

# INVESTIGATING THE PERFORMANCE CHARACTERISTICS

OF MATERIAL IN NEUROPATHY TREATMENT

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DIABETES

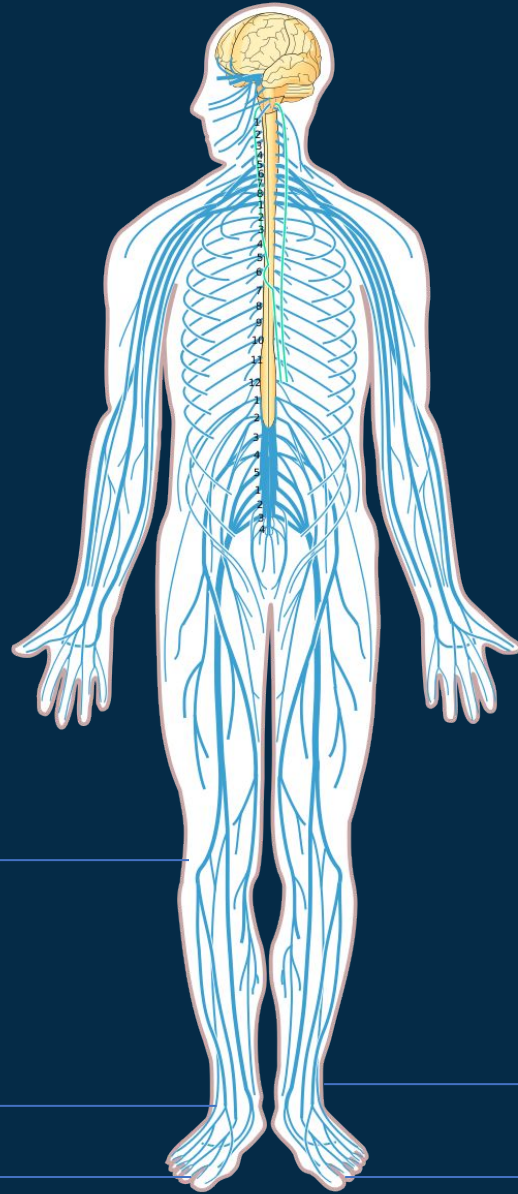
INJURIES

CANCER

PERIPHERAL  
NEUROPATHY

CAUSES





LIMITED MOBILITY

TINGLING/BURNING  
SENSATIONS

EXTREME SENSITIVITY

SHARP PAINS

NUMBNESS

# PERIPHERAL NEUROPATHY





## CAUSES

MICROGRAVITY

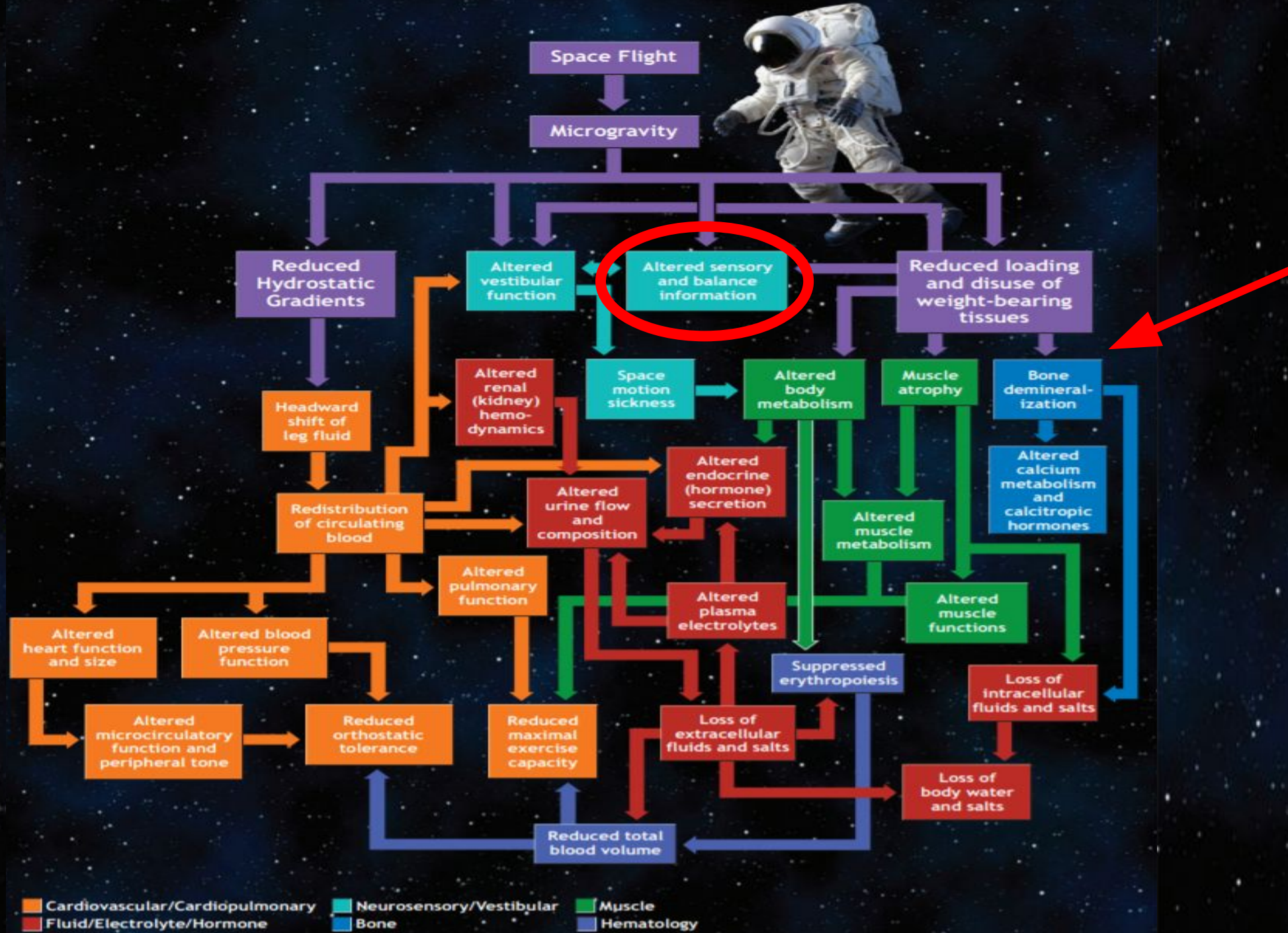
SENOSORIMOTOR  
CHANGES

POSTURAL CHANGES

SHIFTING FLUIDS

RADIATION





IMPROVED  
MEDICATIONS

INTERDISCIPLINARY  
CARE

BETTER  
DIAGNOSIS

BETTER PAIN  
MANAGEMENT  
TECHNOLOGY



NEEDED



## PATIENT NEEDS

- Greater cushioning in footwear aids
- Shoes with ample arch support
- Temperature Control
- Shoes that do not result in blisters

**PAIN MANAGEMENT!**

NEEDED

HIGHLY COMPRESSIBLE

FLEXIBLE

LIGHTWEIGHT

ETHYLENE VINYL  
ACETATE (EVA) FOAM

SUPPORTIVE




DURABLE

DENSER

POLYURETHANE  
(PU) FOAM

CURRENT INDUSTRY MATERIALS



SHOE	NEEDED IMPROVEMENTS
 <p><i>ASICS METARIDE</i></p>	DECREASING SUPPORT OVER TIME
 <p><i>BIRKENSTOCK EVA</i></p>	MOLDS TO THE WEARER'S FOOT
 <p><i>BROOKS GLYCERIN 19</i></p>	TENDS TO COMPRESS EASILY

