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# Lead in lipsticks: results from a study on products manufactured in Brazil and Portugal

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## INTRODUCTION:

Lead (Pb) is ubiquitous in the environment and can be present in varying amounts in all raw materials. Due to its well-known toxicity, human exposure to products containing Pb must be limited.

At the end of the 2000s, several reports on the presence of Pb in lipsticks at levels that would pose safety concerns were published in the media and on the internet<sup>1</sup>. A scientific paper published in 2009 [1] also reported very high Pb levels (reaching 3700 ppm) in lipsticks (manufactured in China and available on the Saudi Arabia market). This led to FDA scientists to develop and validate an analytical procedure for Pb determination in lipstick and, later, to perform a survey of the U.S. market. This study, published in 2012 [2], found an average Pb content in the 400 lipsticks tested of 1.11 ppm, with results ranging from the detection limit (0.026 ppm) to 7.19 ppm. In 2013, the results of a European survey on the content of Pb in lipsticks were also published [3]. On average, the Pb content found was 0.75 ppm (max. 3.75 ppm).

## OBJECTIVES:

To determine the Pb content in lipsticks manufactured in Brazil and Portugal. Because only one manufacturer was found in Portugal, samples from a supermarket own brand (declared as manufactured in the EU; known to be actually manufactured in Portugal) and products available in low cost stores were also analysed.

## MATERIALS AND METHODS:

The analytical procedure as developed and validated by Hepp *et al.* [2], combining a two-steps closed vessels microwave-assisted acid digestion for samples mineralization with inductively coupled plasma-mass spectrometry (ICP-MS) for Pb determination, was used. Samples (~0.3g) were digested with 7 ml HNO<sub>3</sub> + 2 ml HF (step 1). Boric acid 4% (m/v) was used to neutralize there mainly HF (step 2). After cooling, the solutions were made to the final volume (50 ml) with ultrapure water and analysed by ICP-MS.

## RESULTS AND DISCUSSION:

A total of n=96 samples were analysed. Results obtained are summarized in next table.

**Table 1** - Lead (Pb) content (µg/g) in lipstick samples

	Portugal					Brazil		TOTAL
	A	B	C	D	E	F	G	
<i>n</i>	10	5	3	5	19	6	48	96
mean	0.63	0.86	0.17	0.15	0.85	0.95	1.02	0.86
SD	0.43	0.75	0.04	0.06	0.93	1.20	0.84	0.83
median	0.61	0.46	0.15	0.15	0.39	0.44	0.90	0.65
minimum	0.14	0.15	0.15	0.08	0.02	0.17	0.02	0.02
maximum	1.21	1.69	0.22	0.23	3.21	3.31	3.89	3.89

**A** = Portuguese manufacturer; **B** = own brand of a supermarket (labelled as manufactured in the EU; known to be actually manufactured in Portugal); **C** = Low cost "youth fashion and beauty stores", manufactured in China; **D** = Low cost "youth fashion and beauty stores", manufactured in Turkey; **E** = Low cost Chinese stores, manufactured in China; **F** = manufactured in Brazil, purchased in Portugal; **G** = manufactured and available in the Brazil market.

<sup>1</sup><http://www.fda.gov/cosmetics/productandingredientsafety/productinformation/ucm137224.htm>

## CONCLUSION:

Overall, the mean Pb content ( $0.86 \pm 0.83$  g/g; max. 3.89 g/g) was quite similar to those levels found in the recent USA and European surveys. Moreover, Pb content was quite below the limits imposed by the Germany (20 µg/g) and Canada (10 µg/g) health authorities for Pb in cosmetics. No important differences were found between the different groups of samples.

*Safety assessment:* According to “Cosmetics Europe” (formerly Colipa) data, the estimated amount of lipstick typically applied by the consumers is 0.057 g/day, corresponding to a relative amount of 0.90 mg/kg body weight/day [4]. Considering the maximum amount of Pb found in the analyzed products (3.89 g/g) and assuming the total oral ingestion of the applied product, this will represent an estimated daily intake (EDI) of Pb of approximately 0.0035 g/kg body weight/day, which corresponds to ca. 0.1% of the tolerable daily intake (TDI) for Pb (3.6 µg/kgbw/day) [5].

This study confirms that when manufactured with raw-materials with adequate quality and according to current good manufacturing practices, it is possible to obtain a product with a very low Pb content, which should pose no risk for human health under normal or reasonably foreseeable use.

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