

Addressing Lyme with NanoVi™ Bio-Identical Signaling

By Xavier A. Figueroa, Ph.D.*

Evaluation of NanoVi™ technology suggests that it can play a valuable role in the treatment of Lyme, its co-infections, and related complications. NanoVi works by initiating cellular repair so it helps reduce damage and improve function – regardless of how infections present themselves in the body. Evidence supports four important advantages of using a NanoVi™ device to address Lyme:

1. Improve modulation of the immune system
2. Make the inflammatory process more effective
3. Improve mitochondrial efficiency
4. Reduce DNA damage

Photons (light particles) play an important part in signaling between cells to promote healing.¹ Multiple studies demonstrate that infrared (IR) and near-infrared (NIR) accelerate wound healing in humans,^{2,3} alleviate pain from multiple conditions⁴⁻⁶ and improve mitochondrial oxidative activity.⁷⁻¹⁰ Furthermore, infrared and near-infrared have a profound effect in reducing inflammation.¹¹⁻¹³ The NanoVi™ utilizes a unique delivery system for a specific NIR wavelength that is highly effective against inflammation.

Lyme does not happen in isolation. It is an interaction with the environment and the body and puts the whole system at risk. Lyme and its co-infections can wreak havoc throughout the body.¹⁴ Poor immune modulation and inflammation not only weaken the system, but are also damaging factors in their own right.¹⁵⁻¹⁷ The damage of Lyme and its co-infections has been researched and verified in all areas of physiology.¹⁸⁻²⁰ The chronic inflammation is neurodegenerative and can lead to a host of psychological disorders.²¹⁻²²

Strong immune modulation is essential for preventing Lyme-related cellular damage and repairing damage that has occurred. Although inflammation is an essential immune response, the activation of an inflammatory response accelerates the production of oxygen radicals that can promote damage to cells.²³⁻²⁵ Making the process of inflammation as effective as possible (promoting good inflammatory responses, limiting the bad inflammatory responses) is essential for proper health maintenance. Independent laboratories testing NanoVi™ demonstrate a potential to reduce the damage of Lyme and its co-infections:

1. NanoVi™ protects against excessive DNA damage and promotes repair²⁶⁻²⁷
2. NanoVi™ improves mitochondrial efficiency and promotes immune system function²⁷

Known and tested results strongly suggest the use of NanoVi™ supports Lyme treatment by modulating the immune system, reducing chronic inflammation and improving mitochondrial function. These combinations work against factors known to promote Lyme progression and are important in countering the potential for related damage. The same published effects of IR/NIR on pain reduction^{4,28-33} have been reported by NanoVi™ users. The measured effects of improved mitochondrial activity²⁷ may help recovering individuals regain their energy levels faster. Finally, the reduction of radiation-induced DNA damage²⁶ suggests the NanoVi™ device can play an important regenerative role.

The NanoVi™ is a non-invasive and safe device that can be easily incorporated as part of a wellness strategy or Lyme recovery. The use of a bio-identical signaling system is a powerful tool that harnesses the healing potential of the body and can enhance the effects of other wellness and recovery programs.

*Xavier Figueroa earned his Ph.D. in Neurobiology from the University of Washington in 2003, then furthered his education at the UW with post-doctoral fellowships in Bioengineering. He is co-founder and President of the Brain Health & Healing Foundation and acts as a science advisor to biotech and medical device companies. Dr. Figueroa has published widely in the areas of neurobiology, bioengineering, evolutionary biology and clinical research involving hyperbaric medicine.

References:

