Case Report
Volume 11:5, 2021

Clinical Case Reports

ISSN: 2165-7920 Open Access

Degenerative Disc Disease Reversal: Rethinking Human Physiology

Dieter Matthias Meier*
Impulse Health Management, ULM, Germany

Abstract

Background: It is recognized in the medical community the world over that intervertebral disc tissue degenerates over the course of life and cannot be regenerated endogenously. But as all living tissue, intervertebral disc cells should be able to absorb and metabolize nutrients and replicate, thereby enabling regeneration. By this logic, disc regeneration should be possible by improving nutrient absorption, which is dependent on correct biomechanics. The role of the autonomic nervous system is critical in understanding function of tissue, including intervertebral discs.

Case report: In this case study, a man 45-year of age with disc degeneration of the lower lumbar spine between L5 and S1 and pain during exercise was treated with a series of full spine chiropractic adjustments in order to correct biomechanics and improve nutrient absorption of the intervertebral discs. This resulted in the growth of the degenerated disc, which increased the lateral angle between L5 and S1 by 80% coinciding with freedom of pain, free range of motion and an improvement of autonomic balance. This was documented by full spine X-rays and a pre- and post-scan of the autonomic nervous system.

Conclusion: This study shows that growth of intervertebral disc tissue is possible without the use of medication, surgery or cell transplantation and should be the beginning of rethinking functional physiology and the importance of translational medicine.

Keywords: Autonomic nervous system • Degenerative disc disease • Lower back pain • Manual manipulation of the spine

Introduction

Chronic low back pain affects over 632 million people worldwide and has tremendous social and economic impacts, which result in a burden billions of dollars in healthcare cost [1]. It has been stated that the causes for disc degeneration include genetic risks, smoking, obesity, aging and physical trauma. Due to its avascular nature and the inability of conservative treatments to correct mechanical stress, no clinical therapy aiming at regeneration of disc tissue and therefore reversal of degeneration has been established. Cell-based therapies and biologics have seen progress in the last few years giving impetus to the field of regenerative medicine in the hopes of finding cures for degenerative diseases in different fields [2-5]. In order to find clinical therapies that result in true regeneration of tissue, it is necessary to consider the basics of human physiology. There is no debate about the fact that the central nervous system controls all other functions of the body, and this includes the metabolism of intervertebral disc cells. Under healthy circumstances the discs are nutrified by diffusion through capillaries across the cartilaginous endplate and through the dense disc matrix. The structural changes that occur during degeneration reduce nutrient flow to the discs and further degradation of tissue. They are a result of an asymmetric loading of the disc caused by vertebral subluxations resulting in an increasing tone of the muscles of the vertebral segments, which play a role in posture control [6,7]. These small muscles are innervated by the sympathetic nervous system, which responds with increased nerve signal output in response to a stress of some kind. An increased tone in these muscles is a result of the asymmetric loading and is aimed towards protection of the segment from further biomechanical displacement. This will inhibit optimal diffusion of nutrients into the disc and accelerate degeneration. The autonomic nervous system is the part of the nervous system, which enables humans to adapt to their environment. The two antagonistically acting elements are the sympathetic and the parasympathetic nervous system. They are essential for survival through adaptive responses in our physiology but are also the cause for chronic disease if there is a chronic imbalance in the system [8]. Typical sympathetic stress responses include increase in heart rate and an inclination towards arrythmias, increase in blood pressure, blood sugar, LDL-cholesterol, stimulation of the adrenal glands with release of norepinephrine, epinephrin and cortisol, widening of the airways and dilation of the pupils, but also increasing the tone of the segmental spinal muscles. The sympathetic nervous system also diminishes gastrointestinal and thyroid activity, downregulates the immune system and interferes with deep sleep. The parasympathetic nervous system does the opposite. An imbalance of the autonomic nervous system can result from an emotional, chemical or from a physical stress, a physical stress being a deviation of cranial, spinal and/or pelvic skeletal structures.

