CIRC and the “new” Translational and Epigenetic Medicine

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DISCLOSURE

- Consultant to Medi
- No Medi interference on the material presented here
CIRC
Center of Interdisciplinary Research on Compression

An independent research institute for compression therapy, among other companies supported by Medi, in order to develop new therapy concepts, to design clinical trials and studies, as well as to research on compression on an international cooperation basis.
CIRC is moving...

- CIRC 2020 in Moscow
- Website implementation: https://www.circ-research.com/circ/
- Calendar of phlebology, lymphology, .... (compression-including) events
- Newsletter
- Multi-center CIRC-endorsed research projects
- Youtube channel («Living veins and lymphatics»)?
- YOUR INPUTS MOST WELCOME !!!
What we can address

* Pathophysiology of disorders that may be improved by compression
* Main mechanisms of action of compression
* Possible innovations in Compression Therapy

The main intention of CIRC is to bring together experts who are able and willing to contribute to this scientific pathway
Science is provisional and we are by no means anywhere near the point of knowing all.

Science is a constantly changing base of knowledge.

We know about 4% of our reality and of science about health and diseases.

- Lee Know «Mitochondria: the future of Medicine: The Key to Understanding Disease, Chronic Illness, Aging, and Life Itself “, 2018
Translational medicine

“an interdisciplinary branch of the biomedical field supported by three main pillars: benchside, bedside and community”.

The goal of TM is to combine disciplines, resources, expertise, and techniques within these pillars to promote enhancements in prevention, diagnosis, and therapies. It is a highly interdisciplinary field which wants to join different biomedical cultures to improve the global healthcare system significantly.
Epigenetics

“The science of phenotype changes that do not involve alterations in the DNA sequence”. It implies features that are "on top of" or "in addition to" the traditional genetic basis for living organisms.

Epigenetics most often involves changes that affect gene activity and expression, but the term can also be used to describe any heritable phenotypic change.

Such effects on cellular and physiological phenotypic traits result from external or environmental factors.

Main mechanisms: DNA methylation, histone modification, microRNA production. Transcription factors are essential to these modifications to silence or activate genes.
Evaluation of Therapeutic Compression Stockings in the Treatment of Chronic Venous Insufficiency

G.D. Motykie, MD, J.A. Caprini, MD, J.I. Arcelus, MD, PhD, J.J. Reyna, MD, E. Overom, and D. Mokhtee

Table 2. The Mean Value of Symptom Severity Scores Reported by Patients Initially, and after 1 and 16 Months of Treatment with Compression Stockings

<table>
<thead>
<tr>
<th></th>
<th>Initial</th>
<th>One Month*</th>
<th>16 Months**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swelling</td>
<td>2.45 (1.25)</td>
<td>1.47 (0.83)</td>
<td>1.13 (0.51)</td>
</tr>
<tr>
<td>Pain</td>
<td>2.94 (1.29)</td>
<td>1.77 (1.09)</td>
<td>1.38 (0.69)</td>
</tr>
<tr>
<td>Discoloration</td>
<td>2.76 (1.29)</td>
<td>2.23 (1.22)</td>
<td>1.81 (0.99)</td>
</tr>
<tr>
<td>Cosmetic problems</td>
<td>3.03 (1.41)</td>
<td>2.50 (1.41)</td>
<td>1.98 (0.99)</td>
</tr>
<tr>
<td>Activity tolerance</td>
<td>2.33 (1.35)</td>
<td>1.71 (1.19)</td>
<td>1.38 (0.73)</td>
</tr>
<tr>
<td>Depression</td>
<td>1.72 (1.12)</td>
<td>1.42 (0.87)</td>
<td>1.29 (0.81)</td>
</tr>
<tr>
<td>Sleep problems</td>
<td>2.00 (1.25)</td>
<td>1.46 (0.99)</td>
<td>1.24 (0.63)</td>
</tr>
</tbody>
</table>

*p < 0.001 for comparison between initial and 1 month severity scores across all categories.

**p < 0.001 for comparison between 1 and 16 month severity scores across all categories.

Statistical analysis via the Wilcoxon Signed Rank Test. Numbers in parentheses are SD.

