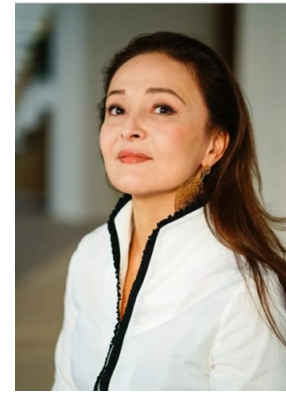




Abzalieva D. S.,
MD, Professor, Director
Institute of Integrative Medicine
and Wellness Ltd., Astana



Sagintayeva R..S.,
PhD, Founder
Institute of Integrative Medicine
and Wellness Ltd., Astana

EXECUTIVE BURNOUT AND THE RELEVANCE OF IMPLEMENTING ANTI-STRESS RECOVERY

In the modern world, the health of managers is becoming an increasingly high-priority topic, especially in the context of stress and its impact on professional performance. A study by FlexJobs and Mental Health America (MHA) (2021) found that 37% of CEOs now work longer hours than before the pandemic, and more than 75% also report work-related mental and physical health problems. According to Deloitte (2022), about 70% of senior managers are seriously considering leaving their jobs, mainly to improve their emotional well-being. According to a recent report from Challenger, Gray & Christmas, Inc., more than 650 executives will leave their jobs in 2022.

Stress is a natural human response that focuses attention on problems or threats that occur in everyday life (WHO, 2023). Most of the causes of stress are workplace burnout. In 2019, the World Health Organization (WHO) included burnout in the 11th edition of the International Classification of Diseases (ICD-11) as an occupational phenomenon. «Burnout (ICD-11) is a syndrome that is seen as the result of chronic workplace stress that has not been managed. It is characterized by three dimensions:

- Feeling drained or drained of energy.
- Increased mental distance from work or feelings of negativism or cynicism associated with work;
- Reduced professional efficiency.

«Burnout refers to phenomena in a professional context and should not be used to describe experiences in other areas of life» (WHO, 2019).

Burnout syndrome in managers

Heavy workload, responsibility for results, risk-taking, and change management distinguish managers from employees in any organization. According to a Harvard Business Review (2021) study, 96% of senior managers reported feeling «burned out» to some degree, with one-third classifying their burnout as extreme. And the Microsoft 2022 Work Trends Index, which includes a global survey of employees in various industries and companies, found that more than 50% of managers report feeling burned out, slightly higher than the level among employees in general. One of the main causes of managers' stress at work is an overload of information and tasks. Modern technologies allow you to be constantly in touch and available for work 24/7, which leads to a constant feeling of lack of time and inability to relax.

Analysis of gender characteristics showed that the average value of the integral professional burnout index is higher for male managers compared to female managers ($F=156.84$, $p0.001$), despite the fact

that significant differences were obtained for all 9 functional components of burnout (Berezovskaya, 2016).

According to the international journal «Global Advances in Health and Medicine», 51.3% of managers are diagnosed with high levels of stress. Most of the problems were related to well-being indicators such as sleep, anxiety, energy levels, and nutrition. Executive stress was associated with work (64.4%), family problems (44.2%), health problems (20.3%), and work-life balance (7.4%) (Ganesh et al., 2018).

One of the most high-profile cases of executive burnout occurred with an American journalist of Greek origin Arianna Huffington, the creator of one of the most visited online publications in the world, The Huffington Post. In 2007, after working for 18 hours, devoting 3-4 hours a day to sleep, Arianna Huffington woke up from fainting in a pool of blood with a broken zygomatic bone due to a nervous breakdown caused by overwork. In August 2016, Huffington left The Huffington Post and launched a multi-functional website dedicated to healthy living (Forbes, 2017).

Causes of stress

A 2019 Harvard Business Review study found that the main causes of burnout are:

- Working load:

According to a Statista study (2019), heavy workloads account for 39% of workplace stress and are the main cause of burnout. Factors contributing to the increased workload include a lack of employees, an excessive workload of skilled professionals, and an over-reliance on software that may not meet expectations.