If it were possible to measure sympathetic stress/tone and decrease it, and by that balance the autonomic nervous system, it should be possible to lessen the muscular pressure on the spinal segments, increase nutrient flow to the discs and letting tissue regenerate, thus changing spinal structure and increase health overall. The use of manual spinal manipulation is known to effectively improve autonomic function and balance [9]. There are several devices available to measure both. For decades lie detector tests have been used to measure emotional stress reactions triggered by an increase of sympathetic tone created by lying. Measurements have also been increasingly used by elite athletes to monitor training status and alert the athlete in the early stages of over training, so as to reduce overall training load to maximize effectiveness of training [10]. Psychologists use measurements to assess overall stress status and as an objective analysis of stress reduction after therapy [11]. This approach is also valid for all other health issues as autonomic imbalances have been implicated with a variety of chronic diseases [12]. In this case report, the autonomic nervous system was scanned by using two different devices measuring 1) heart rate variability and 2) skin temperature at each spinal segment left and right.

1. Heart rate variability measures the change of the time interval between two heart beats. It is an expression of the adaptability of the body to cope with environmental changes. Any kind of stress be it emotional, chemical or physical will enforce a sympathetic response and reduce

***Address for Correspondence:** Meier DM, Impulse Health Management, ULM, Germany, E-mail: media@impulse-hm.de*

Received 14 March 2021; **Accepted** 29 March 2021; **Published** 06 April 2021

variability of the heart rate [13]. The autonomic control of the heart is achieved by the vagus nerve parasympathetically, its origin lying in the medulla oblongata, just above the C1 nerve root. The sympathetic nerve fibers originate in the sympathetic ganglia, typically from the T1 to T4 segments with the predominant fibers coming from T2. As structure and function are physiologically dependent on each other ubiquitously in the body, misaligned vertebrae will have an influence on nerve function of that segment as well as overall autonomic function [14].

2. A rolling thermal measurement of all vertebral segments was used to determine temperature differences on the surface of the skin. The temperature of the skin is determined by the amount of perfusion to that particular area, which is, in turn, controlled by the autonomic nervous system [15]. As the body adapts to a stress situation, it is also able to regulate blood flow to the areas in need of oxygen and nutrients. In misaligned spinal segments the muscles on the convex part of the curve will contract, in order to protect the segment from displacing any further and thus taking pressure off of the opposite side of the disc and the nerves leaving the segment. This will demand a higher energy expenditure of the acting muscles and a higher perfusion to supply them with necessary nutrients. As a result, nutrient supply of the disc will decrease, as movement of the segment will not function optimally due to an asymmetric pressure loading. Finding the adequate physiologic answer to this problem, the autonomic nervous system will increase blood flow to the area as an inflammatory response. This process can be detected by a rolling thermal measurement and is easily reproducible [15].

Case Report

This is a case report of a man, of 45 years of age and occasional smoker, presenting with lower back pain for 1 year with a score of 4 out of 10 on the NRS (Numerical Rating Scales), especially during exercise, without radiating or peripheral neurological deficits. Range of motion was decreased in both right and left rotation by 10°, and the patient reported pain while flexing forward. He had been treated with physical therapy for the last 4 months without substantial improvement of symptoms. The patient also suffered of profuse sweating during the day, and a higher blood sugar level had been found. A full spinal x-ray showed a lateral deviation in the ap image of approximately 10.6°, left-convex at the level of L2/L3, degeneration of the disc L5/S1 resulting in a decrease of the angle between L5 and S1, which was approximately 6.9° initially and a pelvic tilt with an asymmetry of 9.2 mm (right higher than left, Figures 1-3). These measurements are a significant deviation from the norm, as established by the CBP Group (Dr. D. Harrison) [16]. A scan of the autonomic nervous system was performed, showing a type two sympathetic stress response (orange) and decrease of autonomic activity with increase of perfusion to the lower left lumbar spine and the right sacroiliac joint, which is stabilized by the iliolumbar ligament (Figures 4 and 5). A series 30 treatments of manual full spine and pelvic manipulations was performed on the patient with an average of 2 per week. At the end of the series full spine x-rays and scans of the autonomic nervous system were taken and compared to the initial findings. Diagnostics were performed using x-rays of the spine and pelvis as well as a scan of the autonomic nervous system using a heart rate variability measurement as well as a rolling thermal scan of the spine. The x-ray machine used is a: Philips Digital Diagnose V.4.2. The x-rays were performed on a standing patient ap and lateral. The diagnostic tool for the autonomic nervous system was the CLA INSiGHT™ System for heart rate variability and the rolling thermal scan.

