

CONSUMER EXPOSURE ASSESMENT TO CYCLOPIAZONIC ACID FROM CROATIAN DRY-FERMENTED MEAT PRODUCTS

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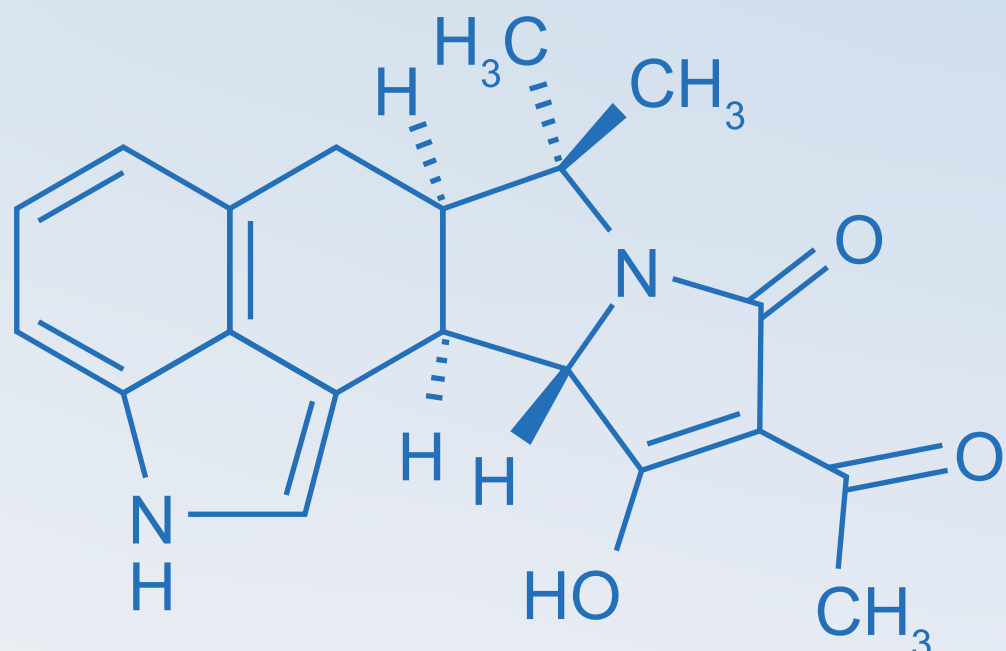
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INTRODUCTION

Cyclopiazonic acid (CPA) has been shown to be present in high concentrations in dry-fermented meat products, mainly as a product of moulds that overgrow the surface of these products during maturation (1-2). The European Food Safety Authority (EFSA) has not yet established a health-based guideline value (HBGV) for the consumer risk associated with CPA in food and CPA has not yet been classified by the International Agency for Research on Cancer (IARC) as the carcinogenicity studies are not sufficiently conclusive (3). The aim of this study was to assess human exposure to CPA by analysing 288 samples of dry-fermented meat products (TMP) available on the market in relation to the consumption data of Croatian citizens.



MATERIALS AND METHODS

DRY-FERMENTED MEAT PRODUCTS (TMP)

The study was conducted on 288 samples of Croatian traditional dry-cured meat products divided into 6 categories: dry-fermented sausages; *Kulen*, *Pečenica/ombolo/kare*, prosciutto/dry ham, bacon/pancetta and dry rack.

CYCLOPIAZONIC ACID (CPA) ANALYSIS

CPA was analysed using the liquid chromatography-tandem mass spectrometry (LC-MS/MS) method, achieving a limit of detection (LOD) of 2.17 µg/kg.

FOOD CONSUMPTION DATA

The data on food consumption in the Republic of Croatia comes from a survey conducted by the Croatian Food Agency in 2011 and 2012 that included 2 002 respondents aged between 18 and 64 with use of a "face-to-face" interview and a 24-hour recall method.

EXPOSURE ASSESMENT

The assessment of human exposure is calculated as estimated daily intake (EDI) in µg/kg body weight (bw) per day according to the following formula:

$$EDI (\mu\text{g/kg bw/day}) = \frac{\text{individual food consumption data (g/day)} \times \text{average CPA contamination } (\mu\text{g/kg})}{\text{bw (kg)}}$$



The average result for CPA contamination was calculated using the "lower bound" (LB), "middle bound" (MB) and "upper bound" (UB) scenarios, in the cases where the result was below the LOD (4).