A Gallup study (2018) found that tired employees are 63% more likely to take sick leave and 2.6 times more likely to actively look for another job.

- Remuneration:

Effort, lack of reward, and an imbalance of effort and reward during the first year on the job lead to exhaustion (Gorgievski, 2017).

- Social factor and justice:

Building strong relationships, nurturing a sense of belonging, and dealing with feelings of loneliness can help prevent burnout and promote well-being in the workplace, regardless of the work environment (HBR, 2019).

Effects of workplace stress

Executive stress and burnout have become a major problem in today's workplaces because of their negative impact on both individual managers and the organization as a whole.

• Impact on the organization's performance:

A study published in the International Journal of Accounting Research» (Oboreh et al., 2016) found a significant negative correlation between managers' stress levels and organizational performance indicators such as profitability and employee productivity.

Every year, approximately 17 million working days are lost worldwide due to poor health caused by stress, depression or anxiety at work (HSE, 2022). Up to 40% of staff turnover is due to stress. The International Labour Organization (ILO) identifies occupational stress as the main threat to workers' health.

• Health and well-being implications:

The Journal of the American Heart Association» published the results of a longitudinal study, according to which managers who experience chronic stress have a 50% higher risk of developing cardiovascular diseases compared to their colleagues who experience less stress (Sara et al., 2018). Some studies have linked work-related stress to various diseases, such as musculoskeletal disorders, cardiovascular diseases, depression, and cancer (Eurofound, 2016; WHO, 2017).

In 2015, Dr. Michael A. Freeman et al. (2018) conducted a survey of 242 entrepreneurs and 93 demographically comparable comparison participants. They found:

- 72% of entrepreneurs (significantly more than in the comparison group) independently noted the presence of mental health problems,
- 49% of entrepreneurs have had one or more mental illnesses in their lifetime,
- 32% of entrepreneurs have had two or more psychiatric disorders in their lifetime,
- 18% of entrepreneurs have had three or more mental health problems in their lifetime,
- 23% of entrepreneurs were asymptomatic family members with high symptoms.

- Compared to the control group, entrepreneurs who participated in the study were significantly more likely to report:
- depression (30% compared to 15% in the control group)
- ADHD (29%, compared to 5% in the control group)
- substance use-related condition (12%, compared to 4% in the control group)
- diagnosis of bipolar disorder (11% compared to 1% in the control group).

Neurotic and psychosomatic diseases, namely the manifestation of neuroses, one of the forms of which is neurasthenia, which is most common in people holding senior positions, are a consequence of constant problems and stress among managers of different ranks. The Polish scientist Кемпинским А. Kempinski, an outstanding psychiatrist, psychologist and professor at the Jagiellon University, introduced the concept of «director's neurosis» in 1975. Kempinski A. describes managers suffering from director's neurosis as follows: «They are always making out something, repeatedly holding several telephone handsets at once, reacting to simple questions with a quick temper and often giving contradictory orders. By their behavior, they irritate the social group, everyone turns like squirrels in a wheel, which as a result leads to general irritation» (Kempinski, 1975).

- *Financial costs:*

According to WHO estimates (2022), around 12 billion working days are lost worldwide each year due to depression and anxiety, and productivity losses amount to US \$ 1 trillion per year.

According to a study conducted by the World Health Organization (WHO), every \$ 1 invested in the treatment and support of common mental disorders generates a profit of \$ 4 in the form of improved health and increased productivity. Therefore, companies should prioritize the mental health of their employees and provide them with the necessary support, as these measures benefit employees and contribute to the overall success of the company.

Possible solutions

Managing executive stress and burnout requires comprehensive solutions that prioritize both individual well-being and organizational support.

1. *Implementation of the Stress Management and Wellness Program (EAPs).*

According to a study by the American Psychological Association (APA, 2023), 54% of organizations with stress management programs report improved employee morale and increased job satisfaction.

A study published in the journal «JAMA Psychiatry» found that employees who received mental health services experienced a 28% reduction in stress levels and a 30% increase in job satisfaction (Mangurian et al., 2023).

