

Exposure risks to carcinogens in food: formation of heterocyclic aromatic amines (HAs) and polycyclic aromatic hydrocarbons (PAHs) in grilled muscle foods

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Diet contains almost all the necessary ingredients to support the human life. However, chemicals that had a deleterious effect may also be present. Such chemicals can occur naturally in the food, others are synthetic and some are produced during cooking. Cooking toxicants have been receiving special attention in the last decades concerning their formation, occurrence, mitigation, and the impact on human health. The risk of exposure to these compounds depends on the kind of diet, eating habits and cooking practices.

Grilling muscle foods involves high temperatures that lead to production of cooking toxicants, such as heterocyclic aromatic amines (HAs) and polycyclic aromatic hydrocarbons (PAHs). High PAHs and HAs contents in food is usually found in charcoal grilled/barbecued foods through the pyrolysis of fat and smoke from heat source. As so, there is an urgent need to study these two groups of mutagens in the same samples. HAs and PAHs were quantified in well-done meat and fish samples.

Quantitative HAs and PAHs profiles were different for beef and salmon using the same type of charcoal. Higher levels of HAs and PAHs were found in salmon samples. Since beef and salmon were grilled in the same way, we believe that the higher amount of PAHs in salmon may be a function of their fat content. Chicken grilled in the charcoal, contained PhIP, 4,8-DiMeIQx, Trp-P-1, AαC, MeAαC, and all PAHs except DhA. PhIP formation was higher than other HAs in chicken samples. Continuous barbecuing with the same charcoal shown that combustion of fat that dropped along the grilling period contributed to higher formation of HAs and PAHs. Salmon and chicken contribute to total HAs exposure with similar amount around 1500 ng/100 g. Salmon exhibited the highest amount of PAHs, followed by chicken and much lower amount was quantified in beef.

Special attention must be given to the intake of barbecued foods since high amounts of HAs and PAHs can be taken in a single meal. Changes in cooking practices can improve the overall reduction of PAHs and HAs content in these types of food.