj.20130354.
 10. Van Kempen M., De Weerdt W., Claes H., wsp. Treatment of erectile dysfunction by perineal exercise, electromyographic biofeedback, and electrical stimulation. *Phys. Ther.* 2003; 83 (6): 536–543. PMID: 12775199.

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ROZDZIAŁ

Zespół wdowca

Piśmiennictwo

1. Kim N., Vardi Y., Padma-Nathan H., wsp. Oxygen tension regulates the nitric oxide pathway. Physiological role in penile erection. *J. Clin. Invest.* 1993; 91 (2): 437–442. doi: 10.1172/JCI116220. 
2. Lew-Starowicz M., Lew-Starowicz Z. Znaczenie utlenowania krwi w patofizjologii i leczeniu zaburzeń erekcji. *Przegląd Seksuologiczny*, wyd. specjalne. 2006; 3–10.
3. Przepływ krwi w niektórych obszarach naczyńowych i regulacja ciśnienia tętniczego krwi. W: Traczyk W., Trzebski A. (red.). *Fizjologia człowieka z elementami fizjologii stosowanej i klinicznej*. PZWL, Warszawa 2015.
4. Tal R., Mueller A., Mulhall J.P. The correlation between intracavernosal pressure and cavernosal blood oxygenation. *J. Sex. Med.* 2009; 6 (10): 2722–2727. doi: 10.1111/j.1743-6109.2009.01429.
5. Udelson D., Nehra A., Hatzichristou D.G. i wsp. Engineering analysis of penile hemodynamic and structural-dynamic relationships: Part I – Clinical implications of penile tissue mechanical properties. *Int. J. Impot. Res.* 1998; 10 (1): 15–24. doi: 10.1038/sj.ijir.3900310.
6. Udelson D., Nehra A., Hatzichristou D.G. i wsp. Engineering analysis of penile hemodynamic and structural-dynamic relationships: Part II – Clinical

- implications of penile buckling. *Int. J. Impot. Res.* 1998; 10 (1): 25–35. doi: 10.1038/sj.ijir.3900311.
7. Yuan J., Hoang A.N., Romero C.A. Vacuum therapy in erectile dysfunction -science and clinical evidence. *Int. J. Impot. Res.* 2010; 22 (4): 211-219. doi. org/10.1038/ijir.2010.4.

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ROZDZIAŁ

Testosteron

Piśmiennictwo

1. Han S., Jeon Y-J., Lee T.Y., wsp. Testosterone is associated with abdominal body composition derived from computed tomography: a large cross sectional study. *Sci. Rep.* 2022; 12 (1): 22528. doi: 10.1038/s41598-022-27182-y. 
2. Kałka D. Terapia zastępcza testosteronem u hipogonadalnych pacjentów z chorobą otyłościową i cukrzycą 2 typu. *Świat Medycyny i Farmacji.* 2025; 4 (283).
3. Kałka D., Biernikiewicz M., Gebala J., wsp. Diagnosis of hypogonadism in patients treated with low energy shock wave therapy for erectile dysfunction: a narrative review. *Transl. Androl. Urol.* 2020; 9 (6): 2786–2796. doi: 10.21037/tau-20-796.
4. Kelly D.M., Jones T.H. Testosterone and obesity. *Obes. Rev.* 2015; 16 (7): 581–606. doi: 10.1111/obr.12282.
5. Ma H., Sun J., Wu X., wsp. Percent body fat was negatively correlated with testosterone levels in male. *PLoS One* 2024; 19 (1): e0294567. doi: 10.1371/journal.pone.0294567.
6. Pasiakos S.M., Berryman C.E., Karl J.P., wsp. Effects of testosterone supplementation on body composition and lower-body muscle function during severe exercise- and diet-induced energy deficit: a proof-of-concept, single centre, randomised, double-blind, controlled trial. *EBioMedicine* 2019; 46: 411–422. doi: 10.1016/j.ebiom.2019.07.059.

7. Wibrall M., Dohmen T., Klingmüller D., wsp. Testosterone administration reduces lying in men. PLoS One 2012; 7 (10): e46774. doi: 10.1371/journal.pone.0046774
8. Zitzmann M. Testosterone, mood, behaviour and quality of life. Andrology. 2020; 8 (6): 1598–1605. doi: 10.1111/andr.12867.

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ROZDZIAŁ

Hipogonadyzm – definicja i podział

Piśmiennictwo

1. Chen H., Liu J., Luo L., Zirkin B.R. Dibutryl cyclic adenosine mono-phosphate restores the ability of aged leydig cells to produce testosterone at the high levels characteristic of young cells. *Endocrinology* 2004; 145 (10): 4441–4446. doi: 10.1210/en.2004-0639.
2. Christin-Maitre S., Zitzmann M., Lambalk C., wsp. Diagnosis and treatment options for hypogonadotropic hypogonadism in adolescents, men and women – review of an expert meeting. *Eur. Gynecol. Obstet.* 2020; 2 (2): 82–89.
3. Corona G., Goulis D.G., Huhtaniemi I., wsp. European Academy of Andrology (EAA) guidelines on investigation, treatment and monitoring of functional hypogonadism in males: Endorsing organization: European Society of Endocrinology. *Andrology* 2020; 8 (5): 970–987. doi: 10.1111/andr.12770.
4. Hackett G., Kirby M., Rees R.W., wsp. The British Society for Sexual Medicine Guidelines on Male Adult Testosterone Deficiency, with Statements for Practice. *World J. Mens Health.* 2023; 41 (3): 508–537. doi: 10.5534/wjmh.221027.
5. Huhtaniemi I. Late-onset hypogonadism: current concepts and controversies of pathogenesis, diagnosis and treatment. *Asian J. Androl.* 2014; 16 (2): 192–202. doi: 10.4103/1008-682X.122336.