A study published in the Journal of Occupational Health Psychology» found that employees who participated in stress management activities had a 25% reduction in their stress levels (Richardson, 2017). A study conducted by the Health Enhancement Research Organizations showed that companies with wellness programs have reduced the number of sick leave and absenteeism by 25%.

Компания Johnson & Johnson» has historically been recognized for its comprehensive approach to employee health and well-being, and its programs have shown positive results in reducing health risks. According to the company's executive vice president, Peter Fasolo, the company's health indicators, such as obesity and triglyceride levels, are consistently ahead of the national average obtained from the Centers for Disease Control and Prevention (CDC). For example, in 2016, 30% of people nationwide had hypertension, compared to just 9.2% of Johnson & Johnson employees» (Bartz, 2018).

«Johnson & Johnson» offers all its employees access to the Energy for Performance® (E4P) course. During the two-day program, participants complete exercises that help them identify and prioritize the most significant components of their lives. They also take part in food seminars and classes that have been scientifically proven to boost energy (Bartz, 2018). The results of the evaluation of the company's wellness program indicate a significant reduction in risks in 8 of the 13 risk categories considered for all employees who participated in two health risk assessments on average for 2 and 3/4 years. The study highlights the ability of large-scale, carefully designed and integrated corporate health and productivity management programs to positively impact employee health and well-being (Goetzel et al., 2002).

An experiment conducted at the multinational corporation «Turbocoating Spa», located in Rubbiano di Solignano (Parma, Italy), which has its headquarters with 229 employees, proved the positive effect of meditation on the body of workers. As a sequence, a 20-minute practice was chosen, taken from the Tibetan tradition, and adapted to specific conditions. The meditation session was held in a specially designated room on the company's premises, from Monday to Friday, from 7: 35 am to 7: 55 am.

The average registered presence rate during working days was 82%. The effects of meditation were measured in terms of both company productivity and the well-being of those who did not meditate, the latter using the Mood State Profile (POMS) and Short Form 36 (SF36) questionnaires. As for the performance indicators of enterprises, the experimental trimester compared to the previous trimester showed an improvement in product quality (+6.6%), non-compliance of critical products with standards due to human factors (i.e. errors) (-42.6%), quarterly productivity (+10.5%) (Explore, 2019).

The Centers for Disease Control and Prevention (CDC, n.d.) also claims that regular physical activity can reduce symptoms of anxiety and depression by 20-30%.

2. *Encourage work-life balance.*

A study conducted by the Society for Human Resource Management (SHRM) found that 89% of employees report better work-life balance when they are offered flexible working hours (Maurer, 2019).

According to the Harvard Business Review», organizations with work-life balance policies have a 21% increase in productivity and a 37% reduction in absenteeism (Seppala & Cameron, 2015).

3. *Prioritize your workload and time management.*

A study conducted by the American Psychological Association (APA, 2011) found that 49% of employees who think they have too much work experience increased levels of stress.

A study published in the Journal of Occupational and Environmental Medicine» found that effective workload management and prioritizing time reduced employee burnout by 41%.

4. *Supportive and healthy leadership.*

The behavior, decisions, and well-being of managers significantly influence how employees perceive their tasks and perceive the workplace. Leaders who prioritize employee well-being play a key role in creating a positive and highly productive work environment. By focusing on the health and happiness of their team members, including themselves, these leaders not only increase individual job satisfaction and morale, but also significantly contribute to the overall success of the organization and long-term sustainability (Jendriks, 2024). Mental health and well-being are seen as key drivers for improving corporate culture by 42% (LinkedIn, 2022).

Research published in the Journal of Applied Psychology» shows that employees who perceive their work environment as supportive have lower burnout rates and higher job satisfaction.

A Gallup study found that employees who feel supported by their supervisors are 70% less likely to suffer from burnout (Harter, 2022).

The PwC report (2021) states that organizations with supportive management have a 70% lower turnover rate.

5. *Training managers in stress management techniques.*

According to the American Stress Institute (APA, 2023), managers trained in stress management techniques can reduce stress levels in their team by 50%.

