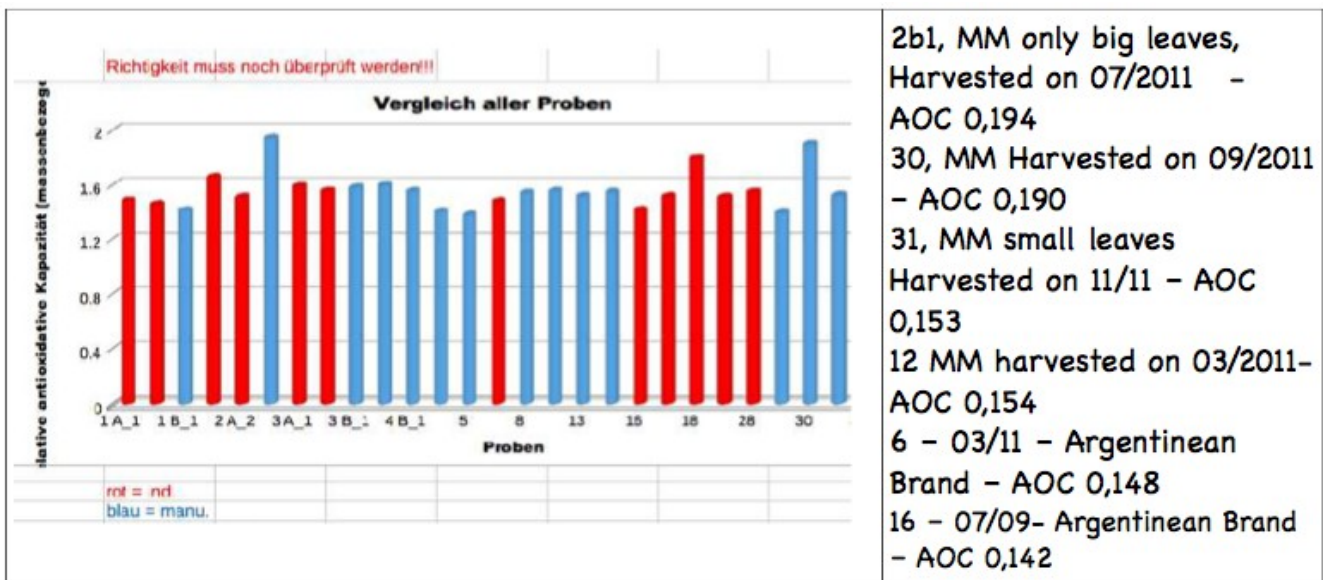




Mate's Carcinogenic Aspects / Overview from our Research for our Friends and Supporters

Berlin, January 2013
 Meta Mate Bar / do Canto GbR
www.metamate.cc

Mate is well known for its high anti-oxidant capacities (AOC) that help prevent cancer by strengthening the immune system and assisting cells in fighting free radicals. Different studies prove that drinking mate prevents cancer. A press release issued by the University of Illinois, Urbana announced in the *Journal Molecular Nutrition & Food Research* states that components isolated from the Erva Mate tea demonstrated anti-cancer properties that led to the death of cultured colon cancer cells. Research conducted in 2011/2012 by Meta Mate in collaboration with Beuth University and Sophia Lab in Berlin show that the quality of the Mate leaves and their freshness play an important role on the AOC levels.



Source: Machbarkeitsstudie zur Etablierung brasilianischer Mate-Produkte auf dem deutschen Markt: Chemische und sensorische Untersuchung qualitäts bestimmender Eigenschaften. Projektarbeit von susanne Fleischmann, Sabrina Kohn, Beuth Hochschule für Technik Berlin - University of Applied Sciences - Master Studiengang Lebensmitteltechnologie / Food Science and Technology, Prof. Dr. rer. Nat. Monika Springer, 09.03.2012.

Nevertheless, the International Agency for Research on Cancer (IARC) classified erva-mate tea as "Probably Carcinogenic to Humans." Multiple studies associate erva-mate and cancer through different aspects. Some research has correlating evidence, while others have partially contradicting results.



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Our literature research shows that the risks of erva-mate causing cancer have been raised in different studies due to two reasons:

a) Hot water - there is statistical evidence that the frequent consumption of Mate as in the traditional South American way with water temperatures above 80°C increases the chance of esophagus cancer. " In 1991, IARC categorized mate, in toto, as not classifiable with regards to human carcinogenicity but classified hot mate as a probable (group 2A) carcinogen to humans (31), suggesting that they judged that repeated thermal injury was probably the mechanism of carcinogenicity. " Source: **High Levels of Carcinogenic Polycyclic Aromatic Hydrocarbons in Mate Drinks** / Farin Kamangar, Michele M. Schantz, Christian C. Abnet, et al.

b) Carcinogenic content - Another potential mechanism for carcinogenicity of mate is its polycyclic aromatic hydrocarbon (PAH), in German PAK, content. PAHs are found in tobacco smoke and other burned organic material, and the IARC has classified some PAHs, such as benzo[a]pyrene (BaP), as carcinogenic to humans and experimental animals. It has been proven that Mate contains PAH substances that are qualified as carcinogenic, however, the levels of most are relatively low besides one of these substances, the Benzo(a)pyrene (BaP), that is considered the most harmful element of the PAH's in erva-mate, and was taken as a parameter in our recent study in Berlin.