Mediven stocking kl II as a treatment also for PNEI and well-being....

Epigenetics arriving within Translational medicine...
The nature of care in the management of lymphoedema; not without laughter!


• ....the application of care to the leg also requires humanity,... sympathy and compassion.....

• Contemporary studies of the limbic system of the brain indicate that cheer that includes laughter is probably more desirable than compassion

• In the management of the swollen leg, the nature of care deserves a rethink of how best practice can relieve pain and anxiety by the release of endorphins, or by switching the autonomic nervous system towards the vagal from the sympathetic
Psychoneuroendocrineimmunology (PNEI) and longevity
Cavezzi Attilio*, Ambrosini Lorenzo, Quinzi Valentina, Colucci Roberto, Colucci Enza

Psychoneuroendocrineimmunology (PNEI) is the science which studies the interactions between psychological, neural, endocrine and immunological processes.

The concept of the PNEI system was developed in the seventies and eighties through the discovery of the interaction between immune system molecules with neuroendocrine activity targeting multiple organs; the interdependence between immunological, psychological and neuroendocrine mechanisms has been elucidated through several studies subsequently.

PNEI system is a self-regulation network which is involved in the homeostasis of the organisms, in the maintenance of chemical-physical-neuropsychological balance in response to stimuli of various nature.

The present review provides an overview of the fundamental scientific literature on PNEI and its interaction with chronic low grade cellular inflammation processes and consequently with longevity. Similarly literature data on the strict link between hormetic processes and PNEI system are discussed, with reference to resilience as a key-factor in the natural/pathologic evolution of aging.

Keywords: PNEI, Psychoneuroendocrineimmunology, Psychoneuroimmunology, Longevity, Hormesis, Inflammation, Polyphenols

Figure 1. PNEI: Interconnections and signaling among psychological, neural, endocrine and immune systems.
BASICS FROM SCIENTIFIC RESEARCH ON SKIN STIMULATION

- **Interoception** (emotional component) is stimulated with light and slow massage, typical of compression garments (in absence of pain) on free nerve components of the skin, subcutaneous layers and deeper layers.

- **Proprioception** is stimulated with deeper massages.

- **Tissue inflammation** activates the consequent deposition of the neoconnective, which increases in a vicious circle: inflammation, edema and tissue fibrosis (reduce hydration of the connective bands). The so-called GENTLE TOUCH (compression treatment a well?) reduces this pathological process.
BASICS FROM SCIENTIFIC RESEARCH ON SKIN STIMULATION (by means of Compression as well ?)

PATHWAYS OF THE PAIN/COMFORT STIMULATION

1) Local/Mechanical RECEPTOR component stimulation, due to hyper-activity and release of inflammatory mediators; mechanical stimulation desensitizes the receptors which ultimately release fewer mediators and in a lower dose.

2) Mechanical stimulation works on medullary neural information which travels to the spine neural component inducing a feeling of pleasure and helps to reduce the release of inflammatory mediators. (reflex arch)

3) From the spine neural component the impulse ascends to the central neural system with greater activation of the parasympathetic system, decreasing the orthosympathetic activity (GENTLE TOUCH). This stimulation of the parasympathetic system has a notorious anti-inflammatory effect
Touch as an epigenetic stimulus for the central nervous system

Dr Jorge Esteves, PhD, MA, BSc, DO
British School of Osteopathy

Can compression therapy exert «the gentle touch»?
How to study any possible interaction of compression therapy on autonomous neural system, stress axis, PNEI?
The higher the HRV, the better:

a) the health, the RESILIENCE

b) the balance between sympathetic and parasympathetic (vagal) system,

c) the aging,

d) the cardiovascular and metabolic state

e) the PNEI
Impact of Wearing Graduated Compression Stockings on Psychological and Physiological Responses during Prolonged Sitting

Masahiro Horiuchi ¹,* D, Chieko Takiguchi ¹, Yoko Kirihara ¹ and Yukari Horiuchi ²

Figure 1. Illustration of experimental procedure. HRV, heart rate variability; POMS, Profile of Mood States; VAS, visual analogue scale.
RESULTS

* Wearing stockings suppressed a subjective uncomfortable sensation (e.g., pain; fatigue; swelling) in the lower limbs,

* Increase in heart rate at 1 h and 3 h was significantly greater without than with stockings.

