



To whom it may concern.

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I have worked with the Austrian Workman's Compensation insurance provider (Allgemeine Unfallversicherungsanstalt- AUVA) since 1988 in several capacities, Trauma Surgeon, Chief of Trauma, and now one as Deputy Medical Director of the Agency. We are responsible of insurance coverage for occupational accidents and diseases for more than 4 million people (1.30 million school children and students, 0.42 million self-employed persons, 1.57 million white collar workers and 1.21 million blue collar workers) out of about 8 million Austrian inhabitants. Our company is running seven full trauma centers and four rehab centers to serve our countrymen. I was in the employee of one such trauma center, Trauma Center Meidling in Vienna for 27 years. At Trauma Center Meidling in 1997 I was tasked to disprove a new emerging technology in Europe for the treatment of non-unions, shockwaves (Acoustic Wave Technology). AUVA is unique in that we offer to pay for a patients care anywhere in Europe and even the US that offers care not available in Austria. It was becoming very expensive to pay for our patients care elsewhere in Europe and I was tasked to prove that this new technology was not effective. At AUVA we established a detailed database to support this project that included not only patient data but surgical history, smoking habits, type of nonunion, and co morbidities. At this time, surgery and bone grafts were still considered the standard of care. AUVA did not often utilize Bone Stim technology as our prior experiences with this technology were not convincing. After just a year or so, it became apparent that this new shockwave technology was a very effective tool to manage delayed and non-unions fractures (and stress fractures, and AVN) and it quickly evolved as the new standard of care at AUVA. This technology is available at all of our trauma and rehab centers and is utilized daily in acute and chronic wounds, pain management and other orthopedic indications. AUVA Trauma Centers are fully digital and based on orthopedic metrics offers some of the best orthopedic care. Shock wave therapy is an important part of the tools that make us so successful.

Our database has proved invaluable to help refine the shockwave procedure and we can examine the patient parameters to determine the best patient protocols. By learning from the database, over the years we have lowered the energy levels and the number of shocks and we have improved patient outcomes. Today we average a success rate of almost 90% for tibia non unions with a single treatment (second treatment necessary in about 12% of cases), after an average of two failed surgeries and over 9 months of nonunion. Interestingly, we do not show a statistically significant difference in smokers or the aged or even infected non unions. In fact, it is our study of infected nonunion patients that led to the discovery of the underlying biologic mechanism of action, including stem cell migration, homing and differentiation; neo vascularity and the activation of toll like receptors to modulate inflammation.

From the economic perspective, Acoustic Wave therapy has saved AUVA at least 70% of the cost to manage a nonunion patient, excluding the shortened time to recovery. Eventually, in our country of only 8,000,000 we hope to save over 70 million Euros per year to manage just this

patient population. Other pathologies including wounds, the ischemic heart, spinal injury patients, and neurologic brain indications offer great promise and are being researched by our own research team at the Ludwig Boltzmann Institute for experimental and clinical traumatology. I have traveled the world for over 20 years presenting the benefits of this technology and I hope to see it soon as the standard of care worldwide.

A handwritten signature in blue ink, appearing to read 'W. Schaden', with a stylized, cursive script.

Dr. Wolfgang Schaden

Deputy medical director