

Fattar du beslut om trafiksäkerhet?
Tylösandsseminariet är konferensen för dig.

3-4
sep



Årets tema:

Resultat – tack!

Från ord till handling

Är det möjligt att även drogtesta med utandningsprov?

Olof Beck, Nina Gual

3 september, 2019

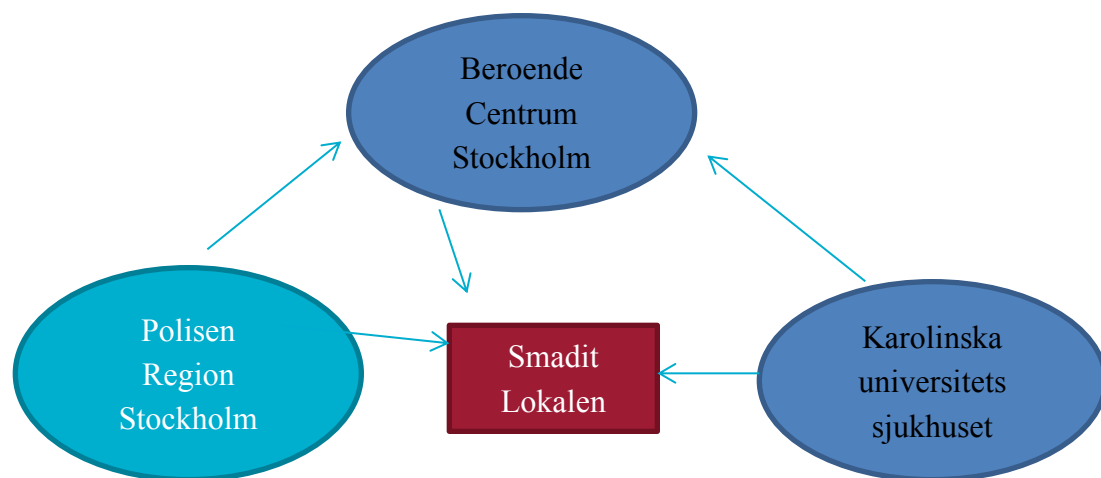
Värdet av ny teknik för bevisprov vid rattfylleribrott?

Blodprov

- Smittorisk och skaderisk med stickande föremål
- Inskränker på det kroppsliga integriteten
- Tids och kostnadskrävande provtagning
- Kan hända att bevisprov uteblir, inget blod

Utandningsprov

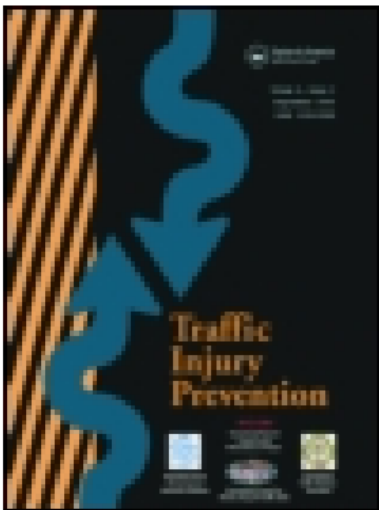
- Mindre ingripande på personen
- Snabbare provtagning, kan ske i fält
- Tids och kostnadseffektiva
- Utandningsprov kan göras av poliser
- Färre risker



Synergieffekt i samverkan

- Användning av redan bekostad verksamhet för forskning.
- Forskning på riktiga fall av rattfylleri.
- Drogpåverkad person erbjuds kontakt med vården enligt SMADIT.

