

Use of high-temperature cooking methods in preparation of meat and fish in European countries

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Background

High-temperature cooking methods such as barbecuing (cooked on grill bars over burning charcoal or wood), grilling (cooked rapidly without moisture, on grill bars under or over intense direct heat), and frying (cooked in heated fat, usually over a direct source of heat) are associated with elevated cancer risk in different case-control studies. These cooking methods are thought to be surrogates for carcinogens, e.g. heterocyclic amines or polycyclic hydrocarbons.

A systematic analysis of differences in the use of high-temperature cooking methods for meat and fish preparation used within Europe has not been reported so far. In this short report, we describe the differences in meat and fish cooking techniques in different regions of the European Prospective Investigation into Cancer and Nutrition (EPIC).

Methods

A single 24-h recall was obtained in a representative subgroup of about 10% of all EPIC cohorts. Information about

type and quantity of foods consumed as well as details on cooking methods were obtained by means of this method. To ensure that 24-h recalls were conducted in a standardized manner in each EPIC centre, a computer program, EPIC-SOFT, was developed.

Using 24-h recalls of 35 644 persons (22 727 women and 12 917 men, 35–75 years old), we obtained the amount of meat and fish consumed as well as the cooking methods used. The intake of fried, grilled, and barbecued meat and fish and their relative contribution to the overall cooking of meat and fish was calculated per region. The EPIC centres were grouped into regions according to similar patterns in meat and fish cooking. The calculated intake of meat and fish was adjusted for age, weekday and season.

Results

The relative contribution of these three cooking methods to the overall applied cooking methods for meat and fish cooking ranged from a low of 11.5% in North Italian centres to a high of 46.5% in the Dutch cohort. In the northern parts

of Europe and North Spain, these high-temperature cooking methods were more often used in contrast to the centres in France, Greece, Italy, and Great Britain. Between 0% and 12% of meat and fish were grilled, 4%–43% were fried and 1%–9% were barbecued. Frying was more often observed in North and Central Europe and less in the South. Although barbecuing was rarely used in most EPIC regions, over 8% of meat and fish was barbecued in Greece.

Mean daily intake of fried, grilled, and barbecued meat and fish varied between 11 g/day (South Spain) and 55 g/day (The Netherlands) for women and between 20 g/day (North Italy) and 91 g/day (North Spain) for men. Most of cooked meat and fish was fried. The lowest amounts were consumed in Greece (1 g/day in women, 2 g/day in men), the highest amounts in the centres of The Netherlands (50 g/day in women, 80 g/day in men) and North Spain (43 g/day in women, 88 g/day in men). The consumption of fried meat and fish was generally lower in the centres of France, Greece, Spain, Italy.

and Great Britain than in the northern and middle European centres. The intake of grilled meat and fish ranged from less than 1 g/day (Germany, Naples, Denmark) to 15 g/day among women in Ragusa and 20 g/day among men. A higher intake was observed in the French, Greek, and Italian EPIC cohorts than in the North of Europe. No grilled meat was consumed in the EPIC centres of Spain. Barbecued meat consumed was between 1 g/day and

11 g/day; less than 5 g/day were consumed in most regions.

Conclusion

The consumption of meat and fish prepared by high-temperature cooking methods (frying, grilling, and barbecuing) varies considerably in EPIC. EPIC, therefore, provides the opportunity to further investigate the possible relationship between high-temperature cooking methods, meat and

fish cooking carcinogens and cancer risk in a large prospective cohort study. In order to study the variation in meat and fish cooking methods and their impact on cancer risk in the full EPIC cohort, a questionnaire on meat and fish cooking methods was developed. This questionnaire also assesses the degree of browning and doneness of meat and fish consumed.