A study published in the Journal of Occupational Health Psychology» found that employees whose supervisors were trained in stress management techniques had a 23% reduction in stress-related absenteeism (Richardson, 2017).

Conclusion

Executive wellness is an ongoing process that is essential for reducing workplace stress, for overall well-being, and for improving productivity. Our research highlights the need for active implementation of stress and chronic fatigue prevention programs by organizing health improvement for employees in wellness-sanatoriums.

Институт The OM Institute for Integrative Medicine and Wellness (IIMW) has developed оздоровительная программа «the Anti-Stress Wellness program, which is an integrative approach to improving overall well-being based on the principles of evidence-based medicine, where all procedures interact synergistically, providing an integrated approach to human health. This program includes the following main components:

1. Physiological stimulation of the respiratory system with phytoncides, aeroionotherapy with coniferous trees and improving the function of the cardiovascular system by conducting activities in the forest area. Also in the work of Japanese scientist Lee 2022, it is proved that «bathing in the forest - Shinrin-Yoku» reduces the level of stress hormones such as epinephrine and norepinephrine in the urine, as well as cortisol in saliva/serum, helping to manage stress, and also reduces blood pressure and heart rate, having a preventive effect on the heart. cardiovascular system.но-сосудистую систему.

2. Meditation practices, yoga, дыхательные breathing practices, and vibroacoustic therapy. Исследование A Harvard Medical School study (2013) used advanced genomic testing to analyze transcriptional changes that occur during meditation practice. The results showed that just one mindfulness meditation session caused rapid increased expression of genes related to energy metabolism, mitochondrial function, insulin secretion, and telomere maintenance, as well as reduced expression of genes related to the inflammatory response and stress-related pathways. In addition, data from Novaes et al. (2020) suggest that yoga programs that include pranayama lead to reduced anxiety in people. The Institute's clinic selects personalized meditation and breathing exercises using biofeedback techniques based on the results of a study of heart rate variability and stress levels.

3. Practices for improving adaptive abilities based on the effective use of natural resources, including methods of aromatherapy, herbal medicine, pantotherapy, koumiss treatment and other natural therapeutic techniques.

4. Stimulation of the lymphatic drainage function of the body with the help of heat and contrast treatments, as well as hardware pressotherapy.

5. A balanced diet of organic products with enhanced properties of antioxidant protection of the body and products to normalize the intestinal microbiome.

6. Organization of space and conditions for healthy sleep and rest.

Achieving optimal effectiveness of our preventive and wellness programs is a top priority. Preliminary data showed an improvement not only in the emotional state and general well-being as a result of the Anti-Stress program, but also in the positive dynamics of the Heart Rate Variability (HRV) study indicators. A comprehensive analysis of the indicators, including variational, spectral and autocorrelation, showed reliable dynamics during the health program. The most sensitive indicators indicated an improvement in the neurohumoral regulation of the body, a decrease in the imbalance of the autonomic nervous system, and an increase in the adaptive reserves of the body, and a comprehensive health indicator. The synthesized approach in our wellness Program «Antistress» is a holistic method for preventing early aging, helping to reduce stress levels and improve the physical and psychological state of a person. This study highlights the importance of a personalized approach to health and longevity, combining scientific evidence and practical methods to achieve optimal results in maintaining health and quality of life.

Для успешной implementation of these Programs, it is necessary to develop a network of wellness-resorts throughout Kazakhstan, increasing their availability and efficient use of natural resources. This initiative can have a huge impact on public health, preventing the development of many chronic diseases associated with the impact of stress and will contribute to an overall improvement in the quality of life of the population.

List of used literature

American Psychology Association (APA). 2023. Artificial intelligence, monitoring technology, and psychological well-being. <https://www.apa.org/pubs/reports/work-in-america/2023-work-america-ai-monitoring>

American Psychological Association. 2023. 2023 Work in America Survey. <https://www.apa.org/pubs/reports/work-in-america/2023-workplace-health-well-being>

American Psychological Association (APA). 2022. Workers appreciate and seek mental health support in the workplace. <https://www.apa.org/pubs/reports/work-well-being/2022-mental-health-support>

American Psychological Association (APA). 2011. APA Survey Finds Many U.S. Workers Feel Stressed Out and Undervalued. <https://www.apa.org/news/press/releases/2011/03/workers-stressed>

Harter J. 2017. Employee Engagement vs. Employee Satisfaction and Organizational Culture.

