Technology Opportunity, Ref. No. UB-17/334

Low heat drill bit for surgery

Keywords minimal temperature elevation, surgery, bone drilling

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Reference Feldmann et al.: *Temperature Prediction Model for Bone Drilling Based on Density Distribution and In Vivo Experiments for Minimally Invasive Robotic Cochlear Implantation.* Annals of Biomedical Engineering, Vol. 44, pp. 1576–1586

Background Little is known about the *in vivo* temperature elevation of surrounding structures experienced due to the surgical drilling process. However, as in our study of minimal invasive cochlea implantation, the main risk is damage to the facial nerve due to direct contact of the drill bit or due to the temperature elevation generated by the drilling process. Whilst it is generally believed that a low rotational speed (around 1'000 rpm) and a high feed rate (up to 1.5 mm/s) leads to a lower overall temperature elevation, we have found that optimization of the design of the drill bit is crucial for a stable low heat drill process.

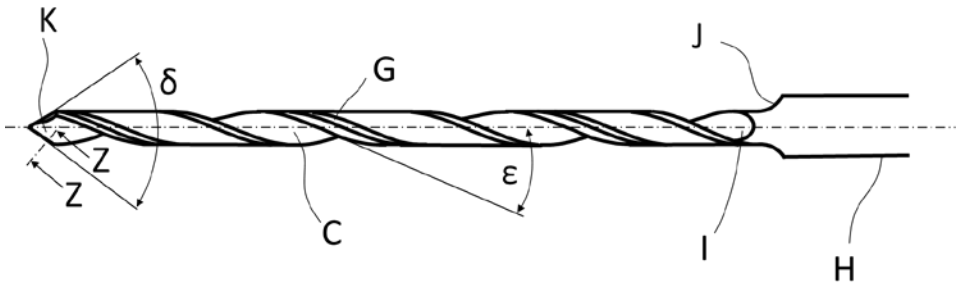

Figure 1: new drill bit design comprising one single cutting edge and one spiral flute with specific rake and helix angles

Invention An extensive experimental study revealed a new drill bit design to generate less heat was compared to a standard surgical drill bit (Synthes, Johnson&Johnson, USA). The optimized drill bit was successfully employed in a pilot study with an image guided surgical robot, developed for minimally invasive cochlear implantation.

Fields of Use The drill bit according to the current invention is designed to minimize risk of damage of tissue and nerves due to temperature elevation and is applicable for various surgical drilling processes.

Patent Status PCT application filed

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