SUB-BANDAGE PRESSURE MEASUREMENTS:
THE PHYSICS OF COMPRESSION THERAPY

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Aim: To evaluate compressive forces provided by compression bandages and how physical laws can be used to explain the sub-bandage dynamics that are necessary to support the venous backflow.

Methods:
1. Measurements were taken from 744 compression bandage applications with different materials to artificial legs equipped with pressure transducers.
2. Measurements during functional activities were taken from 12 applications on healthy volunteers. All bandages were applied by experts in the field.

Results: Pressure calculations by modified Laplace’s law equations do not accurately predict the measured values in these studies. True graduated compression was observed in only 53 of 744 (7.1%) applications. The measurements on healthy volunteers revealed that Laplace’s law is wrongly interpreted when calculating sub-bandage pressures.

Conclusion / Discussion: The widespread belief that correctly applied compression systems provide graduating pressure values, is based solely on theoretical mathematical equations. The final pressure depends only on the radius of the specific curvature on which a sensor is positioned, rather than on the circumference of the leg at the level of positioning. The sub-bandage dynamics are better explained by using Pascal’s law on pressure, in which is stated that if pressure is applied to a non-flowing fluid (a muscle or muscle group) in a container (the surrounding fascia, as well as the compression bandage), that pressure is transmitted equally in all directions within that container.