Resultaten från denna studie presenteras



Traffic Injury Prevention

ISSN: 1538-9588 (Print) 1538-957X (Online) Journal homepage: <https://www.tandfonline.com/loi/gcpi20>

First evaluation of the possibility of testing for drugged driving using exhaled breath sampling

Olof Beck, Shahid Ullah & Robert Kronstrand

Studiens syfte

Att undersöka om ett utandningsprov kan ersätta blodprov vid en trafikmedicinsk undersökning

.....samt för att utvärdera den nya tekniken med mera resultat

Drogtestning med utandningsprov

Journal of Analytical Toxicology, Vol. 34, June 2010

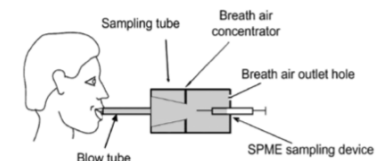
2010

Amphetamines Detected in Exhaled Breath from Drug Addicts: A New Possible Method for Drugs-of-Abuse Testing

Olof Beck^{1,*}, Kathinka Leine¹, Göran Palmkog¹, and Johan Franck²

¹Department of Medicine, Section of Clinical Pharmacology and ²Department of Clinical Neuroscience, Division of Psychiatry, Karolinska Institutet, Stockholm, Sweden

Visade att drogtestning med utandningsprov är möjligt



**Karolinska
Institutet**

Exhaled breath – a rich source of information

>3500 compounds identified in breath

- Popov TA, Human exhaled breath analysis 2011 (a review)

Urine >3000

- Bouatra S, et al, The Human Urine Metabolome. *PLoS ONE*, 2013

Breath contains:

Volatiles

- (ethanol, NO) in gas phase

Non-volatiles

- as aerosol particles

The exhaled particles are well studied and characterized. They are formed as a result of the normal breathing maneuver. The particles originate from deeper parts of lung.

Schwartz K et al, 2010

Characterization of Exhaled Particles from the Healthy Human Lung—A Systematic Analysis in Relation to Pulmonary Function Variables

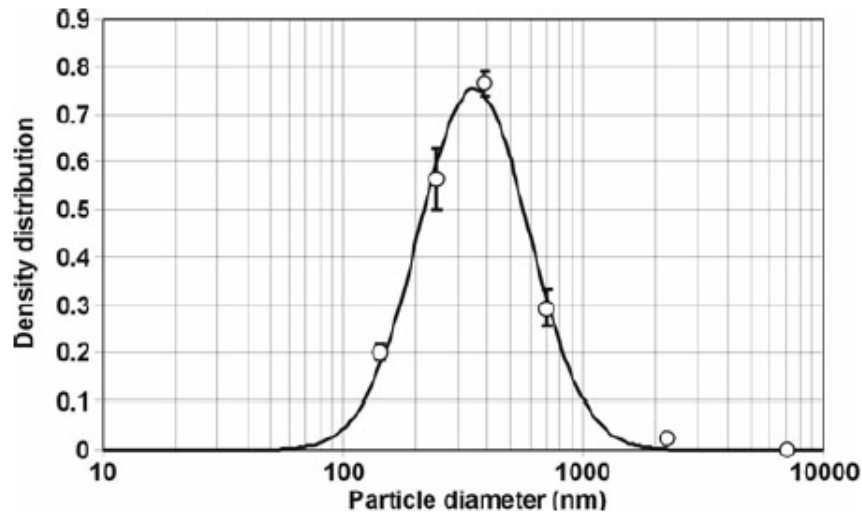


FIG. 6. Number size distribution of exhaled particles from all subjects at a ratio of tidal volume (V_T)/vital capacity (VC) = 0.5. Vertical error bars indicate the standard deviation for the density values at the different particle diameters.

