The comet assay in Drosophila: analysis of *in vivo* and *in vitro* repair approaches over MMS induced DNA damage

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The comet assay in Drosophila was used to study DNA repair of MMS induced DNA damage in somatic cells, specifically the roles of nucleotide excision repair (NER) system and Mus308 (dmPOLQ) protein, checking the value of the *in vivo* and *in vitro* comet repair approaches. We have used the *mus201*, *mus308* and *mus201;mus308* mutant strains and the wild-type efficient repair *OK* strain in these analyses. For both approaches, third instar larvae were treated *in vivo*, and the comet assays were performed with neuroblast cells from brain ganglia. For the *in vivo* approach, larvae from the different strains were treated with increasing MMS concentrations, and the solvent. In the *in vitro* approach larvae from the wild-type *OK* strain were treated with 1 mM MMS, and the solvent, and comet nucleoids were incubated with cell free protein extracts from the different strains. Results demonstrated that whereas both approaches allowed the detection of NER and Mus308 repair activities on MMS induced damage, only the *in vitro* one permitted the quantification of these activities, comparing them with that of the *OK* strain: considering the Tail DNA comet parameter, the repair activity of *mus201* strain on MMS induced damage was 47% of the *OK* strain activity, whereas that of the *mus308* strain was 63%. These results demonstrate that the *in vitro* comet repair assay is applicable in Drosophila and may be a useful tool to study DNA repair.