The chiropractic adjustments were performed in accordance to safe practice guidelines after informed consent by the patient. The adjustments were made according to x-ray misalignment and palpation result in the order: skull, cervical spine, thoracic spine, lumbar spine and pelvis. After each adjustment leg length was measured supine and sitting. The duration of the procedure was approximately 3 months with an average of 2 adjustments per week. After 30 adjustments the diagnostics were repeated. The structural changes of the spine included a reduction of the pelvic misalignment from 9.2 to 2.9mm improving symmetry of the ossa ilium, a reduction of the lumbar left-convexity from 10.6° to 3.7° in the longitudinal axis and an increase in the angle of the disc of the level L5/S1 from 6.9° to 12.5° resulting in an improvement of the lumbar lordosis (Figures 1-3). This coincided with a free range of motion and no pain whatsoever including during rigorous exercise. The autonomic function of the patient improved significantly in both balance (from 53.0 to 77.4) and activity (from 56.96 to 81.65, Figure 5). The rolling thermal scan showed a dramatic decrease in the perfusion of the lumbar spine muscles and the iliolumbar ligament due to correction of the biomechanics (Figure 4), which resulted in the growth of the lumbar disc of the segment L5/S1 and better symmetry of both the lumbar spine and the pelvis/sacrum. The perfusion of the left cervical and thoracic spinal muscles increased significantly during the adjustments, as the biomechanics in these portions of the spine didn´t show much change in comparison to the initial x-ray. This, in theory, should be the area of most significant improvement if the treatment were to continue further due to a higher flow of nutrients. In addition to the improvement of spinal structure and autonomic function, the patient also had noticed a significant improvement with the hyperhidrosis. The diagnostic tests, which had been done because of the raised blood sugar showed normal values after treatment.

Discussion

Chiropractic adjustments have been utilized for thousands of years but have never been incorporated as a structural element into allopathic modern medicine in order to reverse chronic disease. The history of chiropractic treatment has shown that many diseases, physical and mental, can be influenced by high velocity low amplitude manual adjustments, but yet these techniques remain a part of alternative medicine, not offered to the broad

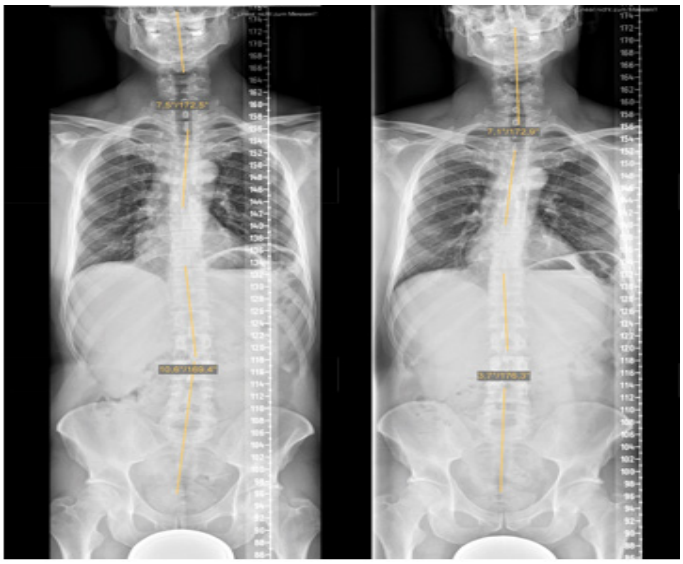


Figure 1. Full spine AP X-ray pre/post showing left convexity of 10.6° before and 3.7° after series of treatment. The upper thoracic region did not show any significant changes in structure.

