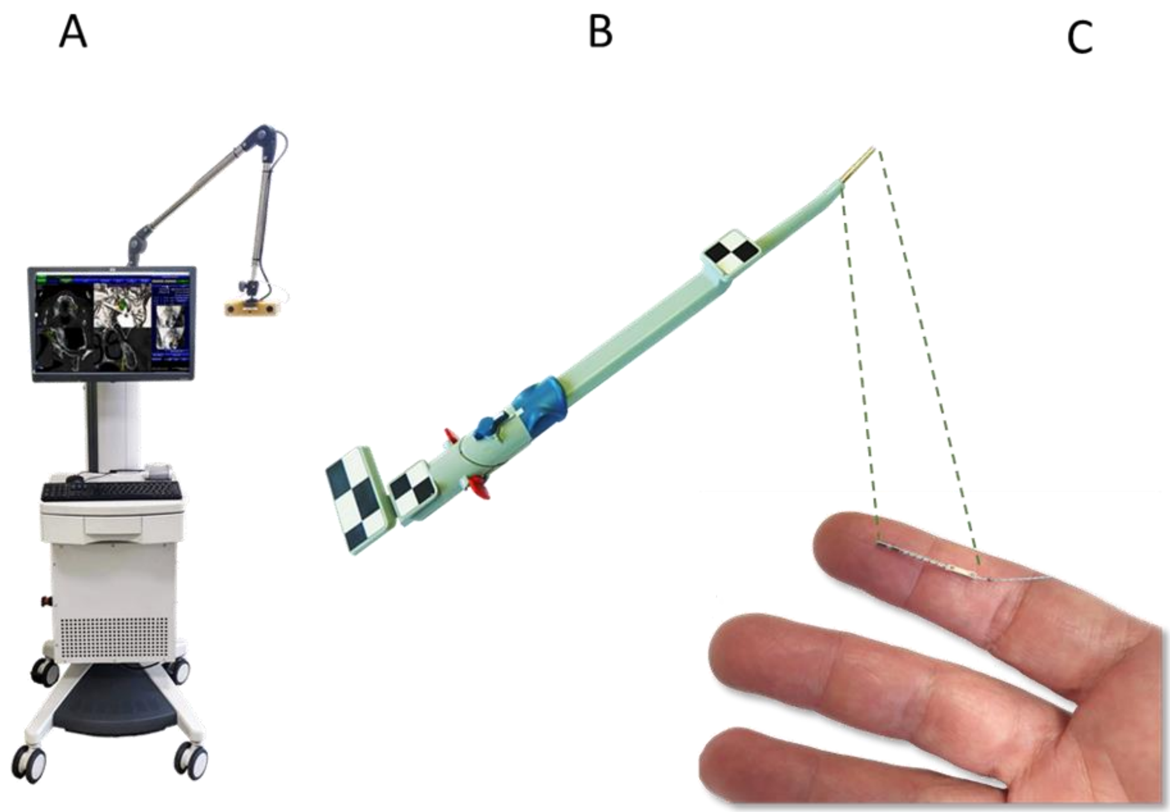
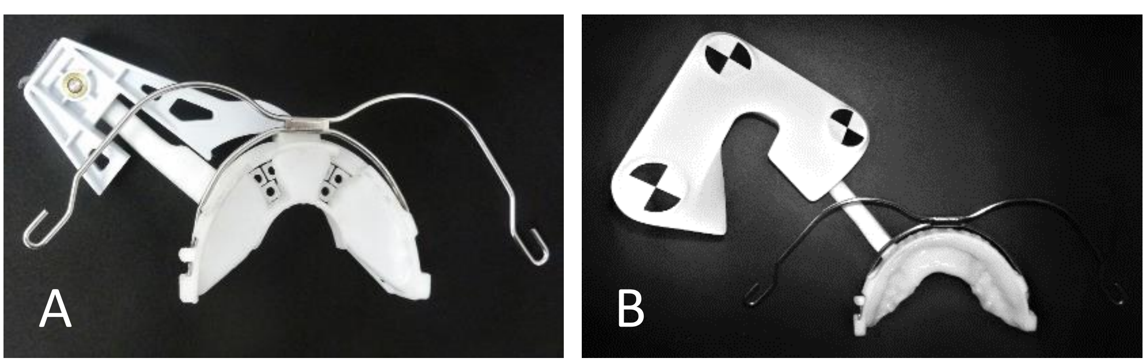
I