6. Iranmanesh A., Mulligan T., Veldhuis J.D. Age in men does not determine gonadotropin-releasing hormone's dose-dependent stimulation of luteinizing hormone secretion under an exogenous testosterone clamp. *J. Clin. Endocrinol. Metab.* 2010; 95 (6): 2877–2884. doi: 10.1210/jc.2009-2581.
7. Khera M., Adaikan G., Buvat J., wsp. Diagnosis and treatment of testosterone deficiency: Recommendations from the Fourth International Consultation for Sexual Medicine (ICSM 2015). *J. Sex. Med.* 2016; 13 (12): 1787–1804. doi: 10.1016/j.jsxm.2016.10.009.
8. Morales A., Lunenfeld B. International Society for the Study of the Aging Male. Investigation, treatment and monitoring of late-onset hypogonadism in males. Official recommendations of ISSAM. *Aging Male* 2002; 5 (2): 74–86. PMID: 12198738.
9. Morley J.E., Kaiser F.E., Perry H.M., wsp. Longitudinal changes in testosterone, luteinizing hormone, and follicle-stimulating hormone in healthy older men. *Metabolism* 1997; 46 (4): 410–413. doi: 10.1016/s0026-0495(97)90057-3.
10. Mularoni V., Esposito V., Di Persio S., wsp. Age-related changes in human Leydig cell status. *Hum. Reprod.* 2020; 35 (12): 2663–2676. doi: 10.1093/humrep/deaa271.
11. Mulhall J.P., Trost L.W., Brannigan R.E., wsp. Evaluation and management of testosterone deficiency: AUA guideline. *J. Urol.* 2018; 200 (2): 423–432. doi: 10.1016/j.juro.2018.03.115.

12. Rastrelli G., Carter E.L., Ahern T., wsp. Development of and recovery from secondary hypogonadism in aging men: prospective results from the EMAS. *J. Clin. Endocrinol. Metab.* 2015; 100 (8): 3172–3182. doi: 10.1210/jc.2015-1571.
13. Ryan G.E., Bohaczuk S.C., Cassin J., wsp. Androgen receptor positively regulates gonadotropin-releasing hormone receptor in pituitary gonadotropes. *Mol. Cell Endocrinol.* 2021; 530: 111286. doi: 10.1016/j.mce.2021.111286.
14. Salonia A., Bettocchi C., Boeri L., wsp. EAU Working Group on Male Sexual and Reproductive Health European Association of Urology Guidelines on Sexual and Reproductive Health-2021 Update: Male Sexual Dysfunction. *Eur. Urol.* 2021; 80 (3): 333–357. doi: 10.1016/j.eururo.2021.06.007.
15. Shao J., Wang J., Wen X. i wsp. Effects of aging and macrophages on mice stem Leydig cell proliferation and differentiation in vitro. *Front. Endocrinol. (Lausanne)* 2023; 14:1139281. doi: 10.3389/fendo.2023.1139281.
16. Wittert G., Grossmann M. Obesity, type 2 diabetes, and testosterone in ageing men. *Rev. Endocr. Metab. Disord.* 2022; 23 (6): 1233–1242. doi: 10.1007/s11154-022-09746-5.
17. Veldhuis J.D., Zwart A., Mulligan T., Iranmanesh A. Muting of androgen negative feedback unveils impoverished gonadotropin-releasing hormone/luteinizing hormone secretory reactivity in healthy older men. *J. Clin. Endocrinol. Metab.* 2001; 86 (2): 529–535. doi: 10.1210/jcem.86.2.7200.

18. Xia K., Yu J., Liu G., wsp. Editorial: Aging and male hypogonadism. *Front. Endocrinol. (Lausanne)* 2023; 14: 1207907. doi: 10.3389/fendo.2023.1207907.
19. Yeap B.B., Manning L., Chubb S.A.P., wsp. Progressive impairment of testicular endocrine function in ageing men: testosterone and dihydrotestosterone decrease, and luteinizing hormone increases, in men transitioning from the 8th to 9th decades of life. *Clin. Endocrinol. (Oxf)* 2018; 88 (1): 88–95. doi: 10.1111/cen.13484.

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ROZDZIAŁ

Objawy hipogonadyzmu

Piśmiennictwo

1. Morales A., Lunenfeld B. Investigation, treatment and monitoring of late-onset hypogonadism in males. Official recommendations of ISSAM. International Society for the Study of the Aging Male. *The Aging Male* 2002; 5 (2): 74–86. doi:10.1080/tam.5.2.74.86. PMID: 12198738.
2. Tajar A., Huhtaniemi I.T., O'Neill T.W., wsp. Characteristics of androgen deficiency in late-onset hypogonadism: results from the European Male Aging Study (EMAS). *J. Clin. Endocrinol. Metab.* 2012; 97 (5): 1508–1516. doi: 10.1210/jc.2011-2513.
3. Wu F.C., Tajar A., Beynon J.M., wsp. Identification of late-onset hypogonadism in middle-aged and elderly men. *N. Engl. J. Med.* 2010; 363 (2): 123–135. doi: 10.1056/NEJMoa0911101.



