Aromatic Amines: Contribution to the Mutagenic Activity of Tobacco Smoke

**Background**

Mutagens are cancer-causing chemicals capable of triggering the conversion of normal cells into cancer cells. Aromatic amines (AA) are cancer-causing chemicals present in tobacco smoke and are commonly associated with its mutagenic activity.

Health Canada has studied AA in order to determine which of these chemicals contribute the most to the total mutagenic activity of mainstream tobacco smoke. The formula to estimate the contribution of a certain chemical to the total mutagenic activity of mainstream tobacco smoke is shown below. The concentration of the chemical in mainstream tobacco smoke (measured in nanograms per cigarette) is multiplied by its respective capacity to induce mutations. The mutagenic activity is determined through the bacterial reverse mutation assay using *Salmonella typhimurium* mutant strains TA98, TA1537 and TA100.

\[
\text{Concentration of chemical in mainstream tobacco smoke (ng/cigarette) } \times \text{ Capacity of this chemical to induce mutations (number of mutations/ng)} = \text{ Contribution of this chemical to the total mutagenic activity of mainstream tobacco smoke (number of mutations/cigarette)}
\]

**Key Messages**

- Aromatic amines (AA) are cancer-causing chemicals found in tobacco smoke.
- Harman, MeAαC, o-toluidine and 1-aminonaphtalene are the AA that contribute the most to the total mutagenic activity of mainstream tobacco smoke.

**Results**

The Health Canada study analyzed the AA present in mainstream tobacco smoke. The study found that norharman and harman are present in the highest concentration in mainstream tobacco smoke. On the other hand, 4-aminobiphenyl, 3-aminobiphenyl and o-anisidine were found to have the highest capacity to induce mutations (Table 1). Of the chemicals studied, harman, MeAαC, o-toluidine and 1-aminonaphtalene contribute the most to the total mutagenic activity of mainstream tobacco smoke (Figure 1).
Aromatic Amines: Contribution to the Mutagenic Activity of Tobacco Smoke

**Conclusion**

Health Canada considers that aromatic amines present in mainstream tobacco smoke can potentially lead to mutations causing cancer.

**References**