SUPPLEMENTAL MATERIAL

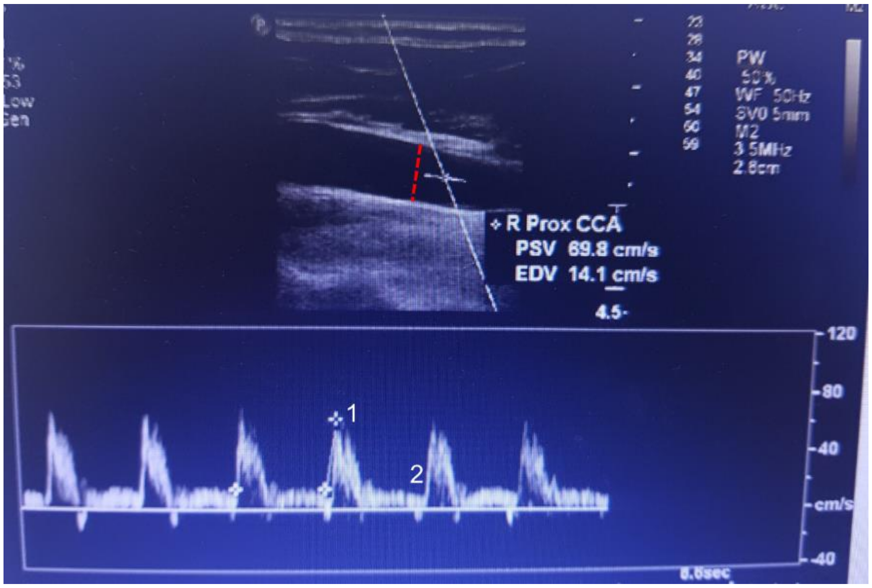
Supplemental eFigure I – The Optical Navigation System (A), the pre-loaded injector with optical markers (B) and the implant (C).



Supplemental eFigure II – The CT Marker (A) and Patient Reference Marker (B) attached at a fixed location to a dental impression of the upper palate and teeth



Supplemental eFigure III – The Technique for Quantifying Common Carotid Artery Blood Flow



The quantitative common carotid artery (CCA) blood flow technique was similar to the method previously described by Schöning et al and by Schell et al.[14,15] The CCA was first explored following an initial 10 minutes of rest with subjects in a supine position with the head slightly elevated and turned to the contralateral side by 10°. Flow volume measurements were taken approximately 1 cm below the carotid bulb. The luminal diameter (d) was determined on the enlarged B-mode image of the vessel as the distance between the internal layers of the parallel walls. The average of 2 measurements was evaluated. The calipers could be adjusted in 0.1-mm increments. Flow measurements were done at the same location. Exact angle correction of Doppler frequencies was achieved by adjusting the angle between the Doppler beam and the course of the vessel (along the walls of the vessel as well as along the color Doppler stream). The angle-corrected peak systolic (PSV) and end diastolic (EDV) velocities were determined, averaged over 3 cardiac cycles. From these measures, the absolute blood flow in cc/second through the CCA was calculated. The intravascular Peak Systolic and End Diastolic Flow volumes (PSF and EDF) were calculated as the product of the blood velocity and the cross-sectional area of the circular vessel according to the formulas:

$$PSF = PSV \times \pi \left(\frac{d}{2}\right)^2$$

$$EDF = EDV \times \pi \left(\frac{d}{2}\right)^2$$