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ROZDZIAŁ

Testosteron a cukrzyca typu 2

Piśmiennictwo

1. Bhasin S., Brito J.P., Cunningham G.R., wsp. Testosterone therapy in men with hypogonadism: an endocrine society clinical practice guideline. *J. Clin. Endocrinol. Metab.* 2018; 103 (5): 1715–1744. doi: 10.1210/jc.2018-00229.
2. Corona G., Goulis D.G., Huhtaniemi I., wsp. European Academy of Andrology (EAA) guidelines on investigation, treatment and monitoring of functional hypogonadism in males: Endorsing organization: European Society of Endocrinology. *Andrology* 2020; 8 (5): 970–987. doi: 10.1111/andr.12770.
3. Garvey W.T., Mechanick J.I., Brett E.M., wsp.; Reviewers of the AACE/ACE Obesity Clinical Practise Guidelines. American Association of Clinical Endocrinologists and American College of Endocrinology comprehensive clinical practice guidelines for medical care of patients with obesity. *Endocr. Pract.* 2016; 22 (Suppl. 3): 1–203. doi: 10.4158/EP161365.GL.
4. Haffner S.M., Shaten J., Stern M.P., wsp. Low levels of sex hormone-binding globulin and testosterone predict the development of non-insulin-dependent diabetes mellitus in men. MRFIT Research Group. Multiple Risk Factor Intervention Trial. *Am. J. Epidemiol.* 1996; 143 (9): 889–897. doi: 10.1093/oxfordjournals.aje.a008832.



5. Jones T.H., Haider A., Haider K.S., wsp. 895-P: Testosterone replacement therapy in men with hypogonadism and type 2 diabetes – ABCD Worldwide Audit. *Diabetes* 2024; 73 (Supl. 1): 895-P. doi.org/10.2337/db24-895-P.
6. Oh J.-Y., Barrett-Connor E., Wedick N.M., Wingard D.L., Rancho Bernardo Study. Endogenous sex hormones and the development of type 2 diabetes in older men and women: the Rancho Bernardo study. *Diabetes Care* 2002; 25 (1): 55–60. doi: 10.2337/diacare.25.1.55.
7. Stellato R.K., Feldman H.A., Hamdy O., wsp. Testosterone, sex hormone binding globulin, and the development of type 2 diabetes in middle-aged men: prospective results from the Massachusetts male aging study. *Diabetes Care* 2000; 23 (4): 490–494. doi: 10.2337/diacare.23.4.490.
8. Wittert G., Bracken K., Robledo K.P., wsp. Testosterone treatment to prevent or revert type 2 diabetes in men enrolled in a lifestyle programme (T4DM): a randomised, double-blind, placebo-controlled, 2-year, phase 3b trial. *Lancet Diabetes Endocrinol.* 2021; 9 (1): 32–45. doi: 10.1016/S2213-8587(20)30367-3.
9. Yassin A., Haider A., Haider K.S., wsp. Testosterone therapy in men with hypogonadism prevents progression from prediabetes to type 2 diabetes: eight-year data from a registry study. *Diabetes Care* 2019; 42 (6): 1104–1111. doi: 10.2337/dc18-2388.

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ROZDZIAŁ

Testosteron a otyłość

Piśmiennictwo

1. Anderson L.A., McTernan P.G., Harte A.L., wsp. The regulation of HSL and LPL expression by DHT and flutamide in human subcutaneous adipose tissue. *Diabetes Obes. Metab.* 2002; 4 (3): 209–213. doi: 10.1046/j.1463-1326.2002.00214.x.
2. Battineni G., Sagaro G.G., Chintalapudi N, wsp. Impact of obesity-induced inflammation on cardiovascular diseases (CVD). *Int. J. Mol. Sci.* 2021; 22 (9): 4798. doi: 10.3390/ijms22094798.
3. Bhasin S., Brito J.P., Cunningham G.R., wsp. Testosterone therapy in men with hypogonadism: an Endocrine Society Clinical Practice Guideline. *J. Clin. Endocrinol. Metab.* 2018; 103 (5): 1715–1744. doi: 10.1210/jc.2018-00229.
4. Bhasin S., Taylor W.E., Singh R., wsp. The mechanisms of androgen effects on body composition: mesenchymal pluripotent cell as the target of androgen action. *J. Gerontol. A Biol. Sci. Med. Sci.* 2003; 58 (12): M1103-10. doi: 10.1093/gerona/58.12.m1103.
5. Bhasin S., Woodhouse L., Casaburi R., wsp. Older men are as responsive as young men to the anabolic effects of graded doses of testosterone on the skeletal muscle. *J. Clin. Endocrinol. Metab.* 2005; 90 (2): 678–688. doi: 10.1210/jc.2004-1184.
6. Biernikiewicz M., Rusiecka A., Kałka D. Obesity and sexual desire: a systematic review and