BARTZ, A. (2018). "This healthcare company is determined to have the healthiest employees in the world" <https://www.nj.com/innovation/how-johnson-johnson-is-improving-workplace-wellness-for-healthiest-employees>

CDC. n.d. Benefits of Physical Activity. <https://www.cdc.gov/physicalactivity/basics/pa-health/index.htm>

Challenger, Gray & Christmas, Inc. (2022) "May '22 CEO Report: Changes Continue Upward Trajectory, Exits Up 52% From Same Month Last Year" <https://www.challengergray.com/blog/ceo-changes-continue-upward-trajectory-may-exits-up-52-from-same-month-last-year/>

Deloitte (2022). "The C-suite's role in well-being" <https://www2.deloitte.com/us/en/insights/topics/leadership/employee-wellness-in-the-corporate-workplace.html>

Eurofound. (2016). Germany: Occupational health strategy focuses on work-related stress. Retrieved from <https://www.eurofound.europa.eu/observatories/eurwork/articles/workingconditions/germany-occupational-health-strategy-focuses-on-work-related-stres>

Forbes (2017). «On the Verge of a nervous Breakdown: How Arianna Huffington is making money from the global stress epidemic» <https://www.forbes.ru/forbes-woman/343367-na-grani-nervnogo-sryvak-arianna-haffington-zarabatyvaet-na-globalnoy>

FlexJobs Report: Statistics on the State of Remote Work for 2021 (2021) <https://www.prweb.com/releases/flexjobs-report-statistics-on-the-state-of-remote-work-for-2021-843040451.html>

FlexJobs, MentalHealthAmerica Survey: MentalHealth in the Workplace https://www.flexjobs.com/blog/post/flexjobs-mha-mental-health-workplace-pandemic/?utm_source=cj&utm_medium=VigLink&utm_campaign=affiliates&cjevent=778ad27ac3cc11eb80a700040a82b836

Freeman, M.A., Staudenmaier, P.J., Zisser, M.R. et al. 2018. The prevalence and co-occurrence of psychiatric conditions among entrepreneurs and their families. *Small Bus Econ* 53, 323–342 (2019)

Ganesh, MBBS, MD,¹ Saswati Mahapatra, MS,¹ Debbie L Fuehrer, LPCC,¹ Levi J Folkert, BA,¹ Whitney A Jack, RN,² Sarah M Jenkins, MS,³ Brent A Bauer, MD,¹ Dietlind L Wahner-Roedler, MD,¹ and Amit Sood, MD (2018) “The Stressed Executive: Sources and Predictors of Stress Among Participants in an Executive Health Program” *GLOBAL ADVANCES IN HEALTH AND MEDICINE* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6196623/>

Gallup (2018) <https://www.gallup.com/workplace/237059/employee-burnout-part-main-causes.aspx#:~:text=Although%20burnout%20has%20become%20%22just,actively%20seeking%20a%20different%20job>

Gavelin, Magdalena E. Domellöf, Elisabeth Åström, Andreas Nelson, Nathalie H. Launder, Anna Stigsdotter Neely, Amit Lampit (2021) “Cognitive function in clinical burnout: A systematic review and meta-analysis” *Work&Stress* <https://www.tandfonline.com/doi/full/10.1080/02678373.2021.2002972>

Goetzel, R. Z., Ozminkowski, R. J., Bruno, J. A., Rutter, K. R., Isaac, F., & Wang, S. (2002). “The Long-Term Impact of Johnson & Johnson’s Health & Wellness Program on Employee Health Risks” *Journal of Occupational and Environmental Medicine* <https://doi.org/10.1097/00043764-200205000-00010>

Harvard Business Review (2021) <https://hbr.org/2021/02/beyond-burned-out>

Jendriks T. 2024. 95 Company Culture Statistics: Leadership, Employee Engagement, and Work-Life Balance. *Flair HR*. <https://flair.hr/en/blog/company-culture-statistics/>