EXHALED PARTICLES AND BREATHING PATTERN

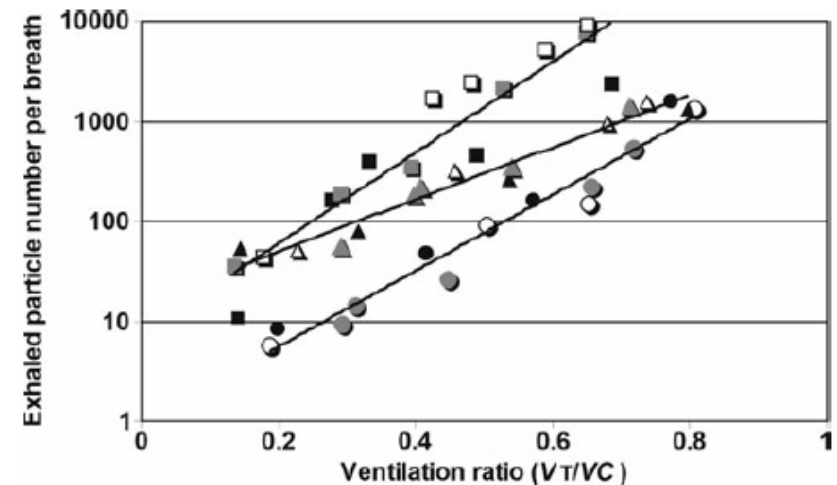
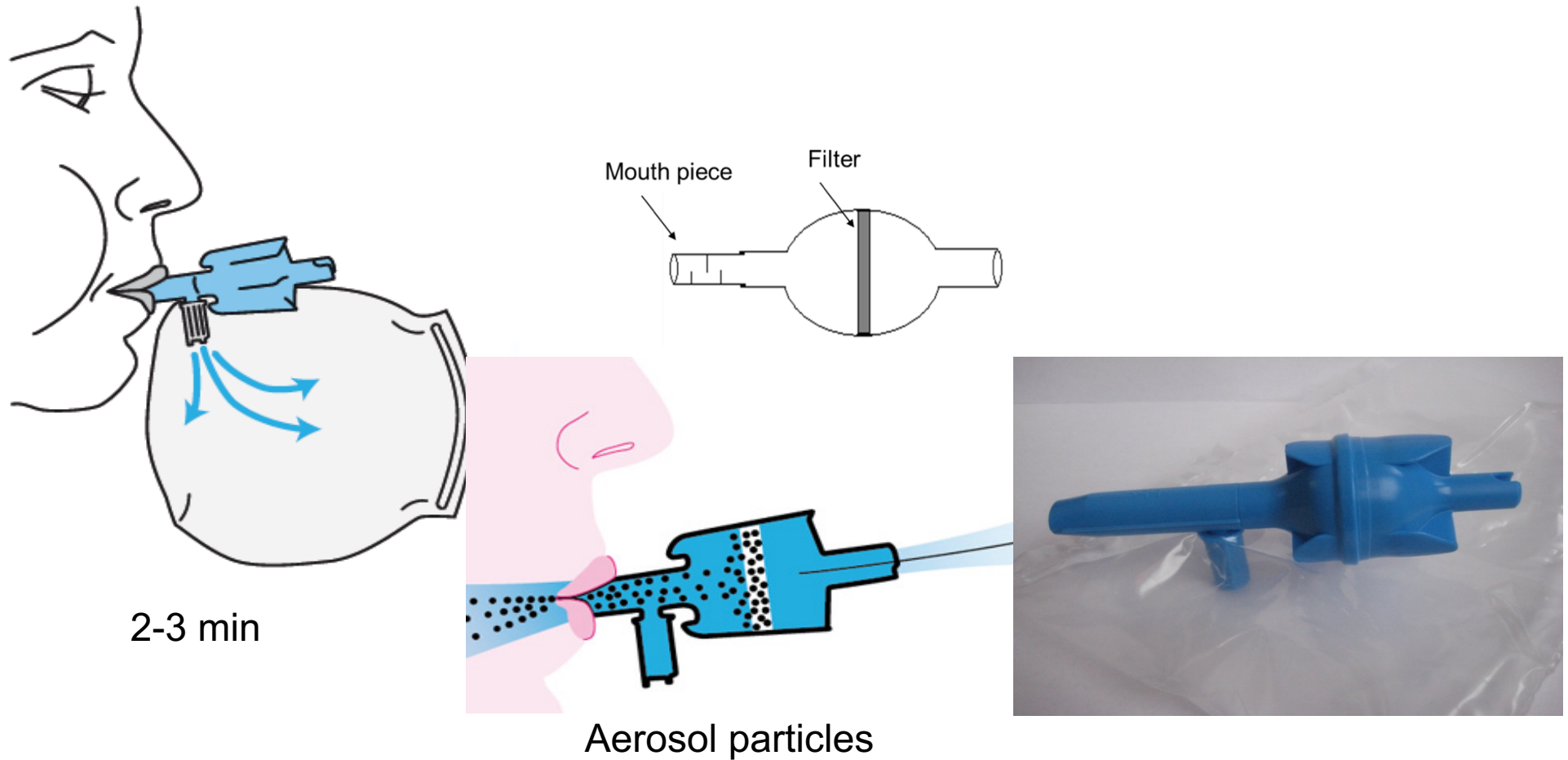


FIG. 3. Exhaled particle number per breath as a function of the ventilation ratio tidal volume (V_T)/vital capacity (VC) for three volunteers. Different symbols (circle, square, triangle) are used per subject and the different shadings (white, gray, black) indicate the three repeated measurements.

