

# Petrol exposure and DNA integrity of peripheral lymphocytes

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## Background

Petrol attendants are at risk for the development of cancers. Exposures experienced by such workers include polycyclic aromatic hydrocarbons PAH's and the volatile organic compounds (VOCs) which are associated with DNA damage, DNA strand breaks, micronuclei and chromosomal aberrations.

## Aim

To determine the effect of petrol exposure on DNA integrity in peripheral blood lymphocytes among petrol attendants and a non-exposed comparison population.

## Methods

Fuel station employees (n=101) and office-based non-exposed (n=50) workers in Durban, South Africa were interviewed using a validated questionnaire. Genomic DNA was extracted from peripheral lymphocytes for the benzo(a)pyrene diol epoxide (BPDE)-DNA Adduct assay (ELISA), and DNA damage was determined using the comet assay.

## Results

Among the exposed, the mean duration of employment in the fuel industry was 5.8 years (SD=4.6) and among those pumping fuel (n=75), the mean metric tons of petrol pumped in the past 12 months per worker was 199.2 (SD=88.9). The mean percentage tail DNA varied significantly between exposed and non-exposed groups: 23.8% (SD=13.3) and 8.1% (SD=1.8) ( $p<0.01$ ) respectively. A significant difference existed between the exposed and non-exposed groups for BPDE-DNA adducts: 30.0ng/ml (SD=12.7) and 18.1ng/ml (SD=18.2) ( $p<0.0001$ ), respectively. A 16.5 greater percentage tail DNA among the exposed compared to non-exposed (95% CI=11.8%-21.1%) was found from regression models, adjusting for cigarette smoking, age and sex. The exposed group had a 12.9 ng/ml greater increase in BPDE-DNA adducts has compared to the unexposed (95% CI=7.2 ng/ml -18.7 ng/ml). Cigarette smoking resulted in almost a 3.5% increase in percentage tail DNA.

## Conclusion

Our study adds to the literature that long term, low dose exposure to vehicular fuels are likely to result in altered DNA integrity and genotoxicity among petrol attendants. These results strengthen the case that these workers must be afforded appropriate protection to prevent serious adverse outcomes.

**Keywords:** petrol attendants, DNA damage, comet assay, BPDE-DNA adduct