LinkedIn. 2022. The Reinvention of Company Culture. 2022 Global Talent Trends https://business.linkedin.com/content/dam/me/business/en-us/talent-solutions-lodestone/body/pdf/global_talent_trends_2022.pdf?trk=bl-po&veh=Global-talent-trends-2022-launch-post

Mangurian C, Fitelson E, Devlin M, et al. Envisioning the Future of Well-Being Efforts for Health Care Workers—Successes and Lessons Learned From the COVID-19 Pandemic. *JAMA Psychiatry*. 2023;80(9):962–967. doi:10.1001/jamapsychiatry.2023.2355

Marjan J. Gorgievski (2017) Effort-reward imbalance and work-home interference: a two-wave study among European male nurses <https://www.tandfonline.com/doi/full/10.1080/02678373.2018.1503358>

Maurer R. 2019. Flexible Work Critical to Retention, Survey Finds. *Society for Human Resource Management (SHRM)*. <https://www.shrm.org/topics-tools/news/talent-acquisition/flexible-work-critical-to-retention-survey-finds>

Ministry of Health, Labour and Welfare, “Stress check system implementation manual based on the Industrial Safety and Health Act (in Japanese),” Feb. 2021. <http://www.mhlw.go.jp/content/000533925.pdf>

Medicine https://journals.lww.com/psychosomaticmedicine/abstract/2006/11000/burnout_and_risk_of_type_2_diabetes__a_prospective.8.aspx

Oboreh, J., Echo, O. & Okeke, M.M. (2016). Effects of Stress on Employee Productivity. *International Journal of Accounting Research*. 2. 38-49. 10.12816/0028138.

Oswald, Eugenio Proto, Daniel Sgroi (2009) “Happiness and Productivity” *IZA Institute of Labor Economics* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1526075

Pagliarola, Renato Pelatib, Domenico Signorinib, Giulia Parentia, Francesca Roversi (2019). “The effects of meditation on the performance and well-being of a company: A pilot study”

PwC. 2021. Organisational culture: It’s time to take action. 2021 Global Culture Survey of 3,200 leaders and employees worldwide. <https://www.pwc.com/gx/en/issues/upskilling/global-culture-survey-2021.html>

Richardson, K. M. (2017, February 2). Managing Employee Stress and Wellness in the New Millennium. *Journal of Occupational Health Psychology*. Advance online publication. <http://dx.doi.org/10.1037/ocp0000066>

Sara, J. D., Prasad, M., Eleid, M. F., Zhang, M., Widmer, R. J., & Lerman, A. (2018). Association Between Work-Related Stress and Coronary Heart Disease: A Review of Prospective Studies Through