- meta-analysis. *J. Sex. Med.* 2025; 22 (5): 677–693. doi: 10.1093/jsxmed/qdaf057.
7. Chang B., Song C., Gao H. *wsp.* Leptin and inflammatory factors play a synergistic role in the regulation of reproduction in male mice through hypothalamic kisspeptin-mediated energy balance. *Reprod. Biol. Endocrinol.* 2021; 19 (1): 12. doi: 10.1186/s12958-021-00698-0.
 8. Cooper L.A., Page S.T., Amory J.K., *wsp.* The association of obesity with sex hormone-binding globulin is stronger than the association with ageing-implications for the interpretation of total testosterone measurements. *Clin. Endocrinol. (Oxf.)* 2015; 83 (6): 828–833. doi: 10.1111/cen.12768. 887.
 9. Corona G., Goulis D.G., Huhtaniemi I., *wsp.* European Academy of Andrology (EAA) guidelines on investigation, treatment and monitoring of functional hypogonadism in males: endorsing organization: European Society of Endocrinology. *Andrology* 2020; 8 (5): 970–987. doi: 10.1111/andr.12770.
 10. Dhindsa S., Batra M., Kuhadiya N., Dandona P. Oestradiol concentrations are not elevated in obesity associated hypogonadotrophic hypogonadism. *Clin. Endocrinol. (Oxf.)* 2014; 80 (3): 464. doi: 10.1111/cen.12236.
 11. Fui M.N.T., Dupuis P., Grossmann M. Lowered testosterone in male obesity: mechanisms, morbidity and management. *Asian J. Androl.* 2014; 16 (2): 223–231. doi: 10.4103/1008-682X.122365.
 12. Garvey W.T., Mechanick J.I., Brett E.M., *wsp.*; reviewers of the AACE/ACE Obesity Clinical Practise

- Guidelines. American Association of Clinical Endocrinologists and American College of Endocrinology Comprehensive Clinical Practice Guidelines for Medical Care of Patients with Obesity. *Endocr. Pract.* 2016; 22 (supl. 3): 1–203. doi: 10.4158/EP161365.GL.
13. Gharahdaghi N., Rudrappa S., Brook M.S., wsp. Pharmacological hypogonadism impairs molecular transducers of exercise-induced muscle growth in humans. *J. Cachexia Sarcopenia Muscle* 2022; 13 (2): 1134–1150. doi: 10.1002/jcsm.12843.
 14. Green D.J., Chasland L.C., Yeap B.B., Naylor L.H. Comparing the impacts of testosterone and exercise on lean body mass, strength and aerobic fitness in aging men. *Sports Med. Open* 2024; 10 (1): 30. doi: 10.1186/s40798-024-00703-x.
 15. Hautanen A. Synthesis and regulation of sex hormone-binding globulin in obesity. *Int. J. Obes. Relat. Metab. Disord.* 2000; 24 (supl. 2): S64–S70. doi: 10.1038/sj.ijo.0801281.
 16. Herbst K.L., Bhasin S. Testosterone action on skeletal muscle. *Curr. Opin. Clin. Nutr. Metab. Care* 2004; 7 (3): 271–277. doi: 10.1097/00075197-200405000-00006.
 17. Herman A.P., Misztal T., Romanowicz K., Tomaszewska-Zaremba D. Central injection of exogenous IL-1 β in the control activities of hypothalamic-pituitary-gonadal axis in anestrus ewes. *Reprod. Domest. Anim.* 2012; 47 (1): 44–52. doi: 10.1111/j.1439-0531.2011.01800.x

18. Kelly D.M., Jones T.H. Testosterone and obesity. *Obes. Rev.* 2015; 16 (7): 581–606. doi: 10.1111/obr.12282.
19. Kelly D.M., Jones T.H. Testosterone: a metabolic hormone in health and disease. *J. Endocrinol.* 2013; 217 (3): R25–R45. doi: 10.1530/JOE-12-0455.
20. Khafagy R., Dash S. Obesity and cardiovascular disease: the emerging role of inflammation. *Front. Cardiovasc. Med.* 2021; 25 (8): 768119. doi: 10.3389/fcvm.2021.768119.
21. Kley H.K., Deselaers T., Peerenboom H. Evidence for hypogonadism in massively obese males due to decreased free testosterone. *Horm. Metab. Res.* 1981; 13 (11): 639–641. doi: 10.1055/s-2007-1019359.
22. Lopes H.F., Corrêa-Giannella M.L., Consolim-Colombo F.M., Egan B.M. Visceral adiposity syndrome. *Diabetol. Metab. Syndr.* 2016; 8: 40. doi: 10.1186/s13098-016-0156-2 doi: 10.1186/s13098-016-0156-2.
23. Luo Q., Li W., Li M., wsp. Leptin/leptinR-kisspeptin/kiss1r-GnRH pathway reacting to regulate puberty onset during negative energy balance. *Life Sci.* 2016; 153: 207–212. doi: 10.1016/j.lfs.2016.03.048.
24. Mangolim A.S., Brito L. de A.R., Nunes-Nogueira V.D.S. Effectiveness of testosterone replacement in men with obesity: a systematic review and meta-analysis. *Eur. J. Endocrinol.* 2021; 186 (1): 123–135. doi: 10.1530/EJE-21-0473.
25. Mongioi L.M., Cimino L., Condorelli R.A., wsp. Effectiveness of a very low calorie ketogenic diet on testicular function in overweight/obese men. *Nutrients* 2020; 12 (10): 2967. doi: 10.3390/nu12102967.

