

Toward standardization of breath sampling methods



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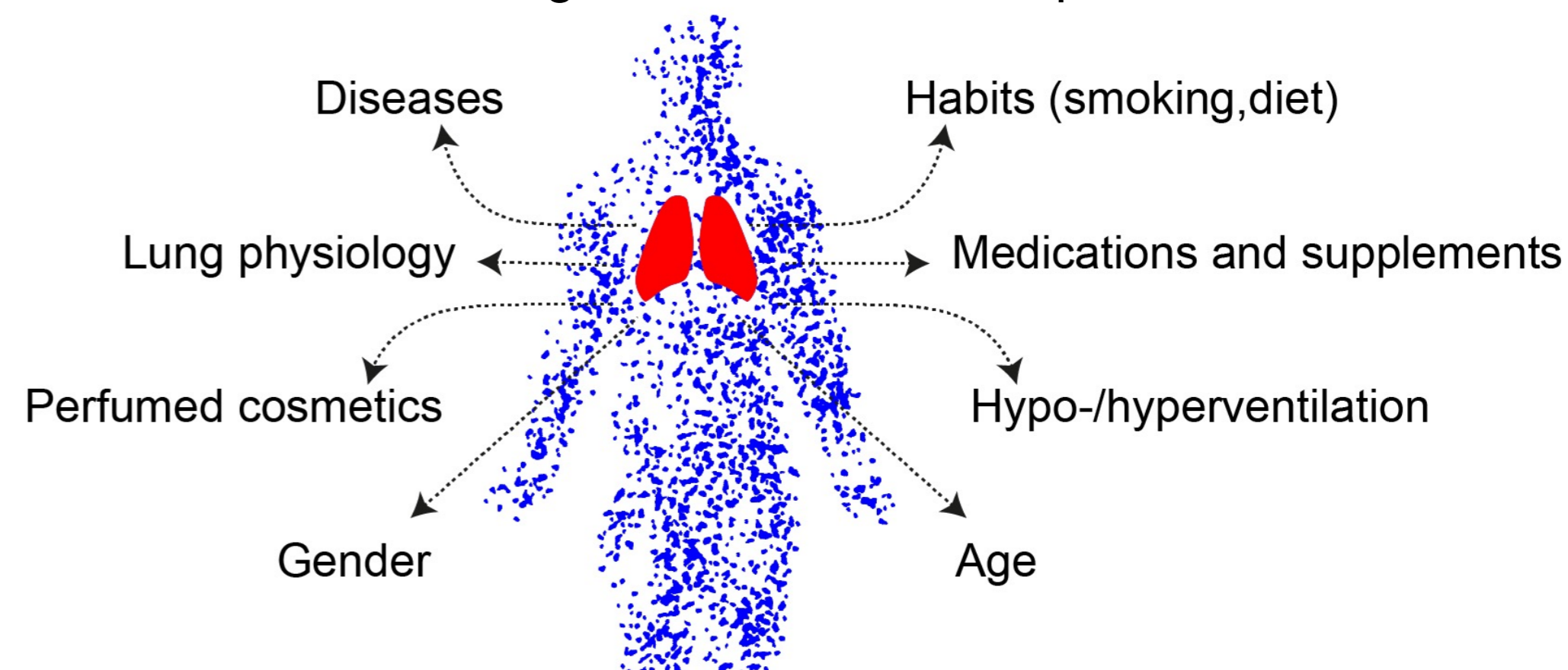
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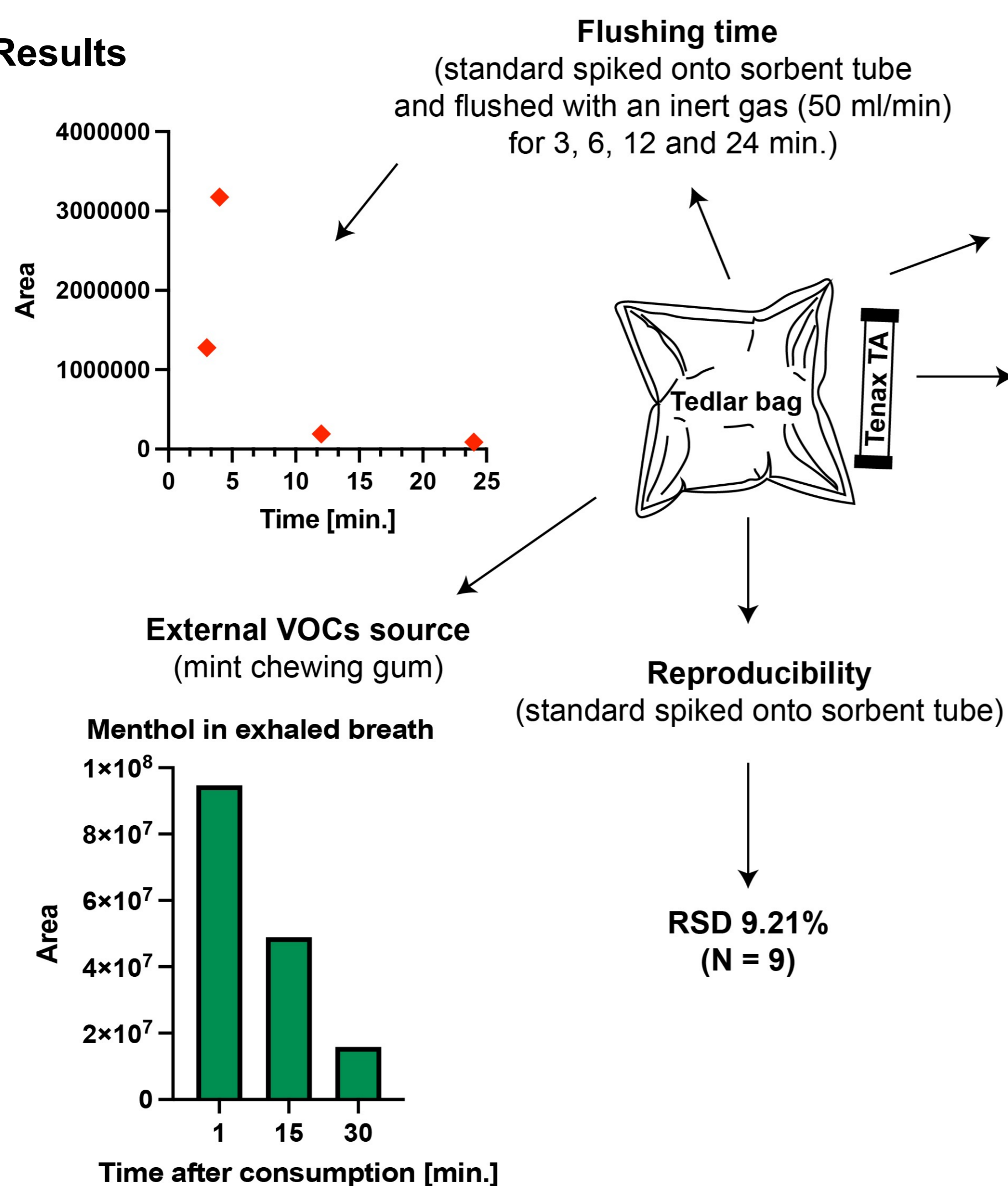
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Abstract One of the biggest challenge in exhale breath analysis is background VOCs contamination. These compounds are both produced by regular metabolic processes and derived from environmental exposure, which especially makes breath sampling an advantageous process that requires understanding of exhalation physiology and interfering factors. To overcome these obstacles, we performed the experiment in which Tedlar® bags and Tenax® TA tubes were employed to collect breath samples and several conditions that could alter breath composition. The results along with literature review were essential to determine guidelines that should be followed when sampling, to ensure its appropriateness and facilitate reliable data collection.

