

## Effect of Cumulative Dissipated Energy on Short-Term and Long-Term Outcomes after Uncomplicated Cataract Surgery

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**Abstract :** Purpose: To investigate the effect of ultrasound energy, expressed as cumulative dissipated energy (CDE), on short and long-term outcomes after uncomplicated cataract surgery by phacoemulsification. Methods: In this single-surgeon, two-center retrospective study, non-glaucomatous participants who underwent uncomplicated cataract surgery were investigated. Best-corrected visual acuity (BCVA) and intraocular pressure (IOP) were measured at 3 separate time points: pre-operative, Day 1 and  $\geq 1$  month. Anterior chamber (AC) inflammation and corneal edema (CO) were assessed at 2 separate time points: Pre-operative and Day 1. Short-term changes (Day 1) in BCVA, IOP, AC and CO and long-term changes ( $\geq 1$  month) in BCVA and IOP were evaluated as a function of CDE using a multivariate multiple linear regression model, adjusting for age, gender, cataract type and grade, preoperative IOP, preoperative BCVA and duration of long-term follow-up. Results: 110 eyes from 97 non-glaucomatous participants were analysed. 60 (54.55%) were female and 50 (45.45%) were male. The mean ( $\pm$ SD) age was 73.40 ( $\pm 10.96$ ) years. Higher CDE counts were strongly associated with higher grades of sclerotic nuclear cataracts ( $p < 0.001$ ) and posterior subcapsular cataracts ( $p < 0.036$ ). There was no significant association between CDE counts and cortical cataracts. CDE counts also had a positive correlation with Day 1 CO ( $p < 0.001$ ). There was no correlation between CDE counts and Day 1 AC inflammation. Short-term and long-term changes in post-operative IOP did not demonstrate significant associations with CDE counts (all  $p > 0.05$ ). Though there was no significant correlation between CDE counts and short-term changes in BCVA, higher CDE counts were strongly associated with greater improvements in long-term BCVA ( $p = 0.011$ ). Conclusion: Though higher CDE counts were strongly associated with higher grades of Day 1 postoperative CO, there appeared to be no detriment to long-term BCVA. Correspondingly, the strong positive correlation between CDE counts and long-term BCVA was likely reflective of the greater severity of underlying cataract type and grade. CDE counts were not associated with short-term or long-term postoperative changes in IOP.

**Keywords :** cataract surgery, phacoemulsification, cumulative dissipated energy, CDE, surgical outcomes

**Conference Title :** ICOVVD 2021 : International Conference on Ophthalmology, Vision and Visual Disorders

**Conference Location :** Sydney, Australia

**Conference Dates :** December 02-03, 2021