

# Environmental damage – Nicotine balance of cigarettes (tobacco burners) when smoking

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Illegally disposed cigarette butts cause enormous environmental damage [1,2,3]! Of the over 6 trillion cigarettes smoked worldwide each year, smokers throw around 4 trillion into the countryside. Toxicity [4,5] and microplastics [6] are of gigantic consequences for plants, animals and humans, not including the personal damage [7] caused by active and passive smokers. The environmental hazard of passive smoking (UFP PM2.5) is very high [8,9]. Of the approximately 12,000 different chemicals in a cigarette butt, only nicotine is considered in this poster [3,5].

## Nicotine balance of cigarettes (tobacco burners) when smoking Mass balance

- ① in average 13 mg per cigarette (scattering 8-30 mg);  
ca. 12 (10-14) puffs per cigarette; ca. 1,2 mg per puff;
- ② 6 (5-7 mg); ca. 0,6 mg per puff remain in the filter
- ③ Point ① minus ② = 7 mg; **without** filter: 14-20 % (2-3 mg) nicotine,  
**with** filter 5-12 % (0,7-1,5 mg) nicotine;
- ④ approx. 1.5 mg nicotine per cigarette is measured in the blood of smokers [7,10,11];  
approx. 98 % is absorbed, of which approx. 93 % is absorbed in  
the lungs and approx. 5% in the oral cavity;
- ⑤ according to this, only 2 % (0.02 mg) nicotine is exhaled per puff [10,11];  
i.e. approx. 1,500 tons per year into air worldwide;
- ⑥ in the glow zone, 30-35 % (4 mg) of nicotine are burned; in the side stream smoke,  
40 % (5 mg) of nicotine go to air [10]
- ⑦ according to these literature values, approx. 5 mg of nicotine per cigarette smoked  
should remain in the side stream (ambient air), as well as 4 mg of  
nicotine combustion products, also in the environment

