Background
Femtosecond laser assisted cataract surgery (FLACS) with lens implantation offers potential advantages over conventional surgery including a controlled, precise means of creating a capsulotomy in order to remove the lens material and a reduction in power needed to complete phacoemulsification following femtosecond laser lens fragmentation. Femtosecond lasers rely on the use of a docking system in order to stabilize the eye and target the laser energy but inherently generate an increase in intra-ocular pressure (IOP) that in turn can potentially lead to optic neuropathy. The aim of this study was to determine the effect of the Ziemer FEMTO LDV Z8 Femtosecond liquid patient interface laser platform on IOP during lens fragmentation and capsulotomy.

Methods
Porcine eyes were recovered and used within six hours of retrieval. Eyes were mounted on a pressurized stand and a 30-gauge cannula connected to an IOP catheter transducer which was inserted into the anterior chamber, posterior to the limbus. Each cataract procedure was carried out with standard clinical settings for lens fragmentation and capsulotomy on the Ziemer FEMTO LDV Z8. Patients undergoing routine femtosecond cataract surgery with the Ziemer FEMTO LDV Z8 system at the Oftalmosaligno (LI) had tonometry performed from the central cornea at the pre-docking (analogous to pre-cannulation in the porcine study), suction application and post laser stages of surgery (analogous to post-cannulation). Patients had a median age of 73.2 years [range 69–77], and did not have glaucoma or other co-morbid pathology prior to surgery.

Results
The effects of angulation on IOP in porcine eye: we investigated the effect of altering the weighted hand piece on IOP. It should be noted here that the moveable arm on the LDV Z8 platform has a counter-weight so as to minimize the effect of the hand piece weight. At an angulation close to zero degrees, the hand piece was measured at 310 g. By reducing the angulation to -10°, the weight was reduced to 110 g due to the cantilever effect of the counterweight on the laser arm. In turn this resulted in a laser IOP of 36.4 ± 7.7 mmHg. In human subjects: IOP measurements at baseline were found to be 12.3 ± 3.71 mmHg and following suction 42.5 ± 6.52 mmHg in a cohort of healthy individuals undergoing routine femtosecond laser cataract with the FEMTO LDV Z8 (n = 10). This represented a mean escalation in IOP of 30.20 ± 7.50 mmHg (range 19.0–41.0 mmHg).

Conclusions
The FEMTO LDV Z8 FLACS system offers a flat applana
tion system like the Z6 for cornea and a liquid patient inte
rface laser platform on IOP during lens fragmentation and capsulotomy.

Fig. 1. Representative plot demonstrating the difference between peak and plateau IOP with suction on the FEMTO LDV Z8 at -10° arm angulation.

References: