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2022 PSBR High School Essay Contest *Grand Essayist*

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It is scary for any child to go through a major operation, but it is terrifying for any child to go through several major operations for the same problem. Fortunately, for families with young children suffering from severe scoliosis, this nightmare can come to a close. With the biomedical research and advancement of a growing spinal rod, annual or bi-yearly invasive operations to prohibit spinal curvature, contortion, or displacement are replaced with a single surgery.

Typically when a patient has severe scoliosis, a 40-45 Cobb degree curve, they must receive a spinal fusion using hardware implants and bone graft to prevent the spine from continuing to deform. I myself at the age of 16 underwent this operation to inhibit any advancement of the 59 Cobb degree, S-shaped curve of my spine. My body handled the risky surgery well, avoiding any complications. Even though my operation and rehabilitation went smoothly, there were times of unbearable pain and extreme discomfort. I am so thankful that I will not have to put myself through that torment for decades to come, but prepubescents suffering from the same condition cannot say the same. Body growth is a direct cause of spinal curvature, meaning that as a child grows so does the spinal deformity. Thus, a child under the age of 12 is highly likely to undergo several of these operations to replace spinal implants and reshape the spine; this brings a stronger chance of infection, malfunction, and complications in general. Sadly, this was the reality for hundreds of kids until a new method was found.

Magnetic Expansion Control (MAGEC) is a treatment for early onset scoliosis that requires one operation for the entirety of childhood. The operation itself involves placing rods within the spine of the young patient that can expand or lengthen over time as the child grows. Doctor Robert Lark M.D. of Duke Health states that, "Children return to the clinic every three months, and we gently rest a device onto their backs, which magnetically telescopes the rods apart at 3 mm to 5 mm increments each time." This non-invasive treatment along with other preventative measures can keep kids away from the operation table and simply to live a better life. This innovative treatment made its appearance in March of 2014 by NuVasive.

Prior to its implementation in scoliosis treatment, MAGEC was tested first in animals then humans. In a 2012 study, nine 7-month-old pigs were used to determine the safety and effectiveness of using a magnetically controlled growing rod (MCGR) in the spine. The findings concluded that MCGR provided 80% of predicted spinal growth from 8 of the subjects, which is significant. Unfortunately, a misplacement of a pedicle screw paralyzed one of the subjects, and due to protocol, terminated its life. This misplacement was not necessarily from the new treatment procedure, but rather a known risk throughout both operations that are being compared. More importantly, the animal testing found that further research is safe and

beneficial. The importance of animal testing is to ensure the efficacy and safety of the product being tested to human beings. It is crucial that all testing on animals is under a standard code of ethics and is for a justifiable cause. The pigs in this particular study are being examined and tested on for the health and safety of humans and, when something did “go wrong,” proper measures were used to treat the pig in a humane way. The minimal number of subjects were used to obtain data that was practical to continue research as well. Once deemed safe, human testing for MAGEC started following animal testing. A 2013 study of 14 patients with current child scoliosis found that, “MCGR was safe and provided adequate distraction similar to standard growing rods.” The study states as well that no major complications were found during a follow-up when using MCGR. Eventually, the FDA approved MAGEC for those in which it would help. Today, MAGEC is still used, preventing unnecessary, traumatic surgeries for young children. And through this procedure, proper safety can be ensured with the unintrusive magnetic shift of a rod in a few minutes rather than weeks of pain; it’s just like MAGEC.

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