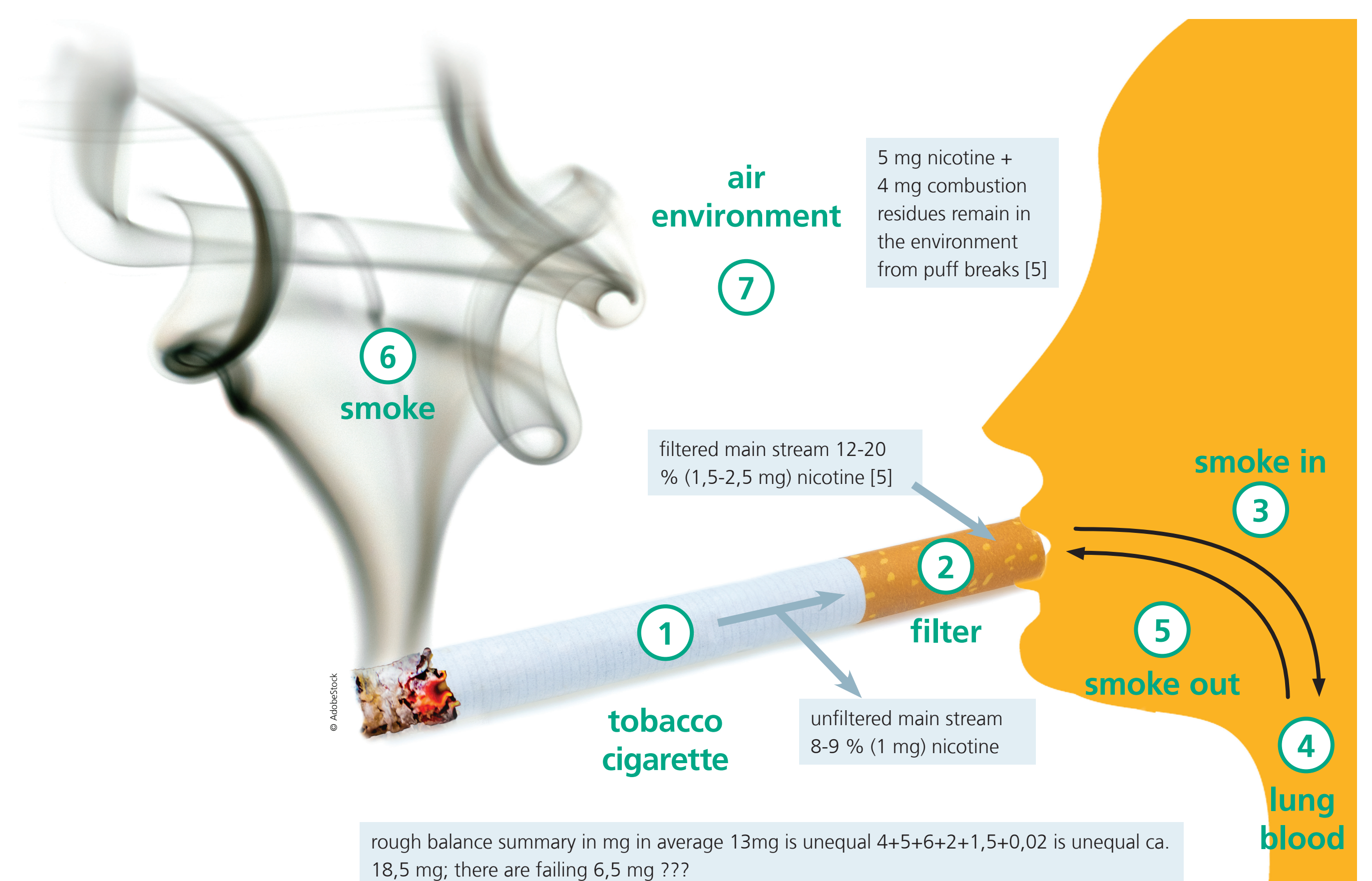
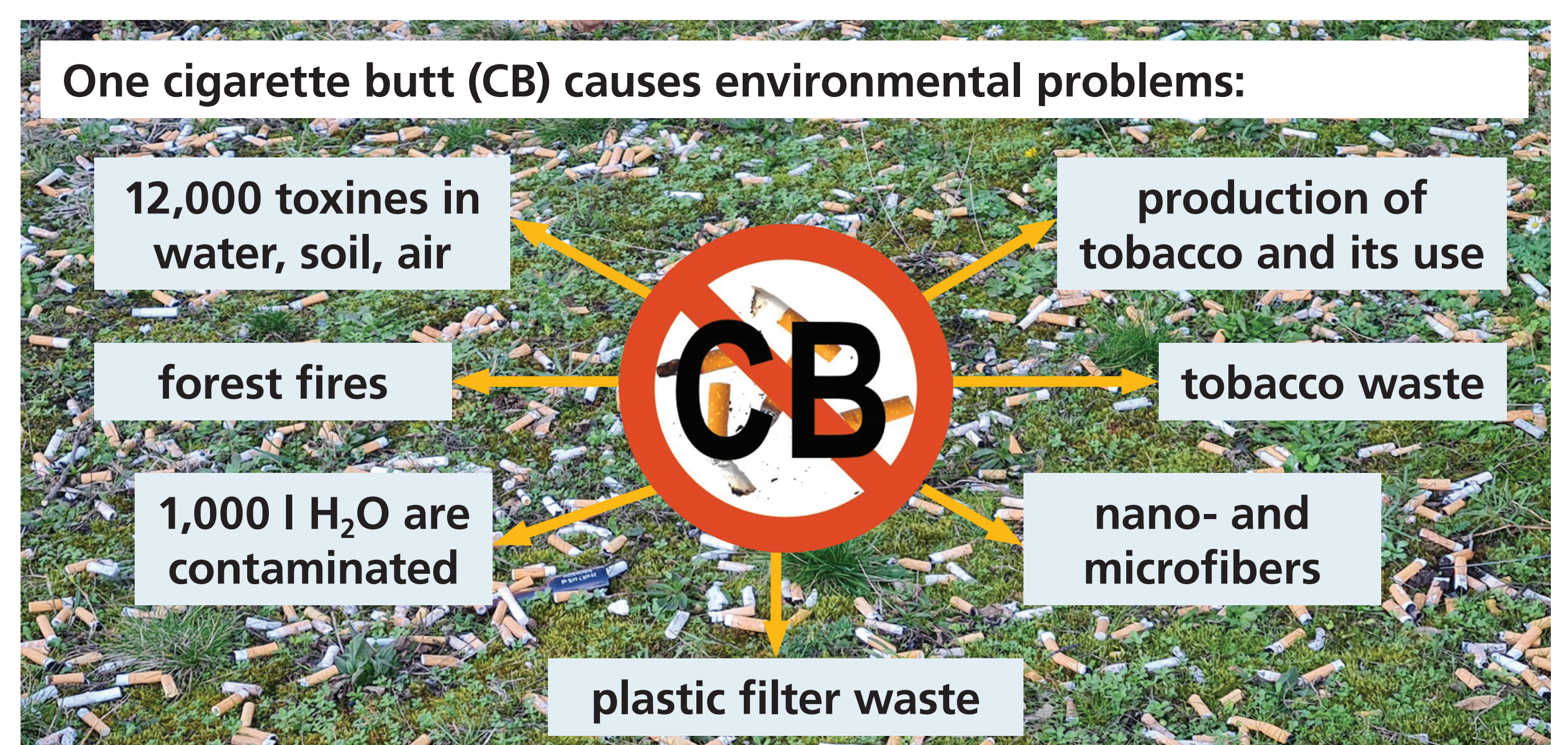
## Conclusion

Environmental damage caused by nicotine from butts worldwide every year:

- A** As a result of the disposal of 2/3 of the filters in surface water and soil, approx. 6 mg of nicotine is released per butt; approx.  $4 \times 10^{12}$  discarded butts result in approx. 24,000 tons of nicotine in water and soil worldwide every year.
- B** All smokers worldwide emit approx. 5 mg of nicotine from  $6 \times 10^{12}$  cigarettes into the ambient air every year; this results in approx. 30,000 tons of nicotine being released into the atmosphere plus 1,500 tons of nicotine in exhaled air and 100,000 tons of other toxins from the butts.

The annual worldwide mass of cigarette butts is approx. 0.8 million tons.

**For comparison:** tire abrasion from approx. 1.5 billion vehicles worldwide amounts to approx. 100,000 tons per year [12,14]; or baby diapers account for approx. 40 million tons of waste [13] the total annual waste on earth amounts to approx. 2.02 billion tons. **The environmental damage caused by cigarette butts is huge [1-6]; The tobacco industry neglects its global responsibility.**



## Our environment is polluted by cigarette smoking (disposal of cigarette butts)

- in surface water with 24,000 tons of nicotine
- in the air with 30,000 tons of nicotine during puff breaks and
- 1,500 tons by exhaling the residual nicotine from the smoke

→ **A total of 55,500 tons of nicotine contaminate the earth worldwide every year!**

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