The Impact of Immunotherapy on Sleep

Vanja Bašić Kes[1]

[1] Department of Neuroimmunology, Neurogenetics and Pain, Department of Neurology, University Hospital Centre Sestre milosrdnice, Zagreb, Croatia

Contact: kesvanja@gmail.com

Abstract

Multiple sclerosis (MS) is a chronic autoimmune demyelinating disease of the central nervous system characterized by inflammatory processes and neurodegeneration. Immunomodulatory therapy is a cornerstone of treatment, aiming to reduce relapse frequency, slow disease progression, and preserve patients' functional status. Available therapeutic options include interferon beta, glatiramer acetate, oral medications such as fingolimod and dimethyl fumarate, and monoclonal antibodies such as natalizumab and ocrelizumab. Newer approaches focus on selective modulation of the immune response while minimizing adverse effects. Sleep disorders are common in patients with MS, with a reported prevalence of up to 50–60%. The most frequent disorders include insomnia, restless legs syndrome, obstructive sleep apnea, and excessive daytime sleepiness. These disturbances significantly affect quality of life and cognitive functioning and may be associated with disease progression. The interaction between the immune system and sleep is an increasingly important area of research. Chronic inflammation may disrupt sleep architecture, while disturbed sleep may further aggravate immune dysfunction. Certain immunomodulatory therapies may have either beneficial or adverse effects on sleep patterns, highlighting the need for an individualized treatment approach. In conclusion, an integrated approach combining optimal immunomodulatory therapy with the recognition and treatment of sleep disorders is essential for improving outcomes in patients with MS. Future research should focus on personalized medicine and a better understanding of the neuroimmunological mechanisms underlying the relationship between sleep and immune function.

Keywords: multiple sclerosis; immunotherapy; sleep disorders; neuroimmunology

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Utjecaj imunoterapije na spavanje

Vanja Bašić Kes[1]

[1] Zavod za neuroimunologiju, neurogenetiku i bol, Klinika za neurologiju, Klinički bolnički centar Sestre milosrdnice, Zagreb, Hrvatska

Kontakt: kesvanja@gmail.com

Sažetak

Multipla skleroza (MS) kronična je autoimuna demijelinizacijska bolest središnjega živčanog sustava, obilježena upalnim procesima i neurodegeneracijom. Imunomodulatorna terapija temelj je liječenja, s ciljem smanjenja učestalosti relapsa, usporavanja progresije bolesti i očuvanja funkcionalnog statusa bolesnika. Dostupne terapijske mogućnosti uključuju interferon beta, glatiramer acetat, oralne lijekove poput fingolimoda i dimetilfumarata te monoklonska protutijela poput natalizumaba i okrelizumaba. Noviji terapijski pristupi usmjereni su na selektivnu modulaciju imunološkog odgovora uz smanjenje nuspojava. Poremećaji spavanja česti su u bolesnika s MS-om, s prijavljenom prevalencijom do 50–60 %. Najčešći oblici uključuju nesanicu, sindrom nemirnih nogu, opstruktivnu apneju u spavanju i prekomjernu dnevnu pospanost. Ovi poremećaji značajno utječu na kvalitetu života i kognitivno funkcioniranje te mogu biti povezani s progresijom bolesti. Interakcija između imunološkog sustava i spavanja sve je važnije područje istraživanja. Kronična upala može narušiti arhitekturu spavanja, dok poremećeno spavanje može dodatno pogoršati imunološku disfunkciju. Pojedine imunomodulatorne terapije mogu imati povoljan ili nepovoljan učinak na obrasce spavanja, što naglašava potrebu za individualiziranim pristupom liječenju. Zaključno, integrirani pristup koji uključuje optimalnu imunomodulatornu terapiju te prepoznavanje i liječenje poremećaja spavanja ključan je za poboljšanje ishoda u bolesnika s MS-om. Buduća istraživanja trebala bi biti usmjerena na personaliziranu medicinu i bolje razumijevanje neuroimunoloških mehanizama koji povezuju spavanje i imunološku funkciju.

Ključne riječi: multipla skleroza; imunoterapija; poremećaji spavanja; neuroimunologija

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