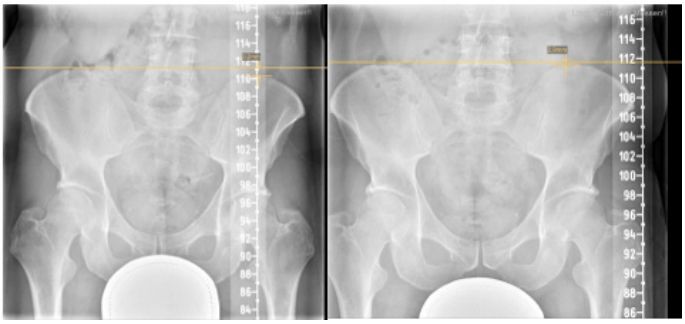


Figure 2. AP X-ray of the pelvis pre/post showing a pelvic tilt of 9.2 mm and 2.9 mm respectively.

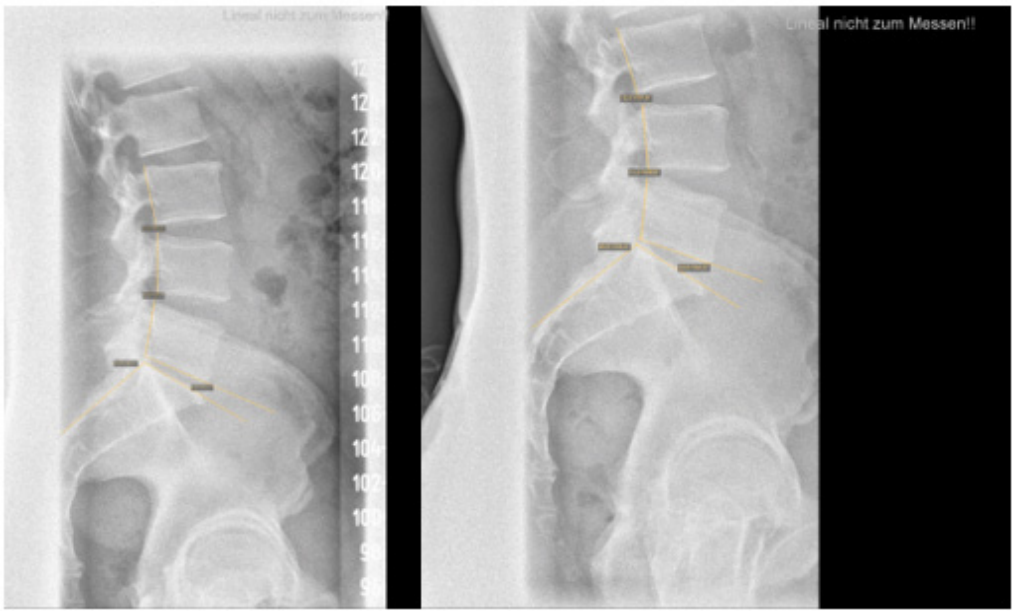


Figure 3. Lateral X-ray of the lumbar spine pre/post showing degeneration of the L5/S1 segment with a lateral angle of 6.9° (pre) and 12.5° (post) improving the lordosis curve.

