# PLANTAR PRESSURE DISTRIBUTION MEASURED DURING ALPINE SKI TURNS

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**Introduction**: Previous research on skiing has focused on the forces and pressures involved in skiing in laboratory and/or static situations [1]. Following recent developments in biomechanical instrumentation, research on alpine skiing can now be performed on-hill [2,3,4]. The focus of the on-site research done to this point has been aimed towards ski racers. However, most recreational skiers do not race. Therefore it seems of greater value to measure the distribution of underfoot pressures of high level ski instructors, performing a variety of turns.

**Methods**: Full-time ski instructors (CSIA level IV) consented to serve as subjects for this study. Their ski boots were instrumented with pressure sensitive insoles linked to the PEDAR mobile system (Novel GmbH, Munich). The subjects performed four different types of turns on a groomed run (Short Radius, Dynamic Parallel, Giant Slalom and Basic Parallel). Markers on the snow surface controlled the turn radii, set according to the guidelines of FIS and CSIA. While the subjects skied, the PEDAR mobile system recorded data at a rate of 50 Hz, while saving it to its memory card. A mobile video (60Hz) recording of every trial was made and synchronized with the PEDAR data to facilitate analysis.

**Results**: Results from this study indicated that the pressures under the feet were quite high, reaching up to 45 $N/cm^2$. These peak pressures were recorded on the medial side of the heel, as well as under the first metatarsal. The centre of pressure (cop) travelled from under the head of the first metatarsal down to the medial part of the longitudinal arch as the skiers progressed through the SR, DP and BP turns. During GS turns however, the cop migrated from the head of the first metatarsal back towards the medial side of the heel. Force-time histories revealed peak forces of up to 2127 N during GS turns.

**Discussion/Conclusions:** It is quite likely that the equipment used by the subjects (skis, boots, custom footbeds) influenced the pressure values. Technical adjustments made by the skiers may also have had an influence on the measurements. An interesting tendency is observed however, the centre of pressure tends to move from the medial part of the forefoot, back towards the middle of the longitudinal arch. Further research in this field should include more subjects of varying ability levels and standardization of skiing equipment.

**References**:

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