26. Nayak S.S., Partheepan K., Mantena S., wsp. The Effect of Weight Loss and Weight Loss Interventions on Sex Hormones: An Umbrella Review of Systematic Reviews and Meta-Analyses. *Endocrine Practice* 2026; 32 (2): 246–257. doi: 10.1016/j.eprac.2025.10.014.
27. Obradovic M., Sudar-Milovanovic E., Soskic S., wsp. Leptin and obesity: role and clinical implication. *Front. Endocrinol. (Lausanne)* 2021; 12: 585887. doi: 10.3389/fendo.2021.585887.
28. Oussaada S.M., Kilicarslan M., de Weijer B.A., wsp. Tissue-specific inflammation and insulin sensitivity in subjects with obesity. *Diabetes Res. Clin. Pract.* 2024; 211: 111663. doi: 10.1016/j.diabres.2024.111663.
29. Rubino D., Abrahamsson N., Davies M., wsp. Effect of continued weekly subcutaneous semaglutide vs placebo on weight loss maintenance in adults with overweight or obesity the STEP 4 randomized clinical trial. *JAMA* 2021; 325 (14): 1414–1425. doi: 10.1001/jama.2021.3224.
30. Ruppert Z., Neuperger P., Rákóczi B., wsp. Characterization of obesity-related diseases and inflammation using single cell immunophenotyping in two different diet-induced obesity models. *Int. J. Obes.* 2024; 48 (11): 1568–1576. doi: 10.1038/s41366-024-01584-6.
31. Rusiecki L., Zdrojowy R., Gebala J., wsp. Sexual health in Polish elderly men with coronary artery disease: importance, expectations, and reality. *Asian J. Androl.* 2020; 22 (5): 526–531. doi: 10.4103/aja.aja_131_19.

32. Salonia A., Boeri L., Capogrosso P., wsp. EAU Guidelines on Sexual and Reproductive Health. European Association of Urology. <https://uroweb.org/guidelines/sexual-and-reproductive-health> (dostęp: 14.08.2025).
33. Sarchielli E., Comeglio P., Squecco R., wsp. Tumor necrosis factor- α impairs kisspeptin signaling in human gonadotropin-releasing hormone primary neurons. *J. Clin. Endocrinol. Metab.* 2017; 102 (1): 46–56. doi: 10.1210/jc.2016-2115.
34. Schleh M.W., Caslin H.L., Garcia J.N., wsp. Metaflammation in obesity and its therapeutic targeting. *Sci. Transl. Med.* 2023; 15 (723): eadf9382. doi: 10.1126/scitranslmed.adf9382.
35. Simó R., Sáez-López C., Barbosa-Desongles A., wsp. Novel insights in SHBG regulation and clinical implications. *Trends Endocrinol. Metab.* 2015; 26 (7): 376–383. doi: 10.1016/j.tem.2015.05.001.
36. Sinha-Hikim I., Cornford M., Gaytan H., wsp. Effects of testosterone supplementation on skeletal muscle fiber hypertrophy and satellite cells in community-dwelling older men. *J. Clin. Endocrinol. Metab.* 2006; 91 (8): 3024–3033. doi:10.1210/jc.2006-0357.
37. Souteiro P., Belo S., Oliveira S.C., wsp.; AMTCO Group. Insulin resistance and sex hormone-binding globulin are independently correlated with low free testosterone levels in obese males. *Andrologia* 2018; 50 (7): e13035. doi: 10.1111/and.13035.
38. Srinivas-Shankar U., Wu F. Frailty and muscle function: role for testosterone? *Front. Horm. Res.* 2009; 37: 133–149. doi: 10.1159/000176050.

39. Urban R.J., Bodenbunrg Y.H., Gilkison C., wsp. Testosterone administration to elderly men increases skeletal muscle strength and protein synthesis. *Am. J. Physiol.* 1995; 269 (5 pt 1): E820-6. doi: 10.1152/ajpendo.1995.269.5.E820.
40. Wu S.A., Kersten S., Qi L. Lipoprotein lipase and its regulators: an unfolding story. *Trends Endocrinol. Metab.* 2021; 32 (1): 48–61. doi: 10.1016/j.tem.2020.11.005.
41. Xu X., De Pergola G., Eriksson P.S., wsp. Postreceptor events involved in the up-regulation of beta adrenergic receptor mediated lipolysis by testosterone in rat white adipocytes. *Endocrinology* 1993; 132 (4): 1651–1657. doi: 10.1210/endo.132.4.8384992.
42. Zhang X., Gao L., Meng H., wsp. Obesity alters immunopathology in cancers and inflammatory diseases. *Obes. Rev.* 2023; 24 (12): e13638. doi: 10.1111/obr.13638.
43. Zhao J., Zhai L., Liu Z., wsp. Leptin level and oxidative stress contribute to obesity-induced low testosterone in murine testicular tissue. *Oxid. Med. Cell. Longev* 2014; 2014: 190945. doi: 10.1155/2014/190945.
44. Zitzmann M. Testosterone deficiency, insulin resistance and the metabolic syndrome. *Nat Rev Endocrinol.* 2009; 5 (12): 673–681. doi: 10.1038/nrendo.2009.212.