1. J. Tafur, E. P. Van Wijk, R. Van Wijk, P. J. Mills, Biophoton detection and low-intensity light therapy: a potential clinical partnership. *Photomed Laser Surg* 28, 23-30 (2010).
2. K. D. Desmet et al., Clinical and experimental applications of NIR-LED photobiomodulation. *Photomed Laser Surg* 24, 121-128 (2006).
3. M. E. Chaves, A. R. Araujo, A. C. Piancastelli, M. Pinotti, Effects of low-power light therapy on wound healing: LASER x LED. *An Bras Dermatol* 89, 616-623 (2014).
4. B. D. Hodgson et al., Amelioration of oral mucositis pain by NASA near-infrared light-emitting diodes in bone marrow transplant patients. *Support Care Cancer* 20, 1405-1415 (2012).
5. M. Lopez-Ramirez, M. A. Vilchez-Perez, J. Gargallo-Albiol, J. Arnabat-Dominguez, C. Gay-Escoda, Efficacy of low-level laser therapy in the management of pain, facial swelling, and postoperative trismus after a lower third molar extraction. A preliminary study. *Lasers Med Sci* 27, 559-566 (2012).
6. C. S. Enwemeka et al., The efficacy of low-power lasers in tissue repair and pain control: a meta-analysis study. *Photomed Laser Surg* 22, 323-329 (2004).
7. R. O. Poyton, K. A. Ball, Therapeutic photobiomodulation: nitric oxide and a novel function of mitochondrial cytochrome c oxidase. *Discov Med* 11, 154-159 (2011).
8. E. A. Buravlev, T. V. Zhidkova, Y. A. Vladimirov, A. N. Osipov, Effects of laser and LED radiation on mitochondrial respiration in experimental endotoxic shock. *Lasers Med Sci* 28, 785-790 (2013).
9. E. A. Buravlev, T. V. Zhidkova, Y. A. Vladimirov, A. N. Osipov, Effects of low-level laser therapy on mitochondrial respiration and nitrosyl complex content. *Lasers Med Sci*, (2014).
10. F. Gonzalez-Lima, B. R. Barksdale, J. C. Rojas, Mitochondrial respiration as a target for neuroprotection and cognitive enhancement. *Biochem Pharmacol* 88, 584-593 (2014).
11. H. Araki, A. Imaoka, N. Kuboyama, Y. Abiko, Reduction of interleukin-6 expression in human synoviocytes and rheumatoid arthritis rat joints by linear polarized near infrared light (Superlizer) irradiation. *Laser Ther* 20, 293-300 (2011).
12. S. Farivar, T. Malekshahabi, R. Shiari, Biological effects of low level laser therapy. *J Lasers Med Sci* 5, 58-62 (2014).
13. M. K. Giacci et al., Differential Effects of 670 and 830 nm Red near Infrared Irradiation Therapy: A Comparative Study of Optic Nerve Injury, Retinal Degeneration, Traumatic Brain and Spinal Cord Injury. *PLoS One* 9, e104565 (2014).
14. W. Berghoff, Chronic Lyme Disease and Co-infections: Differential Diagnosis. *The Open Neurology Journal* 6, 158-178 (2012).
15. Keane-Myers, S. P. Nickell, T cell subset-dependent modulation of immunity to *Borrelia burgdorferi* in mice. *J Immunol* 154, 1770-1776 (1995).
16. G. Ramesh, P. Didier, J. England, L. Santana-Gould, L. Doyle-Meyers, D. Martin, M. Jacobs and M. Philipp, Inflammation in the Pathogenesis of Lyme Neuroborreliosis. *The American Journal of Pathology* 185, 1344-1360 (2015).
17. M. J. Soloski, L. A. Crowder, L. J. Lahey, C. A. Wagner, W. H. Robinson, and J. N. Aucott, Serum inflammatory mediators as markers of human Lyme disease activity. *PLoS ONE* 9, p.e93243 (2014).
18. D. S. Pinto, Cardiac manifestations of lyme disease. *Medical Clinics of North America* 86, 285-296 (2002).
19. S. K. Singh and H. J. Girschick, Lyme borreliosis: From infection to autoimmunity. *Clinical Microbiology and Infection* 10, 598-614 (2004).
20. B. A. Fallon, E. S. Levin, P. J. Schweitzer, and D. Hardesty, Inflammation and central nervous system Lyme disease. *Neurobiology of Disease* 37, 534-541 (2010).
21. D. Mattingley and M. Koola, Association of lyme disease and schizoaffective disorder, bipolar type: Is it inflammation mediated? *Indian Journal of Psychological Medicine* 37, 243 (2015).
22. R. C. Bransfield, The Psychoimmunology of Lyme/tick-borne diseases and its association with neuropsychiatric symptoms. *The Open Neurology Journal* 6, 88-93 (2012).
23. M. Soory, Relevance of nutritional antioxidants in metabolic syndrome, ageing and cancer: potential for therapeutic targeting. *Infect Disord Drug Targets* 9, 400-414 (2009).
24. M. Varcin, E. Bentea, Y. Michotte, S. Sarre, Oxidative stress in genetic mouse models of Parkinson's disease. *Oxid Med Cell Longev* 2012, 624925 (2012).
25. T. Guina, F. Biasi, S. Calfapietra, M. Nano, G. Poli, Inflammatory and redox reactions in colorectal carcinogenesis. *Ann N Y Acad Sci* 1340, 95-103 (2015).
26. W. Dörr, E. Bozsaky, D. o. R. O. a. t. M. U. o. Vienna, Ed. (2014).
27. S. Hartmann, "NanoVi™ - Inhalation bei Sportlern zur Verbesserung des oxidativen Schutzes," Universität at Wien, Universität at Wien, Magisterstudium Sportwissenschaft (2015).
28. K. M. Lagan, B. A. Clements, S. McDonough, G. D. Baxter, Low intensity laser therapy (830nm) in the management of minor postsurgical wounds: a controlled clinical study. *Lasers Surg Med* 28, 27-32 (2001).
29. H. T. Whelan et al., Effect of NASA light-emitting diode irradiation on wound healing. *J Clin Laser Med Surg* 19, 305-314 (2001).
30. A. Gur et al., Efficacy of different therapy regimes of low-power laser in painful osteoarthritis of the knee: a double-blind and randomized-controlled trial. *Lasers Surg Med* 33, 330-338 (2003).
31. T. G. Carrasco, M. O. Mazetto, R. G. Mazetto, W. Mestriner, Jr., Low intensity laser therapy in temporomandibular disorder: a phase II double-blind study. *Cranio* 26, 274-281 (2008).
32. C. M. Hancock, C. Riegger-Krugh, Modulation of pain in osteoarthritis: the role of nitric oxide. *Clin J Pain* 24, 353-365 (2008).
33. R. L. Carvalho, P. S. Alcantara, F. Kamamoto, M. D. Cressoni, R. A. Casarotto, Effects of low-level laser therapy on pain and scar formation after inguinal herniation surgery: a randomized controlled single-blind study. *Photomed Laser Surg* 28, 417-422 (2010).