

## Patient Advisory Handout - Nicotine: The Effect On Spinal Fusion

The inhalation of cigarette smoke has been scientifically proven to have detrimental effects on the body, contributing to life-threatening illnesses such as heart disease, emphysema, and lung cancer. Research has also shown that nicotine, whether absorbed by smoking cigarettes, chewing gum, or applying a patch, has a negative effect on bone health and the healing process.

### **Effects of Nicotine on Bone Health**

Similar to other organs and tissues in our bodies, our bones are nourished by elements in our blood. The nutrients, minerals, and oxygen which promote the formation of new, healthy bone are all supplied to the bones through the bloodstream. The presence of nicotine causes blood vessels to constrict, thus limiting the blood supply to the healing bone and making the fusion process difficult.

### **Spinal Fusion and Nicotine**

Spinal fusion surgery is performed to stabilize the spine often after decompressing spinal nerves and/or spinal cord. In a successful fusion, separate bones are united to form one, with the help of instrumentation and bone graft. In the event of an unsuccessful fusion, the two bones do not unite or have a weak union. In these cases, patients may experience severe neck or back pain, generally increasing with activity and relieved during rest. Furthermore, symptoms such as leg and arm pain may return. Instrumentation may loosen and require additional surgeries which will lengthen the recovery time. For patients using nicotine, the likelihood of an unsuccessful spinal fusion is greatly increased.

### **Evidence**

Multiple studies have shown the negative influence of nicotine on spinal fusions. A study by Brown et al. reviewed 100 patients who underwent lumbar spinal fusion surgery; 50 smokers and 50 non-smokers. Examinations done two years after surgery revealed that 40% of the smokers did not heal, compared to only 8% of non-smokers. In a study at Emory University, scientists used a rabbit model to observe the effects of nicotine on bone healing after spinal fusion. The production of new bone, and the strength and quality of the new bone was compared between a group of rabbits receiving nicotine and a group that did not receive nicotine. The study established a direct relationship between decreased bone healing and the presence of nicotine in the blood stream. The results also suggested that the new bone formed in the presence of nicotine may have inferior strength and stability.

***Candidates for spinal fusion are urged to refrain from the use of nicotine before and after surgery to increase the chances of a successful recovery, and minimizing the need for additional spinal surgery.***

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*Brown CW, Orme TJ, Richardson HD. "The rate of pseudarthrosis (surgical nonunion) in patients who are smokers and patients who are nonsmokers: a comparison study." Spine Nov. 1986: 942-3.*

*Silcox DH, Daftari T, Boden SD, Schimandle JH, Hutton WC, Whiteside TE. "The effect of nicotine on spinal fusion." Spine July 1995: 1549-53.*