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ROZDZIAŁ

TRT – testosteronowa terapia zastępcza

Piśmiennictwo

1. Bachman E., Travison T.G., Basaria S., wsp. Testosterone induces erythrocytosis via increased erythropoietin and suppressed hepcidin: evidence for a new erythropoietin/hemoglobin set point. *J. Gerontol. A Biol. Sci. Med. Sci.* 2014; 69 (6): 725–735. doi: 10.1093/gerona/glt154.
2. Bhasin S., Brito J.P., Cunningham R.G., wsp. Testosterone Therapy in Men With Hypogonadism: An Endocrine Society Clinical Practice Guideline. *Journal of Clinical Endocrinology & Metabolism.* 2018; 103 (5): 1715–1744. doi: 10.1210/jc.2018-00229.
3. Bhasin S., Buckwalter J.G. Testosterone supplementation in older men: a rational idea whose time has not yet come. *J. Androl.* 2001; 22 (5): 718–731. PMID: 11545281.
4. Bhasin S., Thompson I.M. Prostate risk and monitoring during testosterone replacement therapy. *J. Clin. Endocrinol. Metab.* 2024; 109 (8): 1975–1983. doi: 10.1210/clinem/dgae334.
5. Bhasin S., Travison T.G., Pencina K.M., wsp. Prostate safety events during testosterone replacement therapy in men with hypogonadism: a randomized clinical trial. *JAMA Netw. Open.* 2023; 6 (12): e2348692. doi: 10.1001/jamanetworkopen.2023.48692.
6. Chu K.Y., Achua J.K., Ramasamy R. Strategies to increase testosterone in men seeking



- fertility. *Urol. Res. Pract.* 2023; 49 (1): 2–6. doi: 10.5152/tud.2020.20436.
7. Chu K.Y., Kulandavelu S., Masterson T.A., wsp. Short-acting testosterone appears to have lesser effect on male reproductive potential compared to long-acting testosterone in mice. *F. S. Sci.* 2020; 1 (1): 46–52. doi: 10.1016/j.xfss.2020.03.002.
 8. Clift A.K., Johnson H., Huang D.R., Morgentaler A. Real-World Outcomes and Safety of Testosterone Therapy: A Longitudinal, Retrospective Cohort Study of Over 9,000 Men. *World J. Mens Health* 2026; 44 (2): 438–450. doi: 10.5534/wjmh.250245.
 9. Desai A., Yassin M., Cayetano A., wsp. Understanding and managing the suppression of spermatogenesis caused by testosterone replacement therapy (TRT) and anabolic-androgenic steroids (AAS). *Ther Adv. Urol.* 2022; 26:14:17562872221105017. doi: 10.1177/17562872221105017.
 10. Gurayah A.A., Dullea A., Weber A., wsp. Long vs short acting testosterone treatments: a look at the risks. *Urology.* 2023; 172: 5–12. doi: 10.1016/j.urology.2022.11.016.
 11. Hasan H., Bhushan S., Fijak M., Meinhardt A. mechanism of inflammatory associated impairment of sperm function, spermatogenesis and steroidogenesis. *Front. Endocrinol. (Lausanne)* 2022; 28 (13): 897029. doi: 10.3389/fendo.2022.897029.
 12. Kavoussi P.K., Machen G.L., Chen S.H. wsp. Direct conversion from long-acting testosterone replacement therapy to Natesto allows for spermatogenesis resumption: proof of concept. *Andrologia* 2022; 54 (8): e14453. doi: 10.1111/and.14453.

13. Masterson T.A., Turner D., Vo D., wsp. The effect of longer-acting vs shorter-acting testosterone therapy on follicle stimulating hormone and luteinizing hormone. *Sex. Med. Rev.* 2021; 9 (1): 143–148. doi: 10.1016/j.sxmr.2020.07.006.
14. Morgentaler A., Traish A.M. Shifting the paradigm of testosterone and prostate cancer: the saturation model and the limits of androgen-dependent growth. *Eur Urol.* 2009; 55 (2): 310–320. doi: 10.1016/j.eururo.2008.09.024.
15. Rastrelli G., Vignozzi L., Corona G., Maggi M. Testosterone and benign prostatic hyperplasia. *Sex. Med. Rev.* 2019; 7 (2): 259–271. doi: 10.1016/j.sxmr.2018.10.006.
16. Reddy R., Diaz P., Blachman-Braun R., wsp. Prevalence of secondary erythrocytosis in men receiving testosterone therapy. A matched-cohort analysis of intranasal gel, injections, and pellets. *Can. Urol. Assoc. J.* 2023; 17 (7): E202–E207. doi: 10.5489/cuaj.8210.
17. Salonia A., Boeri L., Capogrosso P., wsp. EAU Guidelines on Sexual and Reproductive Health. European Association of Urology. Available online: <https://uroweb.org/guidelines/sexual-and-reproductive-health> (dostęp: 14.08.2025).
18. Zitzmann M., Soave A., Bier S. Functional testosterone deficiency in aging men: Clinical impact, diagnostic pathways, and treatment strategies. *Maturitas* 2026; 207: 108870. doi: 10.1016/j.maturitas.2026.108870.