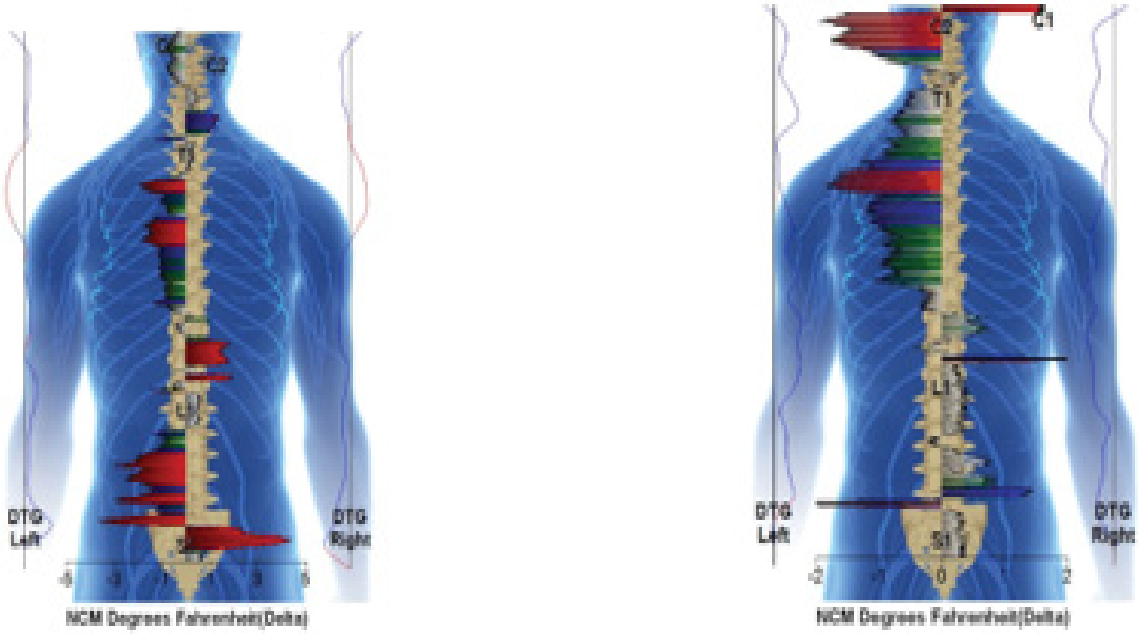
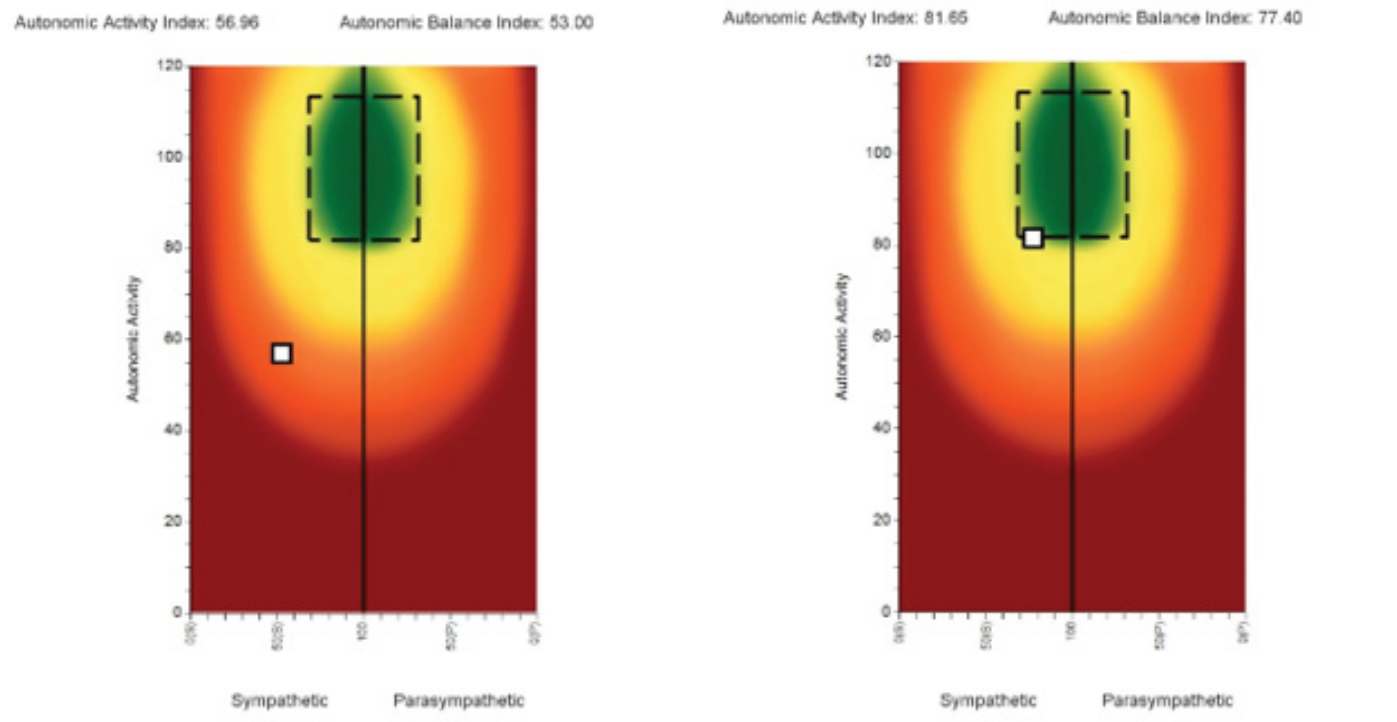


