THROMBOLYSIS BY EXCIMER LASER PHOTOABLATION.

G.H. Pettit, R.Sauerbrey, I.S. Saidi, F.K. Tittel, Rice University, Dept. of Electrical & Computer Engineering, Houston, Tx; R. W. Farrell, C.R. Benedict, University of Texas Medical Branch, Division of Cardiology, Galveston, Tx.

Thrombi have been successfully cleared from canine coronary arteries *in vitro,* without damaging the (essential) vessel wall endothelium, by using a XeF excimer laser (351 nm wavelength) and an optical delivery fiber with a rounded output tip. Thrombi were produced *in vivo* by direct electric current applied via needle electrode (150 microamps, 9 volts) placed in the lumen of circumflex coronary arteries. Occlusive thrombosis of the vessel was determined by measuring blood flow and cardiac function. The average weight of thrombi were 27 $\pm$ 7 mg(mean $\pm$ SD). Arterial segments containing the thrombi were excised, submerged in saline and the modified laser delivery fiber was inserted into the lumen of each artery. The rounded fiber tip prevented mechanical abrasion of the artery and provided terminal focusing of the laser beam. Nine min. of exposure to 5 mJ laser light pulses at 20 per sec. completely thrombolysed all occluded segments. Incresing the laser firing rate to 40 per sec. reduced the thrombolysis time by 50%. Increasing the pulse energy also decreased the time required for thrombolysis. Coronary arterial wall was then examined by scanning and transmission electron microscopy to assess the integrity of the endothelial layer. No evidence of laser induced damage to the endothelial cell surface was found. Thus, by using a highly directional laser delivery fiber, which confines the region of high laser fluence to the central part of the arterial lumen, thrombolysis can be done without compromising vessel integrity or creating a new thrombogenic surface.