## EVA FOAM BASED SHOES

FLYTEFOAM™  
TECHNOLOGY



GEL™  
TECHNOLOGY

FLYTEFOAM™  
PROPEL  
TECHNOLOGY

3D GUIDANCE  
LINE™ TECHNOLOGY

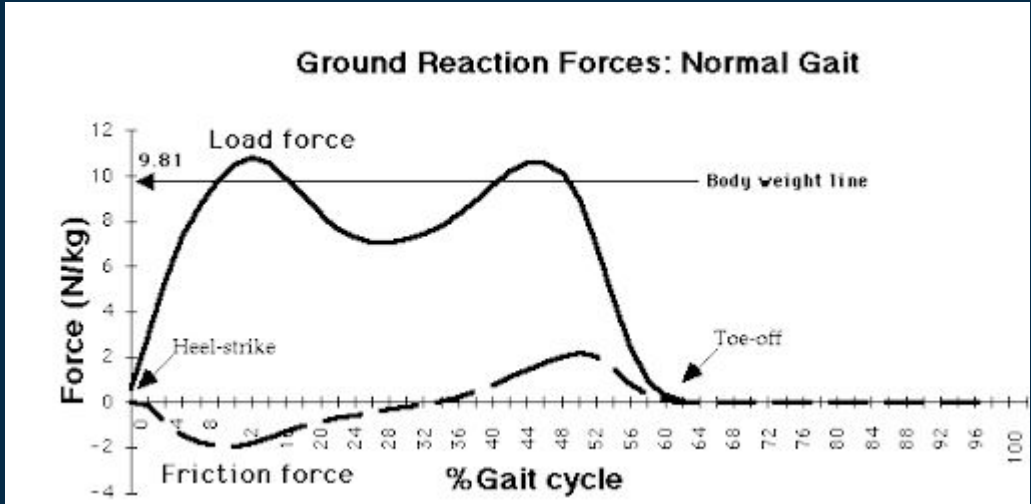
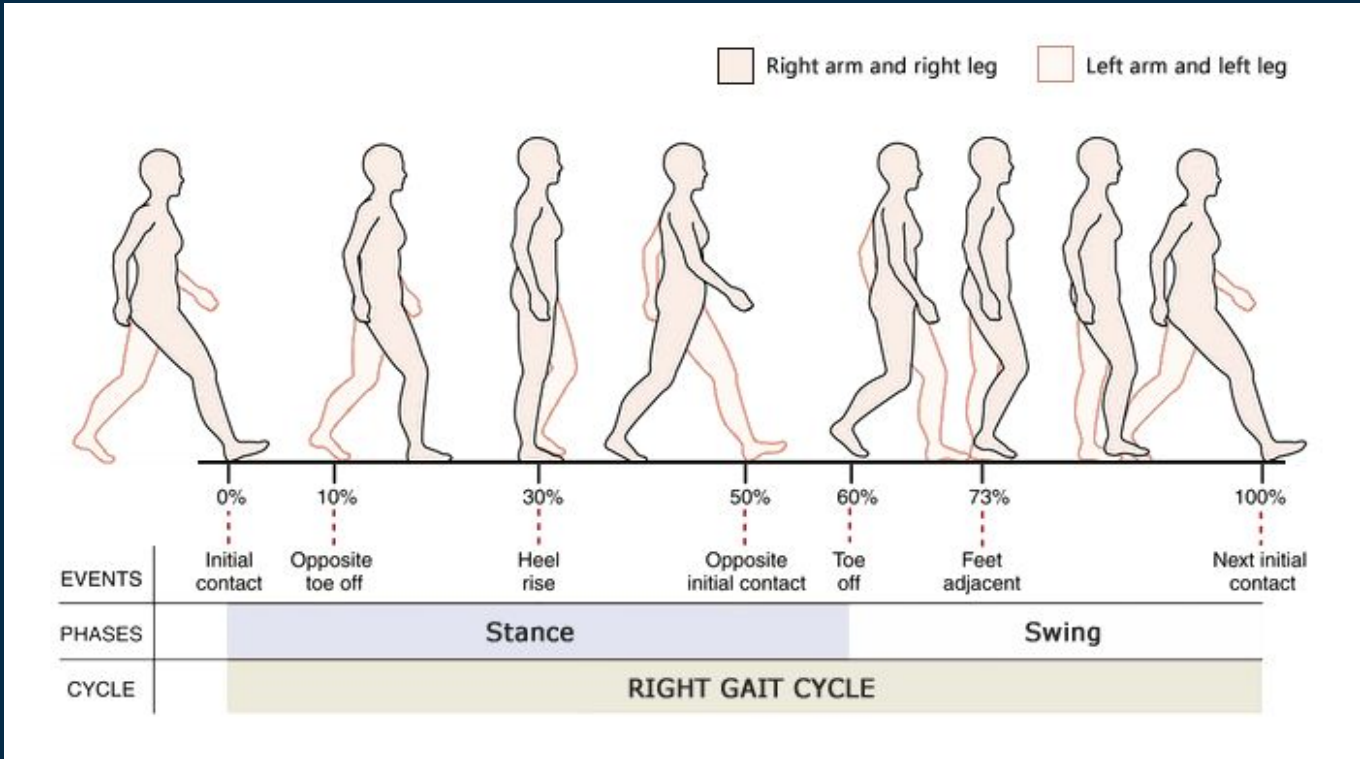
GRIPSOLE™  
OUTSOLE