Figure 4. Rolling thermal scan pre/post showing distribution of perfusion. Notice high perfusion in the left lumbar spine and right ilio-sacral joint pre and the upper right cervical and thoracic area post correction. The perfusion distribution is controlled by the autonomic nervous system and is important for nutrient and oxygen flow to the areas of biomechanical stress.

spectrum of the population [17,18]. Taking medications and utilizing surgery to alleviate symptoms both do not take advantage of the body´s natural ability to heal and regenerate tissue. This case report is, to the author´s knowledge, the first publication showing a clinical and holistic approach capable of reversing degenerative disc disease. Intervertebral disc tissue is alive and can regenerate as other tissues if supplied with the appropriate amount of nutrients and is biomechanically intact. In order to achieve this, it is necessary to improve balance and activity of the autonomic nervous system, which in turn strengthens parasympathetic healing properties. If the nature of the stress compromising its function is physical/mechanical, manual full spine manipulation appears to be the best way of accomplishing this. To identify the main stress component a thorough patient history should rule out any chemical or emotional stressors, and a full spine x-ray will be able to show displacement of vertebrae and/or the pelvis as a means of depicting the cause of autonomic dysfunction.

The rolling thermal scan shows how the body actively distributes perfusion to areas with excess energy expenditure. The left lumbar spine initially shows a convexity, which will lead the muscles to increase in tone holding the vertebrae in place protecting the contained nerve tissue and lead to an increased demand of glucose, nutrients and oxygen. The iliolumbar ligament will be stretched and inflamed due to the mechanical distortion. Inflammation, by definition, is an increase in perfusion leading to a rise in temperature, swelling, reduction of function and pain. This is an orchestrated event commanded by the autonomic nervous system in order to regenerate tissue and not in principle detrimental to tissues [19,20]. This realization should initiate a new discussion about how treatments in modern day medicine try to reduce inflammation in order to minimize symptoms and thus, reduce healing capacity of the body. The implications of this case study are that in order to achieve tissue regeneration, inflammation is necessary, even if uncomfortable for the patient, and triggering inflammation and stimulating the central and autonomic nervous system may be a feasible way to achieve this. The reduction of the mechanical stress via full spinal manipulation will reduce



Statistic	Value
Scan Score	55.58
Mean IBI (ms)	653.43
Mean Beats Per Minute	91.82
Std Deviation of IBI (ms)	27.69
RMS Std Deviation IBI (ms)	366.91
Total Power Spectrum	342.24
Low Frequency (LF)	162.41
High Frequency (HF)	67.73
Normalized LF (%)	70.57 %
Normalized HF (%)	29.43 %
Low/High Ratio	2.40
Sympathetic Activity	Sympathetic Response BELOW Normal Range
Parasympathetic Activity	Parasympathetic Response BELOW Normal Range