The most alarming of those studies compares the drinking of erva-mate with the smoking of cigarettes. However, the relevancy was also questioned in the study due to the different effects of PAH's being absorbed by the lungs vs. stomach. While previous studies concentrated on hot and cold infusions of industrial Mate as tea, our study done in December 2012 has the novelty of comparing traditionally dried with industrially processed erva-mate. Besides that, erva-mate powder using the "Chimarrao" style (the traditional way of consuming mate in Brazil with a gourd and metal straw), was analysed.

It is to be noted that there are no laws regulating the levels of carcinogenic substances in Mate, and we encountered some contradictory information in different studies.

In Germany there are no PAH limits for foods established by the VO (EG) 1881/2006. The only one is for the BaP substance and there is no specific limit of it for erva-mate, tea or coffee. In our recent study, the highest BaP limit allowed (10 µg/kg applied to Oysters) was used as a reference for comparison.



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The following table shows that only one brand of erva-mate from our samples had a BaP level under this reference limit:

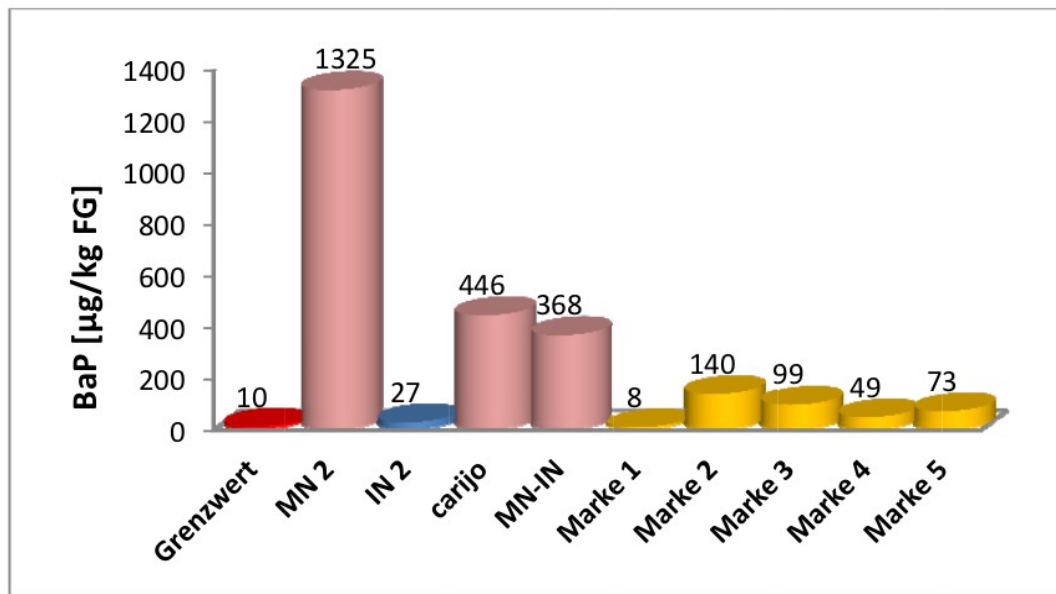


Abbildung 35 Vergleich von manufakturienle und industriellen Mateproben (BaP)

The results above seem to correlate to another report from where the following values were found for 4 different samples of yerba mate: 20,6 ; 42,6; 54,7; 18,9; 32,8; 35,1 µg/kg. (*Occurrence of polycyclic aromatic hydrocarbons throughout the processing stages of erva-mate, 2010*).

However, as one does not eat Mate but usually drinks it, the table on the right shows the contamination of the infusions if consumed as traditional "Chimarrao".

Erva-mate Infusion BaP Levels	
Probe	BaP [µg/kg FG]
Reference Limit	10,0
Traditional Drying 1	23,7
Traditional Drying 2	17,8
Traditional & Industrial combination	16,6
Marke 1	0,4
Marke 2	5,5
Marke 3	4,8
Marke 4	0,8
Marke 5	3,1



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Another study (KAMANGAR et al., 2008) shows higher values of contamination. The difference can be due to the preparation procedure. In the above mentioned study, mate is prepared in a usual tea brewing process where the mate is loose and has a much longer contact with the water (5 min.), while in Thieme's study using the chimarrao style, the mate is compacted on one side of the gourd and has less contact with water in terms of area and time (20 secs).

The learnings are:

- That the source of the erva-mate (environmental and erva-mate species) make a difference both in terms of health aspects and initial contamination which can lead to the increase of carcinogenic substances on the processed erva-mate.
- That traditional way of drying mate shows a higher concentration of PAHs and BaP than the modern industrial procedure, perhaps due to the contact with fire or smoke. However, there are ways of improving the processing, both industrial and traditional or combining them .
- The traditional way of drinking the mate as in Brazil " Chimarrao " shows less risks of contamination if compared with the modern tea brewing procedure. We can not state why but we suspect that it is due to the infusion time and compact form of the erva-mate in the gourd.

Regarding erva-mate drunk as lemonades those studies can not directly be transferred. For that, further studies would be necessary to evaluate the mate quality and the extraction procedure of each brand. One exception in this study was the test of a syrup not available on the market made from fresh non heat dried erva-mate showed no BaP contamination.

We apologize for not being able to publicize the names of the brands tested in these studies due to legal issues, but we can advise with the best of our knowledge if you are choosing an erva-mate for your products.