Analysis of Data

The velocity of the compressional wave decreased while the velocity of the shear wave increased.

There are a number of reasons why the velocity of the compressional wave declined.  The soundest reason why this occurred is due to human error.  The oscilloscope does not provide a perfect result, but the instant the shear wave hit had to be inferred through the graph of the wave.  When the units are as small as microsecond�s accuracy is crucial.  There is no equipment to date which can distinguish between the compressional and shear waves and when they occur on the graph.

Another explanation for our data is that the Ultragel couplant seeped out from between the sample and the transducers when higher pressure was applied.  The effect of this on the data is that when seeping out from between the dentin and the transducers it could have created miniscule air pockets.  These air pockets could slow down the waves due to the change in medium from bone to air and then back to the transducers.  This could account for the .16 microseconds lost from the velocity with no pressure applied.

Even though the compressional wave decreased as pressure was increased, the elastic constants still increased due to the increase in the velocity of the shear wave.  This shows us that the structure of the dentin is more along the lines of an elastic model because of the increase in the values of the elastic constants.

Conclusion

The outcome of our experiment proved our hypothesis was correct for the velocity of the shear wave, but not for the velocity of the compressional wave. Our tests provide evidence that the elastic constants, such as the Young�s Modulus and Shear Constants, did increase; showing that the structure for dentin is variable and not unyielding.  Due to our limited resources for the experiment, we could not get a completely accurate model for dentin.  For example, if the relation between pressure and velocity of sound is exponential, such as a parabola, then by observing at only low pressures we would not see the full parabolic effect of the pressure on dentin structure. In order to have a more accurate representation of the relation between pressure and the velocity it would be ideal to test a broader range of pressures.  By doing so, it would be possible to see whether the relation is truly exponential or linear.