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ROZDZIAŁ

**Bezpieczeństwo
sercowo-naczyniowe
podczas stosowania
testosteronu**

Piśmiennictwo

1. Bhasin S., Lincoff A.M., Basaria S. wsp. Effects of long-term testosterone treatment on cardiovascular outcomes in men with hypogonadism: Rationale and design of the TRAVERSE study. *Am. Heart J.* 2022; 245: 41–50. doi: 10.1016/j.ahj.2021.11.016.
2. FDA Drug Safety Communication: FDA cautions about using testosterone products for low testosterone due to aging; requires labeling change to inform of possible increased risk of heart attack and stroke with use. U.S. Food and Drug Administration. <https://www.fda.gov/drugs/drug-safety-and-availability/fda-drug-safety-communication-fda-cautions-about-using-testosterone-products-low-testosterone-due-to-aging-requires-labeling-change-to-inform-of-possible-increased-risk-of-heart-attack-and-stroke> (dostęp: 25.10.2023).
3. Finkle W.D., Greenland S., Ridgeway G.K. wsp. Increased risk of non-fatal myocardial infarction following testosterone therapy prescription in men. *PLoS One* 2014; 9: e85805. doi.org/10.1371/journal.pone.0085805.
4. Lincoff A.M., Bhasin S., Flevaris P. wsp. Cardiovascular safety of testosterone-replacement therapy. *N. Engl. J. Med.* 2023; 389 (2): 107–117. doi: 10.1056/NEJMoa2215025.



5. No consistent evidence of an increased risk of heart problems with testosterone medicines (EMA/706140/2014). European Medicines Agency. https://www.ema.europa.eu/en/documents/referral/testosterone-article-31-referral-no-consistent-evidence-increased-risk-heart-problems-testosterone_en.pdf (dostęp: 27.10.2023).
6. Papamitsou T., Barlagiannis D., Papaliagkas V., Kotanidou E., Dermentzopoulou-Theodoridou M. Testosterone-induced hypertrophy, fibrosis and apoptosis of cardiac cells – an ultrastructural and immunohistochemical study. *Med. Sci. Monit.* 2011; 17 (9): BR266–273. doi: 10.12659/msm.881930.
7. Rusiecki L., Zdrojowy R., Gebala J. i wsp. Sexual health in Polish elderly men with coronary artery disease: importance, expectations, and reality. *Asian J. Androl.* 2020; 22 (5): 526–531. doi: 10.4103/aja.aja_131_19.
8. Shores M.M., Smith N.L., Forsberg C.W. i wsp. Testosterone treatment and mortality in men with low testosterone levels. *J. Clin. Endocrinol. Metab.* 2012; 97 (6): 2050–2058. doi: 10.1210/jc.2011-2591.
9. Vigen R., O'Donnell C.I., Barón A.E. i wsp. Association of testosterone therapy with mortality, myocardial infarction, and stroke in men with low testosterone levels. *JAMA* 2013; 310 (17): 1829–1836. doi: 10.1001/jama.2013.280386.

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ROZDZIAŁ

Afrodyzjaki

Piśmiennictwo

1. Adimoelja A. Phytochemicals and the breakthrough of traditional herbs in the management of sexual dysfunctions. *Int. J. Androl.* 2000; 23 (Suppl 2): 82–84. doi: 10.1046/j.1365-2605.2000.00020.x.
2. Allen L.L. Chocolate fortunes: The battle for the hearts, minds, and wallets of China's consumers. *Thunderbird International Business Review* 2010; 52 (1): 13–20. doi.org/10.1002/tie.20306.
3. Amagase H., Petesch B.L., Matsuura H., wsp. Intake of garlic and its bioactive components. *J. Nutr.* 2001; 131 (3S): 955S–962S. doi: 10.1093/jn/131.3.955S.
4. Ashokkumar K., Simal-Gandara J., Murugan M., wsp. Nutmeg (*Myristica fragrans* Houtt.) essential oil: A review on its composition, biological, and pharmacological activities. *Phytother. Res.* 2022; 36 (7): 2839–2851. doi: 10.1002/ptr.7491.
5. Bang H., Kwak J.H., Ahn H.Y., wsp. Korean red ginseng improves glucose control in subjects with impaired fasting glucose, impaired glucose tolerance, or newly diagnosed type 2 diabetes mellitus. *J. Med. Food.* 2014; 17 (1): 128–134. doi: 10.1089/jmf.2013.2889.
6. Bayan L., Koulivand P.H., Gorji A. Garlic: a review of potential therapeutic effects. *Avicenna J. Phytomed.* 2014; 4 (1): 1–14. MCID: PMC4103721.



7. Block E. The chemistry of garlic and onions. *Sci. Am.* 1985; 252 (3): 114–119. doi: 10.1038/scientificamerican0385-114.
8. Brillat-Savarin J.A. *Fisiologie du goût*. Paris 1826.
9. Bruinsma K., Taren D.L. Chocolate: food or drug? *J. Am. Diet. Assoc.* 1999; 99 (10): 1249–1256. doi: 10.1016/S0002-8223(99)00307-7.
10. Coe S.D., Coe M.D. *The true history of chocolate*. Thames & Hudson; London 1996.
11. De Andrade E., De Mesquita A.A., de Almeida Claro J., wsp. Study of the efficacy of Korean Red Ginseng in the treatment of erectile dysfunction. *Asian J. Androl.* 2007; 9 (2): 241–244. doi: 10.1111/j.1745-7262.2007.00210.x.
12. Esmaeili A., Khalili N., Najafi N., Hajizadeh-Sharafabad F. Ginseng supplementation and vascular function: a systematic review and meta-analysis of clinical trials. *BMC Complement. Med. Ther.* 2025; 25: 259. doi: 10.1186/s12906-025-04936-5.
13. Esposito K., Giugliano F., Di Palo C., wsp. Effect of lifestyle changes on erectile dysfunction in obese men: a randomized controlled trial. *JAMA.* 2004; 291 (24): 2978–2984. doi: 10.1001/jama.291.24.2978.
14. European Medicines Agency. European Union herbal monograph on *Panax ginseng* C.A. Mey., radix. 12 May 2023.
15. Griffiths G., Trueman L., Crowther T., wsp. Onions – a global benefit to health. *Phytother. Res.* 2002; 16 (7): 603–615. doi.org/10.1002/ptr.1222.

