Introduction: With respect to the cervical spine, coupled motion may be attributed in part to the oncovertberal joints which act as rails to guide the vertebral bodies. Under axial rotation, vertical distraction is observed and increased until additional anatomical structures are engaged to restrain motion. The purpose of this study was to compare the axial distraction manifested by the CerviCore\textsuperscript{0} Intervertebral Disc under axial rotation in comparison to the native intact disc.

Material and methods: Six caprine FSUs with excess tissue removed were utilized in the test. A deflecting transducer was secured with an adhesive to the lateral aspect to the FSU so as to span the intervertebral disc space. The FSU was placed in a materials testing machine where a 100N compressive load was applied to the superior FSU followed by axial rotation relative to the inferior vertebral body. At rotation angles 0\degree, 3\degree, 6\degree and 9\degree the axial displacement between the vertebral bodies of the FSU was recorded using the transducer. The FSU was then returned to the 0\degree condition with surgical implantation of the CerviCore\textsuperscript{0} disc performed. The testing sequence of axial rotation to 0\degree, 3\degree, 6\degree and 9\degree was repeated. The transducer was not removed during insertion of the device. Subsequent FSUs were tested in an identical manner. Statistical comparisons between the intact and implanted conditions were conducted with a repeated measures ANOVA and employed a Tukey post-hoc test for comparisons between angle configurations. Further, comparisons between the intact and implanted conditions at specific angle orientations were performed using a paired t-test.

Results: No statistically significant differences were found between the intact and CerviCore\textsuperscript{0} implanted conditions regardless of rotation angle (P>0.4 for all). With respect to the effect of rotation angle upon distraction, a significant difference between the neutral and 6\degree and 9\degree rotation (P< 0.05 for both) was found for the intact condition. In the case of the CerviCore implanted condition a significant difference was found between the neutral (0\degree) and 9\degree condition (P< 0.05). A comparison of the rate (regression slope) of vertical distraction as well as the initial distraction (regression intercept) to applied rotation did not result in a significant difference between the intact and implanted condition (P>0.08)

Discussion: No statistically significant differences were detected in a side by side comparison of distraction height at rotation angles of 0\degree, 3\degree, 6\degree and 9\degree under intact and implanted conditions. In addition, a linear regression of axial distraction versus rotation angle indicated that implantation of the CerviCore\textsuperscript{0} disc did not alter the FSU response as compared to the native disc. Based on this in-vitro data, the CerviCore\textsuperscript{0} disc displayed performance characteristics of coupled motion for distraction under rotation equal to the intact disc.