SHOE	NEEDED IMPROVEMENTS
 <p>ADIDAS ULTRABOOST 5.0 DNA</p>	MAY FEEL HEAVY
 <p>SAUCONY TRIUMPH 18</p>	MAY FEEL TOO STIFF



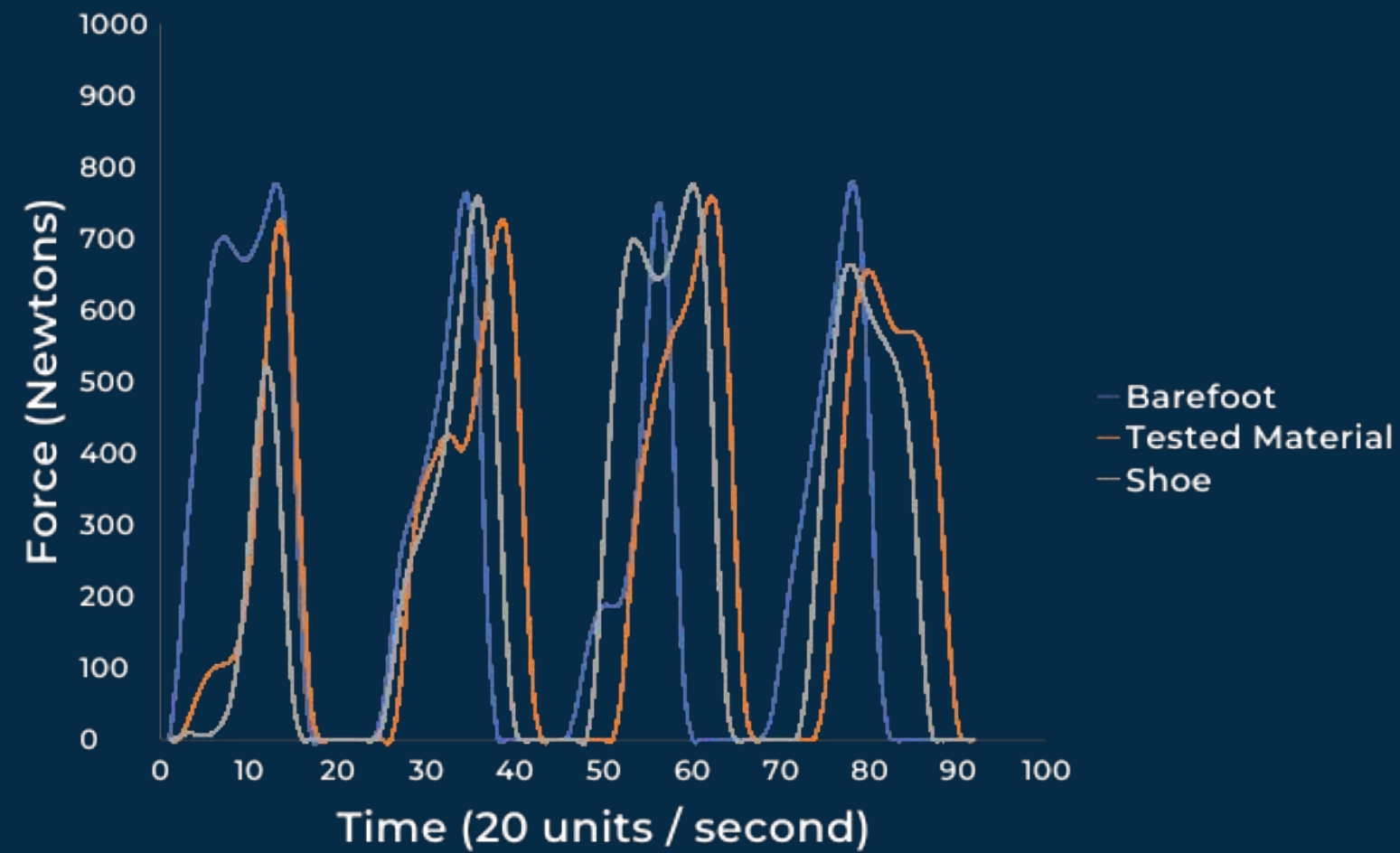
PU FOAM BASED SHOES



# NORMAL GAIT PATTERN



Subject D Right Foot Ground Reaction Forces



	Barefoot	Shoe	Tested Material
Maximum Force	779 N	775 N	757 N
Average Force	280.77 N	264.03 N	272.83 N

PRELIMINARY ANALYSIS

Henderson et al. Diabetic gait is not just slow gait: gait compensations in diabetic neuropathy. *Journal of Diabetes Research*. 2019.

Hoogkamer et al. A comparison of the energetic cost of running in marathon racing shoes. *Sports Medicine*. 2018;48:1009-1019.

Macaulay et al. Developing proprioceptive countermeasures to mitigate postural and locomotor control deficits after long-duration spaceflight. *Frontiers in Systems Neuroscience*. 2021.

Meeusen et al. The brain in micro – and hypergravity: the effects of changing gravity on the brain electrocortical activity. *European Journal of Sport Science*. 2014;14(8):813-22.

Ombergen et al. The effect of spaceflight and microgravity on the human brain. *Journal of Neurology*. 2017;1:18-22.

Reschke et al. Neurovestibular symptoms in astronauts immediately after *Space Shuttle* and *International Space Station* missions. *OTO Open*. 2017.

Take a run on the softer side: the science behind Brooks DNA Loft.  
[https://www.brooksrunning.com/en\\_us/blog/research-innovation/science-behind-brooks-dna-loft.html](https://www.brooksrunning.com/en_us/blog/research-innovation/science-behind-brooks-dna-loft.html).

Running shoe midsoles. Is EVA or PU better? <https://helpshoe.com/running-shoe-midsoles-is-eva-or-pu-better/>

What is Boost? <https://www.adidas.com/us/blog/373504>

Gait Abnormalities <https://stanfordmedicine25.stanford.edu/the25/gait.html>

## REFERENCES

THANK YOU!

QUESTIONS?