Påvisade droger och läkemedel i utandningsprov

- Amphetamine
- Methamphetamine
- MDMA
- Methadone
- EDDP
- Buprenorphine
- Cocaine
- Benzoyl ecgonine
- Zolpidem
- Hydromorphone
- Tramadol
- O-DM-tramadol
- 6-Acetylmorphine
- Morphine
- Codeine
- THC, 11-OH-THC
- Diazepam
- Oxazepam
- Alprazolam
- Nicotine
- Cotinine
- Methylphenidate
- Ritalinic acid
- MDPV
- Caffeine
- Budesonide, steroids
- Ceftazidime
- Piperacillin
- Meropenem
- Phospholipids, proteins

First sampling device for collecting the aerosol particles in breath



Important milestone in 2013

IOP PUBLISHING

JOURNAL OF BREATH RESEARCH

J. Breath Res. 7 (2013) 026006 (11pp)

[doi:10.1088/1752-7155/7/2/026006](https://doi.org/10.1088/1752-7155/7/2/026006)

Detection of drugs of abuse in exhaled breath using a device for rapid collection: comparison with plasma, urine and self-reporting in 47 drug users

Olof Beck^{1,3}, Niclas Stephanson¹, Sören Sandqvist¹ and Johan Franck²

¹ Department of Medicine, Section of Clinical Pharmacology, Karolinska Institutet, Stockholm, Sweden

² Department of Clinical Neuroscience, Division of Psychiatry, Karolinska Institutet, Stockholm, Sweden

The study demonstrated that the simple sampling device for exhaled breath aerosol particles can be used for drug testing of the most common drugs



ELSEVIER

Contents lists available at ScienceDirect

Biochemical Pharmacology

journal homepage: www.elsevier.com/locate/biochempharm



First report on the pharmacokinetics of tramadol and *O*-desmethyltramadol in exhaled breath compared to plasma and oral fluid after a single oral dose

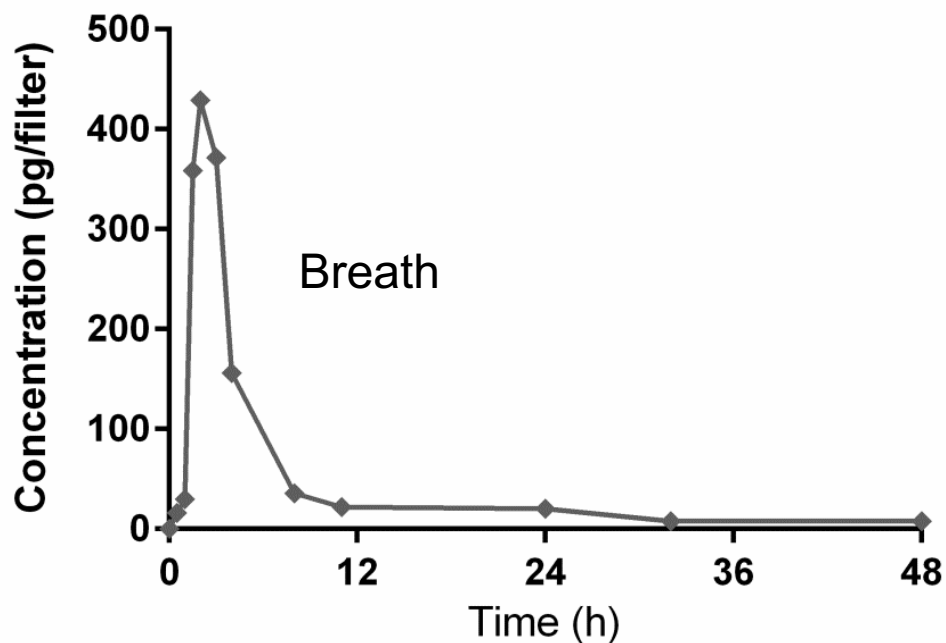


Markus R. Meyer^{a,*}, Staffan Rosenborg^{a,b}, Marta Stenberg^b, Olof Beck^{a,b}