Factors affecting exhaled breath composition



Results



Tenax TA	Benzene, Styrene, Benzaldehyde, Acetophenone, Octanal, Nonanal, Decanal, 2,6-diphenylquinone ²
Tedlar	Phenol and N,N-dimethylacetamide ³

Polymer-derived contaminants
(from Tedlar and Tenax TA)

Cleaning guidelines

Tenax TA	Heat the tube above its desorption temperature (300 - 335°C) in a steam of inert gas (He/N ₂).
Tedlar	Flush the bag with inert gas (at least 5 times) ⁴ , heat the bag if needed. Avoid prolonged heating.

Conclusions In breath analysis, both pre-sampling recommendations and experimental manipulations play a key role in successful data collection.

General principles which must be strictly adhered to avoid false-positive and false-negative results include: (i) fasting for minimum 30 min. to overnight before sampling; (ii) resting in a sampling room for 5 to 15 min; and (iii) avoiding perfumed cosmetics, garlic, onion or any spicy food and flavored drinks. If the need arises, drinking only unflavored water is allowed.⁴⁻⁷

The results obtained (not all of them have been shown) revealed that: (i) the recommended sample volume is 500 ml; (ii) the rate of sample transfer from bag to sorbent tube is 200 ml/min; (iii) the optimal time and rate of flushing is ca. 5 min. and ca. 50 ml/min., respectively.

Cleaning guidelines and commonly detected polymer-derived contaminants were determined.

Literature:

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