Statistic	Value
Scan Score	80.16
Mean IBI (ms)	681.95
Mean Beats Per Minute	87.98
Std Deviation of IBI (ms)	100.69
RMS Std Deviation IBI (ms)	1,673.31
Total Power Spectrum	3,512.95
Low Frequency (LF)	1,575.37
High Frequency (HF)	1,472.21
Normalized LF (%)	51.69 %
Normalized HF (%)	48.31 %
Low/High Ratio	1.07
Sympathetic Activity	Sympathetic Response in Normal Range
Parasympathetic Activity	Parasympathetic Response in Normal Range

Figure 5. Heart rate variability scan pre/post correction. On the left type two sympathetic stress reaction with a reduced activity index pre, and drastic improvement post correction with balancing of the autonomic nervous system and increasing activity index.

sympathetic stress strengthening the parasympathetic tone, balancing out the autonomic nervous system leading to a higher degree of healing and a better overall health, which can be used as a strong predictor of cardiovascular risk and all-cause mortality in primary and secondary prevention settings [21,22]. This observation lends support to the rationale for further studies to validate these results and evaluate further possibilities of the treatment options of all chronic diseases that plague an increasing number of people in today´s society. Supporting natural and endogenous healing may be of more value for the majority of the population than trying to inhibit the bodies innate drive towards health via medication. Perfusion distribution will change with the corresponding change of need for nutrients in order to stabilize biomechanics of the spine. This case report shows that growth of intervertebral disc tissue is possible without the use of medication, surgery or cell transplantation and should be the beginning of rethinking functional human physiology and stress the importance of translational medicine, which needs to include autonomic function, biomechanics of the spine, nutrition, emotional evaluation and sleep quality in order to be complete from a holistic perspective.

Conclusion

This was a single case study of a young and healthy man without other chronic ailments, taking no medication and able of physical exercise. Further study is needed to evaluate if this finding is replicable in older people with a variety of chronic health issues and in other areas of the spine.

References

1. Christian Elabd, Christopher J. Centeno, John R. Schultz and Gregory Lutz, et al. “Intra-Discal Injection of Autologous, Hypoxic Cultured Bone Marrow-Derived Mesenchymal Stem Cells in Five Patients with Chronic Lower Back Pain: A Long-Term Safety and Feasibility Study.” *J Transl Med* 14 (2016): 253.
2. Sivakamasundari Ventura and Thomas Lufkin. “Stemming the Degeneration: IVD Stem Cells and Stem Cell Regenerative Therapy for Degenerative Disc Disease.” *Adv Stem Cells* 72 (2013): 4547.
3. Khoi D. Than, Shayan U. Rahman, Lin Wang, Adam Khan, et al. “Intradiscal Injection of Simvastatin Results in Radiologic, Histologic, and Genetic Evidence of Disc Regeneration in a Rat Model of Degenerative Disc Disease.” *Spine J* 6 (2014): 1017-1028.
4. David Oehme, Tony Goldschlager, Peter Ghosh and Jeffrey V. Rosenfeld, et al. “Cell-Based Therapies Used to Treat Lumbar Degenerative Disc Disease: A Systematic Review of Animal Studies and Human Clinical Trials.” *Stem Cell Int* 94 (2015): 95.
5. Brenton Pennicooke, Yu Moriguchi, Ibrahim Hussain and Lawrence Bonssar, et al. “Biological Treatment Approaches for Degenerative Disc Diseasse: A Review of Clinical Trials and Future Directions.” *Cureus* 11 (2016): 20.
6. Jung Keun Hyun, Jee Young Lee, Seong Jae Lee and Jae Yong Jeon. “Asymmetric Atrophy of Multifidus Muscle in Patients with Unilateral Radiculopathy.” *Spine* 21 (2007): 21.
7. Ibrahim M. Moustafa, Ahmed Youssef, Amal Ahbouch and May Tamim, et al. “Is

Forward Head Posture Relevant to Autonomic Nervous System Function and Cervical Sensorimotor Control." *Cross Sec Study Gait Posture* 2 (2020): 29-35.