^a Karolinska Institutet, Department of Laboratory Medicine, Division of Clinical Pharmacology, Stockholm, Sweden

^b Karolinska University Laboratory, Department of Clinical Pharmacology, Stockholm, Sweden

Human volunteer study Tramadol 50 mg oral





Contents lists available at [ScienceDirect](#)

Journal of Pharmaceutical and Biomedical Analysis

journal homepage: www.elsevier.com/locate/jpba



Sports drug testing using complementary matrices: Advantages and limitations

Mario Thevis^{a,b,*}, Hans Geyer^{a,b}, Laura Tretzel^a, Wilhelm Schänzer^a



RESEARCH ARTICLE

Expanding analytical options in sports drug testing: Mass spectrometric detection of prohibited substances in exhaled breath

Mario Thevis^{1,2}  | Oliver Krug^{1,2} | Hans Geyer^{1,2} | Wilhelm Schänzer¹

Besides stimulants such as methylhexanamine and pseudoephedrine, also the anabolic-androgenic steroid dehydrochloromethyltestosterone, the metabolic modulator meldonium, and the beta-blocker bisoprolol was detected in exhaled breath.

Conclusions: The EB aerosol has provided a promising proof-of-concept suggesting the expansion of this testing strategy as a complement to currently utilized sports drug testing programs.

Studiens start och upplägg

- Cannabismöte i Stockholm 2013
- SMADIT i Stockholm och Örebro
- Etikillstånd att tillfråga misstänkte om ett extra utandningsprov. Avtal.
- Fick senare aidentifierad kopia av RMV rapporten
- Mål >100 fall

Resultat

67 prover

52 med fynd av någon drog

15 negativa som överensstämde

Övergripande resultat

Utandningsprovet ger 98% känslighet, sensitivitet

Summary of all drug findings		Breath		
		Negative	Positive	
Forensic investigation	Negative	15	6	
	Positive	7	39	
				Σ46
			Σ45	

Amphetamines		Breath	
		Negative	Positive
Forensic investigation	Negative	41	5
	Positive	0	21

Table 2.

Detailed information on the cases with unmatched results regarding a positive or negative drug test

Case #	Breath (pg/sample)	Blood/serum	Urine	Remarks
<i>Cases with analytical findings in breath</i>				
1 8696	Amphetamine (116) Clonazepam (55) MDMA (62) Cocaine (72) Benzoyl ecgonine (59)	Negative for amphetamines, cannabis, opiates, cocaine, benzodiazepines.	Not available.	Immunochemical screening was performed in blood with LLOQ of 25 ng/mL for cannabis and 50 ng/mL for the other parameters.
2	Methylphenidate (252)	Negative for fentanyl	Negative for fentanyl	Methylphenidate was not analyzed in blood

Cannabis		Breath	
		Negative	Positive
Forensic investigation	Negative	46	0
	Positive	9	12

Cocaine		Breath	
		Negative	Positive
Forensic investigation	Negative	56	4
	Positive	1	6

Benzodiazepines		Breath	
		Negative	Positive
Forensic investigation	Negative	60	1
	Positive	4	2