* An indicator of parasympathetic nerve activity showed higher values with than without stockings throughout the 3 h sitting period.

* Changes in saliva cortisol were positively associated with higher uncomfortable sensations of VAS in the lower limbs.

These findings suggest that patients wearing graduated compression stockings may benefit from subjective comfort, increased parasympathetic nerve activity and HRV as overall.
RESULTS

• the secretion of salivary cortisol (SSC) showed a significant decrease during the 180 minutes of the testing period that was maintained up to 10 minutes after the compression was removed.

• Urinary excretion of adrenaline and noradrenaline decreased with increasing pressure levels and was lower in response to higher clothing pressure when tested in the afternoon.
The higher the pressure, the higher the effect.
The dynamic **interactions among the garments, the human body**, and the environment can trigger different sensation receptors, which lead to ... overall **psychophysiological responses** (Guo et al., 2008; Corbera´n et al., 2010; Tanaka et al., 2006; Okura et al., 2000; Lee et al., 2000).

**A whole-body compression sportswear** can help lower the 24-h concentration of creatine kinases and lactate dehydrogenase in the bloodstream, thereby a sign of **enhanced repair** throughout the body **musculature** (Kraemer et al., 2010).

**Pressure on the skin exerted by compression wear** can affect physiological parameters in humans, such as heart rate, blood pressure, and levels of urinary catecholamines and cortisol (Mori et al., 2002; Liu et al., 2012).
The impacts of technical textiles upon society have been influential and as populations continue to age, patient expectations for implant performance will continue to rise.

Technical textiles have the potential to perform better, last longer and increase comfort in the body.

This paper examines key areas in which innovation in textile technology is promoting health and wellbeing.
The results demonstrated a significant difference between compression garments and non-compression garments at the end of the tests and from 90 min onwards during the recovery phase (p < 0.05).

Corrected QT (QTc), ST interval and heart rate (HR) indicated the significant difference between NCGs and CGs: the CG group had a lower HR increase during exercise and a quicker recovery in HR, ST, and QTc after the exercise.
NORMAL BREATHING 5 MINUTES – LF (barireflex activity, sympathetic mainly)

MORNING

- WITHOUT MEDICAL COMPRESSION STOCKING: MEAN 112.7, S.D. 123.60
- WITH MEDICAL COMPRESSION STOCKING: MEAN 305.9, S.D. 412.67

AFTERNOON

- WITHOUT MEDICAL COMPRESSION STOCKING: MEAN 246.55, S.D. 315.16
- WITH MEDICAL COMPRESSION STOCKING: MEAN 84.45, S.D. 83.37
NORMAL BREATHING 5 MINUTES – HF (parasympathetic, vagal activity)

MORNING

- WITHOUT MEDICAL COMPRESSION STOCKING: MEAN 85.5, S.D. 87.54
- WITH MEDICAL COMPRESSION STOCKING: MEAN 89.9, S.D. 70.71

AFTERNOON

- WITHOUT MEDICAL COMPRESSION STOCKING: MEAN 64.15, S.D. 26.23
- WITH MEDICAL COMPRESSION STOCKING: MEAN 98.65, S.D. 87.89
Phase Angle (depending on reactance mainly, on cell membranes... ) is a reliable index of the overall subject’s health.
Conclusions

- Compression Garments exert a series of actions from the mechanical, biochemical, psychological point of view.
- HRV and Bioimpedance Spectroscopy variations confirm the interaction between MCS in the lower limbs and edema/PNEI/well-being.
- Further clinical studies may highlight this relationship better.
- Possible new models of MCS, devices, or garments may target the overall PNEI/well-being condition.
Thank you
Grazie
Gracias
Merci
Obrigado
Dzięki
Благодаря
谢谢
Bedankt
Hvala
Tak
Vd’aka
Teşekkürler
ありがとうございました

Let’s knit a new compression medicine together