8. Jeffrey J. Goldberger, Rishi Arora, Una Buckley and Kalyanam Shivkumar. "Autonomic Nervous System Dysfunction: JACC Focus Seminar." *JACC* 10 (2019): 11.
9. Junichiro, Hayano. "Heart Rate Variability to Assess the Changes in Autonomic Nervous System Function Associated with Vertebral Subluxation." *Res Rev Neurosci* 3 (2017): 20.
10. Korobeynikov Goraschenko and Korobeynikova Ludanov. "Heart Rate Variability System in Elite Athletes with Different Levels of Stress Resistance." *J Phys Edu Sport* 18 (2018): 550-554.
11. Lauren E. Philbrook, Stephen A. Erath, Benjamin J. Hinnant and Mona El-Sheikh. "Marital Conflict and Trajectories of Adolescent Adjustment: The Role of Autonomic Nervous System Coordination." *Dev Psychol* 54 (2018): 1687-1696.
12. Mickey J. Kenney and Cantos K. Ganta "Autonomic Nervous System and Immune System Interactions." *Compreh Physiol* 4 (2014): 1177-200.
13. Jiri Pumprla, Kinga Howorka, David Groves and Michael Chester, et al. "Functional Assessment of Heart Rate Variability: Physiological Basis and Practical Applications." *Int J Cardiol* 1 (2002): 1-14.
14. Budgell, Brain. "Reflex Effects of Subluxation: The Autonomic Nervous System." *J Manipulat Physiol Therapeut* 2 (2000): 104-106.
15. Matthew McCoy, Ismay Campbell, Pamela Stone and Curtis Fedorchuk, et al. "Intra-Examiner and Inter-Examiner Reproducibility of Paraspinal Thermography." *Plos One* 6 (2011): 16535.
16. Stephan J. Troyanovich, Rene Cailliet, Tadeusz J. Janik and Donald D. Harrison, et al. "Radiographic Mensuration Characteristics of the Sagital Lumbar Spine from a Normal Population with a Method to Synthesize Prior Studies of Lordosis." *J Spinal Disorder* 10 (1997): 380-386.
17. Henning, Budde. "Chriopractic and Mental Health: History and Review of Putative Neurobiological Mechanisms." *J Surg Operat Tech Anesth* 1 (2018): 20.
18. David, Russel. "Improvement in Quality of Life in a Female Patient with Crohn´S Disease following Chiropractic Care for the Correction of Vertebral Subluxation: A Case Report." *Chiropract J Austr* 1 (2018): 1-10.
19. Harold M. Olson, Andrew J. Zetocha and Courtney A. Olson. "To Rest or not to Rest: Chiropractic Management Strategies for Juvenile Osteochondrosis: A Case Series." *J Contemp Chiroprac* 1 (2018): 305.
20. Maria Molinos, Catarina R. Almeida, Joana Caldeira and Carla Cunha. "Inflammation in Intervertebral Disc Degeneration and Regeneration." *J R Soc Interface* 12 (2015): 20141191.
21. Brown Maclouf and Hukkanen Ma. "Sensory and Sympathetic Innervation of the Vertebral Endplate in Patients with Degenerative Disc Disease." *J Bone Joint Surg Br* 79 (1997): 147-153.
22. Lauer, Michael. "Autonomic Funtion and Prognosis." *Cleveland Clin J Med* 76 (2009): 18-22.

How to cite this article: Dieter Matthias Meier. "Degenerative Disc Disease Reversal: Rethinking Human Physiology." Clin Case Rep 11 (2021): 1434.