RESULTS

Table 1. Descriptive statistics on consumer consumption in Croatia for groups of traditional meat products

TMP group	Consumers number	Min	Mean	Max	P95	SD
		g/day				
Dry-fermented sausages	423	0.03	33.25	230	100	34.65
<i>Kulen</i>	78	0.46	33.99	200	150	46.95
<i>Pečenica/ombolo/kare</i>	13	0.25	25.56	144	81.96	36.09
Prosciutto/Dry ham	155	0.04	27.59	200	94.19	32.83
Bacon/Pancetta	464	0.03	20.77	600	72.03	36.91
Dry rack	48	0.09	40.81	200	111	44.64

Table 3. CPA exposure assessment in traditional meat products

Mycotoxin	Scenario	Min	Mean	Max	P95	SD
		ng/kg bw/day				
CPA	LB	0.00002	1.520	15.832	5.957	2.123
	MB	0.00045	1.975	20.040	7.474	2.627
	UB	0.00073	2.429	28.371	8.905	3.164

UB = upper bound; MB = middle bound; LB = lower bound;

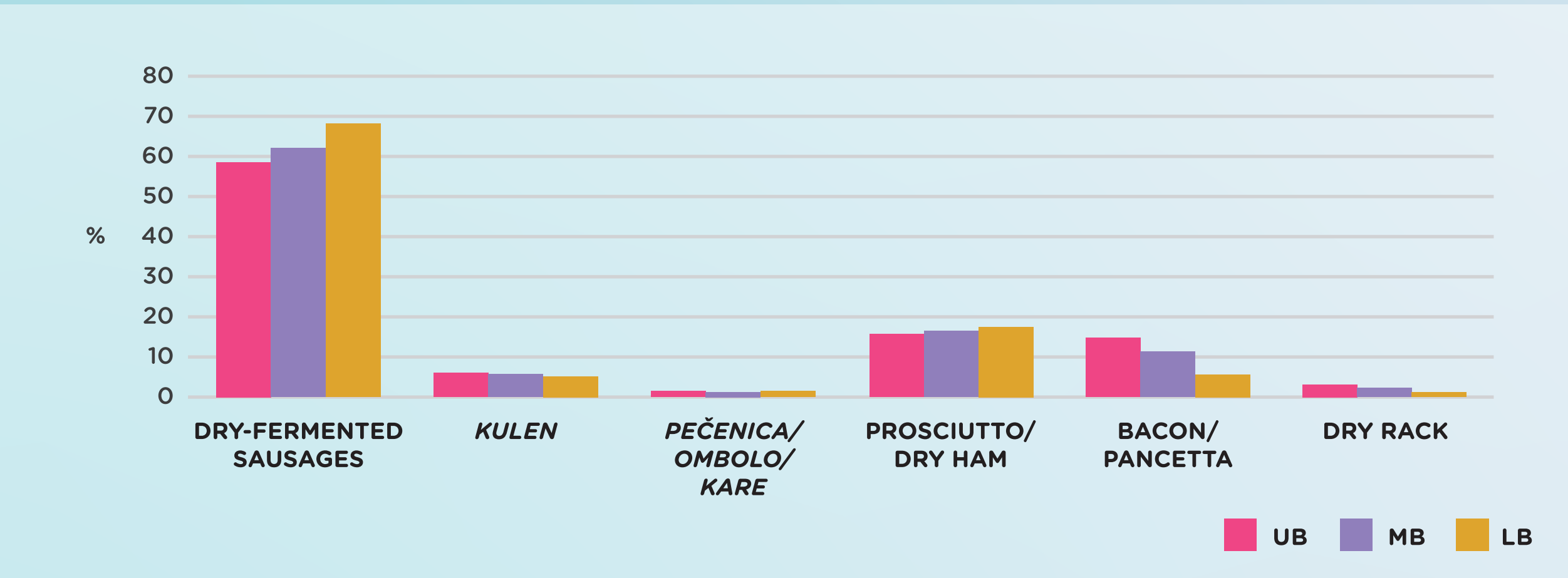


Figure 1. The relative contributions of traditional meat product groups to CPA

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Table 2. Distribution of samples with detected CPA concentrations by groups of traditional meat products

TMP group	N	CPA	
		N*	%
Dry-fermented sausages	129	20	16
<i>Kulen</i>	17	3	18
<i>Pecenica/ombolo/kare</i>	29	5	17
Prosciutto/Dry ham	41	6	15
Bacon/Pancetta	52	4	8
Dry rack	20	2	10
In total	288	40	14

N= total number of samples per traditional meat product (TMP) group; N*= number of samples with detected mycotoxin concentrations (> LOD); %= percentage of samples with detected mycotoxin concentrations

CONCLUSIONS

- The CPA concentrations above LOD were found in 40 out of 288 samples.
- The calculated daily body weight exposure for the LB, MB and UB scenarios was 1.52, 1.98 and 2.43 ng/kg, respectively.
- Among the TMP categories, dry-fermented sausages contributed the most to consumer exposure to CPA.
- CPA occurrence should be monitored over a longer period of time in order to observe the trend of human exposure, as their occurrence in these products depends on different factors such as weather conditions, so the uncertainty of the effects of these factors can be partially excluded.

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