**Background:** Heart valve surgery is a risk factor for the development of postoperative Acute Kidney Injury (AKI). We evaluate the feasibility of using leukocyte depletion filter throughout Cardio-Pulmonary Bypass (CPB), to protect against post-operative AKI by removing activated leukocytes from the circulation.

**Methods:** We conducted a single-centre, double blind, feasibility trial. Patients undergoing non-emergency heart valve surgery with or without a concomitant procedure were eligible. Participants received either LG-6 (LeukoGuard® Leukocyte Reduction-Pall Corporation) filter or standard arterial filter during CPB. We assessed recruitment rate, acceptability to patients, participation in follow-up, ease of blinding, collection of clinical outcome and resource use data and recording of adverse events. The primary clinical outcome was the development of AKI within 6 weeks using KDIGO criteria. Serial measures of 5 biomarkers of acute kidney injury were assessed. Other outcomes included: length of stay (hospital/ICU), and quality of life.

**Results:** Sixty-four participants were randomized (33 LG-6 versus 31 standard). The incidence of post-operative AKI was 39% (95% confidence interval (CI) 26- 53%); of these 65% were stage 1, 25% stage 2 and 10% stage 3 consistent with previous reports. Mean urinary NGAL and Alb:Cr ratios were lower in the intervention group (NGAL 0.80, 95% CI 0.54-1.18, p=0.29. Alb:Cr 0.84, 95% CI 0.51-1.39, p=0.53) and RBP:Cr and KIM-1:Cr ratios were higher (RBP:Cr 1.16, 95% CI 0.80-1.69, p=0.45, KIM-1:Cr 1.15, 95% CI 0.87- 1.52, p=0.35) compared to the control group. Serum Cystatin C varied with time (p=0.011) but suggested a higher average value in the leukodepletion group only at 48 hours. Two patients in the leukodepletion group died within their index admission. The median Hospital/ICU stay was 8/2 days. Comprehensive resource use data were collected, <3% (219/8550 items) were missing. On average, health related quality of life returned to pre-operative levels by 3 months.

**Conclusions:** Although the study was not large enough to be definitive, it is very unlikely that the LG6 filter will significantly reduce the incidence of acute kidney injury after heart valve surgery. Randomized trials of other interventions for the prevention of acute kidney injury are feasible.