16. Ha M.T., Vu N.K., Huong T., wsp. Phytochemical and pharmacological properties of *Myristica fragrans* Houtt.: an updated review. *Arch. Pharm. Res.* 2020; 43 (11): 1067–1092. doi: 10.1007/s12272-020-01285-4.
17. Ichim M.C., de Boer H.J. A review of authenticity and authentication of commercial ginseng herbal medicines and food supplements. *Front. Pharmacol.* 2021; 11: 612071. doi: 10.3389/fphar.2020.612071.
18. Katz D.L., Doughty K., Ali A. Cocoa and chocolate in human health and disease. *Antioxid. Redox. Signal.* 2011; 15 (10): 2779–2811. doi: 10.1089/ars.2010.3697.
19. Lakhan S.E., Vieira K.F. Nutritional and herbal supplements for anxiety and anxiety-related disorders: systematic review. *Nutr. J.* 2010; 9: 42. doi: 10.1186/1475-2891-9-42.
20. Lanzotti V. The analysis of onion and garlic. *J. Chromatogr. A.* 2006; 1112 (1–2): 3–22. doi: 10.1016/j.chroma.2005.12.016.
21. Lee H.W., Lee M.S., Kim T.-H., wsp. Ginseng for erectile dysfunction. *Cochrane Database Syst. Rev.* 2021; 4: CD012654. doi: 10.1002/14651858.CD012654.pub2.
22. Li Z., Wang Y., Xu Q., wsp. Ginseng and health outcomes: an umbrella review. *Front. Pharmacol.* 2023; 14: 1069268. doi: 10.3389/fphar.2023.1069268.
23. Malviya N., Jain S., Gupta V.B., Vyas S. Recent studies on aphrodisiac herbs for the management of male sexual dysfunction-a review. *Acta. Pol. Pharm.* 2011; 68 (1): 3–8. PMID: 21485695.
24. Parker G., Parker I., Brotchie H. Mood state effects of chocolate. *J. Affect. Disord.* 2006; 92 (2–3): 149–159. doi: 10.1016/j.jad.2006.02.007.

25. Park S.-Y., Lee Y.S., Heo I., wsp. Efficacy and Safety of Ginseng Berry Extract (SIRTBERRY™) in Treating Andropause Symptoms. *World J. Mens Health.* 2025; 44 (1): 182–193. doi: 10.5534/wjmh.240311.
26. Peyrot des Gachons C., Beauchamp G.K., Breslin P.A.S. The genetics of bitterness and pungency detection. *Ann. N. Y. Acad. Sci.* 2009; 1170: 140–144. doi: 10.1111/j.1749-6632.2009.04594.x.
27. Rahman K., Lowe G.M. Garlic and cardiovascular disease: a critical review. *J. Nutr.* 2006; 136 (3 Suppl): 736S–740S. doi: 10.1093/jn/136.3.736S.
28. Rowland D.L., Tai W. A review of plant-derived and herbal approaches to sexual dysfunctions. *J. Sex. Marital. Ther.* 2003; 29 (3): 185–205. doi: 10.1080/00926230390155096.
29. Saka V.P., Challa S.R., Raju A.B. Effect of *Avena sativa* on spermatogenesis and reproductive health. *J. Endocrinol. Reprod.* 2016; 20 (2): 118–125. doi: 10.18311/jer/2016/15471.
30. Shamloul R. Natural aphrodisiacs. *J. Sex. Med.* 2010; 7 (1): 39–49. doi: 10.1111/j.1743-6109.2009.01521.x.
31. Sharma V., Thakur M., Chauhan N.S., Dixit V.K. Evaluation of the anabolic and aphrodisiac activity of *Anacyclus pyrethrum*. *Sci. Pharm.* 2009; 77 (1): 97–110. doi.org/10.3797/scipharm.0808-14.
32. Sharifpour Z., Hasanpoor S., Mohammad-Alizadeh-Charandabi S., wsp. The effect of ginseng on sexual function in postmenopausal women. *J. Pharm. Health Care Sci.* 2025; 11: 52. doi.org/10.1186/s40780-025-00461-2.

33. Slimestad R., Fossen T., Vågen I.M. Onions: a source of unique dietary flavonoids. *J. Agric. Food Chem.* 2007; 55 (25): 10067–10080. doi: 10.1021/jf0712503.
34. Vatsyayana. *The Kama Sutra of Vatsyayana*. Norilana Books; 2009.
35. West E., Krychman M. Natural aphrodisiacs-a review. *Sex. Med. Rev.* 2015; 3 (4): 279–288. doi: 10.1002/smrj.62.
36. Zeng M., Zhang K., Yang J., wsp. Effects of ginseng on cognitive function: a meta-analysis. *Phytother. Res.* 2024; 38 (12): 6023–6034. doi: 10.1002/ptr.8359.
37. Zhu J., Xu X., Zhang X., wsp. Efficacy of ginseng supplements on fatigue: a meta-analysis. *Medicine.* 2022; 101 (26): e29767. doi: 10.1097/MD.00000000000029767.