Konklusion

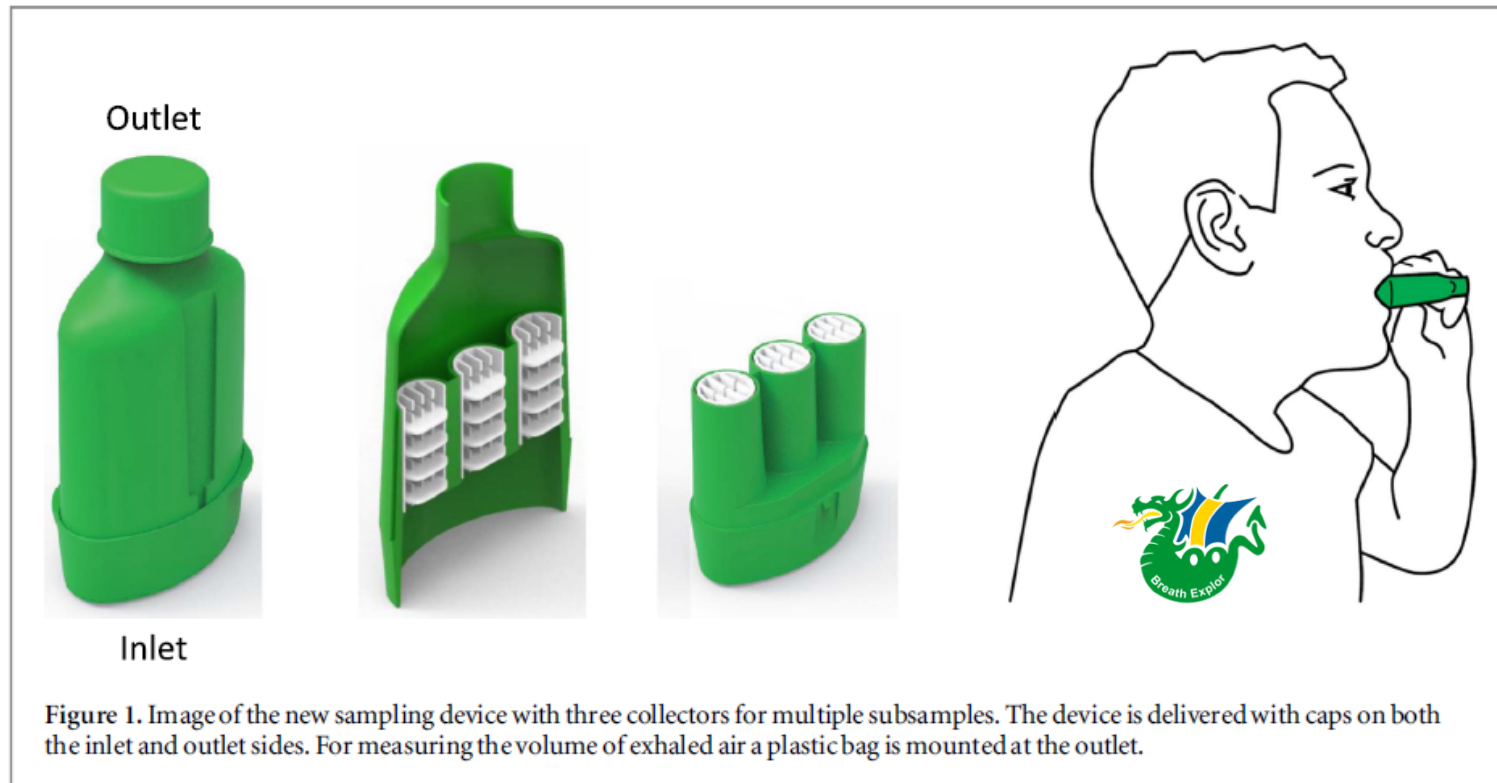
- Resultaten är lovande och behöver följas upp med en större studie
- Det juridiska behöver utredas för att kunna ersätta blod med utandningsprov

New improved device

PAPER

Evaluation of a new simple collection device for sampling of microparticles in exhaled breath

Sabina Seferaj¹, Shahid Ullah^{1,2}, Åsa Tinglev², Sten Carlsson³, Jesper Winberg⁴, Peter Stambeck⁴ and Olof Beck^{1,2} 



Redan nu möjligt



- att på plats kunna ta ett prov för drogtestning

En önskan



- Att på plats ta provet **och** göra en analysundersökning

Framtida möjlighet:

Göra drogtestning lika enkelt som alkoholtestning

Testa vid vägkanten, arbetsplatser, akutsjukvård



SLUT och Tack för oss