- the Job Strain, Effort-Reward Balance, and Organizational Justice Models. *Journal of the American Heart Association*, vol. 7, No. 9. <https://doi.org/10.1161/JAHA.117.008073>
- Seppälä E. & Cameron K. 2015. Proof That Positive Work Cultures Are More Productive. *Harvard Business Review*. <https://hbr.org/2015/12/proof-that-positive-work-cultures-are-more-productive>
- Statista (2019) <https://www.statista.com/statistics/315848/employee-stress-sources-at-work-in-north-america/>
- Harvard Business Review (2019) <https://hbr.org/2019/07/6-causes-of-burnout-and-how-to-avoid-them>
- The Health and Safety Executive (HSE) (2022) <https://www.ukata.org.uk/news/hse-publishes-annual-work-related-ill-health-and-injury-statistics-202122/#:~:text=The%20figures%20from%20Great%20Britain%E2%80%99s%20workplace%20regulator%20show,working%20days%20lost%20due%20to%20work-related%20ill%20health>
- World Health Organization (2023) <https://www.who.int/news-room/questions-and-answers/item/stress>
- World Health Organization (2019) <https://www.who.int/news/item/28-05-2019-burn-out-an-occupational-phenomenon-international-classification-of-diseases>
- World Health Organization. (2017). Tobacco (Fact Sheet No. 339). Retrieved from <http://www.who.int/mediacentre/factsheets/fs339/en/>
- World Health Organization. (2017). Alcohol (Fact Sheet No. 349). Retrieved from <http://www.who.int/mediacentre/factsheets/fs349/en/> 239
- World Health Organization. (2017). Physical Activity (Fact Sheet No. 385). Retrieved from <http://www.who.int/mediacentre/factsheets/fs385/en/>
- World Health Organization. (2017). Cardiovascular diseases (Fact Sheet No. 317). Retrieved from <http://www.who.int/mediacentre/factsheets/fs317/en/>
- Berezovskaya R. A. (2016) «Features of attitude to work and burnout syndrome among managers» *Bulletin of Moscow University* <https://cyberleninka.ru/article/n/osobennosti-otnosheniya-k-rabote-i-sindrom-vygoraniya-u-rukovoditeley/viewer>
- WHO. 2022. Mental health in the workplace. <https://www.who.int/ru/news-room/fact-sheets/detail/mental-health-at-work>
- WHO. 2016. Investing in treatment for depression and anxiety disorders pays off fourfold. <https://www.who.int/ru/news/item/13-04-2016-investing-in-treatment-for-depression-and-anxiety-leads-to-fourfold-return>
- Kempinski A. «Psychopathology of neuroses» <https://coollib.com/b/489050-anton-kempinskiy-psihipatologiya-nevrozov/read>
- Li Q. (2022). Effects of forest environment (Shinrin-yoku/Forest bathing) on health promotion and disease prevention -the Establishment of «Forest Medicine». *Environmental health and preventive medicine*, 27, 43. <https://doi.org/10.1265/ehpm.22-00160>
- Li, Q., Morimoto, K., Kobayashi, M., Inagaki, H., Katsumata, M., Hirata, Y., Hirata, K., Suzuki, H., Li, Y. J., Wakayama, Y., Kawada, T., Park, B. J., Ohira, T., Matsui, N., Kagawa, T., Miyazaki, Y., & Krensky, A. M. (2008). Visiting a forest, but not a city, increases human natural killer activity and expression of anti-cancer proteins. *International journal of immunopathology and pharmacology*, 21(1), 117–127. <https://doi.org/10.1177/039463200802100113>
- Bhasin, M. K., Dusek, J. A., Chang, B. H., Joseph, M. G., Denninger, J. W., Fricchione, G. L., Benson, H., & Libermann, T. A. (2013). Relaxation response induces temporal transcriptome changes in energy metabolism, insulin secretion and inflammatory pathways. *PloS one*, 8(5), e62817. <https://doi.org/10.1371/journal.pone.0062817>
- Black, D. S., Cole, S. W., Irwin, M. R., Breen, E., St Cyr, N. M., Nazarian, N., Khalsa, D. S., & Lavretsky, H. (2013). Yogic meditation reverses NF-κB and IRF-related transcriptome dynamics in leukocytes of family dementia caregivers in a randomized controlled trial. *Psychoneuroendocrinology*, 38(3), 348–355. <https://doi.org/10.1016/j.psyneuen.2012.06.011>
- Antoni, M. H., Lutgendorf, S. K., Blomberg, B., Carver, C. S., Lechner, S., Diaz, A., Stagl, J., Arevalo, J. M., & Cole, S. W. (2012). Cognitive-behavioral stress management reverses anxiety-related leukocyte transcriptional dynamics. *Biological psychiatry*, 71(4), 366–372. <https://doi.org/10.1016/j.biopsych.2011.10.007>
- Creswell, J. D., Taren, A. A., Lindsay, E. K., Greco, C. M., Gianaros, P. J., Fairgrieve, A., Marsland, A. L., Brown, K. W., Way, B. M., Rosen, R. K., & Ferris, J. L. (2016). Alterations in Resting-State Functional Connectivity Link Mindfulness Meditation With Reduced Interleukin-6: A Randomized Controlled Trial. *Biological psychiatry*, 80(1), 53–61. <https://doi.org/10.1016/j.biopsych.2016.01.008>