

Human aging arise trough olfactory sensitivity

Andrea Mazzatenta

Laboratorio di Neurofisiologia Olfattiva e Chemiocettiva (N.O.Ch. Lab.)

Sezione di Fisiologia e Fisiopatologia

Dipartimento di Neuroscienze, Imaging e Scienze Cliniche

Università 'G. d'Annunzio' Chieti-Pescara



Olfatto

- cibo
- ambiente
- riproduzione

Gli stimoli

Odoranti:

- infiniti;
- piccole molecole;
- volatili;
- Idrofobe.

I recettori



The Nobel Prize in Physiology or Medicine 2004

"for their discoveries of odorant receptors and the organization of the olfactory system"



Richard Axel

1/2 of the prize

USA

Columbia University
New York, NY, USA

b. 1946



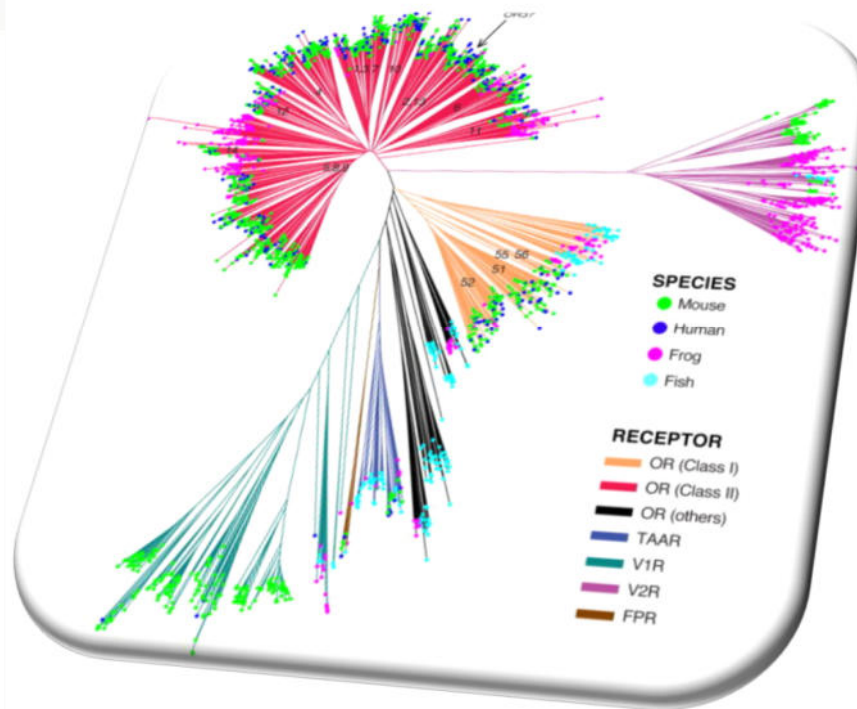
Linda B. Buck

1/2 of the prize

USA

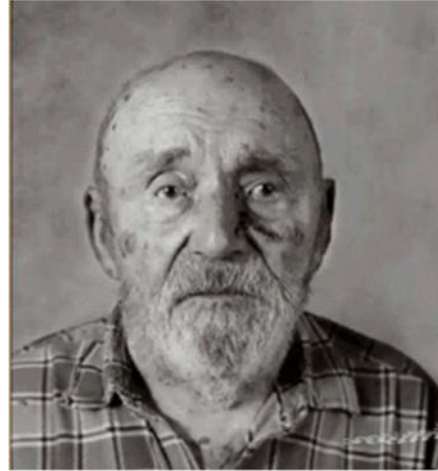
Fred Hutchinson Cancer
Research Center
Seattle, WA, USA

b. 1947



Presbionmia

È il complesso di modificazioni delle funzioni nasali date dall'aging e dalla senescenza



JGG JGG 2020;68:91-98
10.36150/2499-6564-486



02
2020
vol. LXVIII

JGG
JOURNAL OF
GERONTOLOGY
AND GERIATRICS

Review

The secretory senescence of the senses of smell and taste

Krizia Piccinini¹, Francesco Barbara¹, Carlo De Luca², Andrea Mazzatenta¹,
Luigi De Luca³, Giulia De Luca³, Carmelo Zappone⁴, Silvana Ciccarone⁵

¹ Department of Otorhinolaryngology "Mons. Dinicola" Hospital, Barletta, Italy;
² "Fisioter srl" Clinical Centre, San Salvo, Italy; ³ Department of Neuroscience, Imaging and Clinical
Science, University of Pescara-Chieti, Italy; ⁴ "Casa di Cura Lotti", Clinical Centre, Perugia, Italy

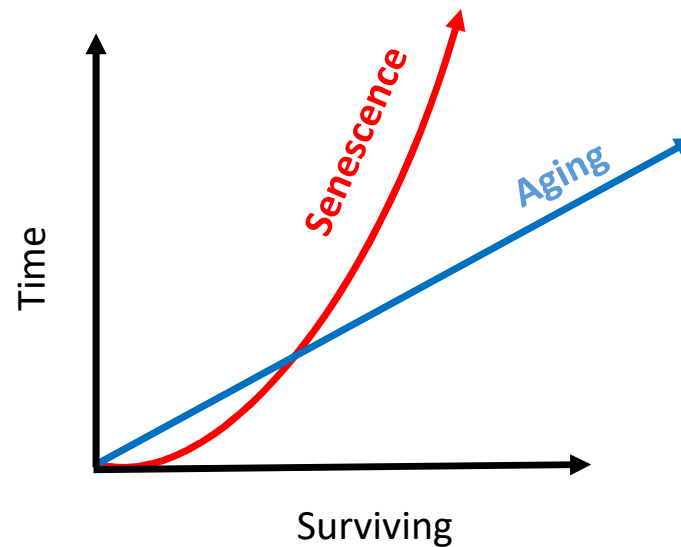


Aging vs. Senescence

Aging is a physiological process of body systems typical of different species.

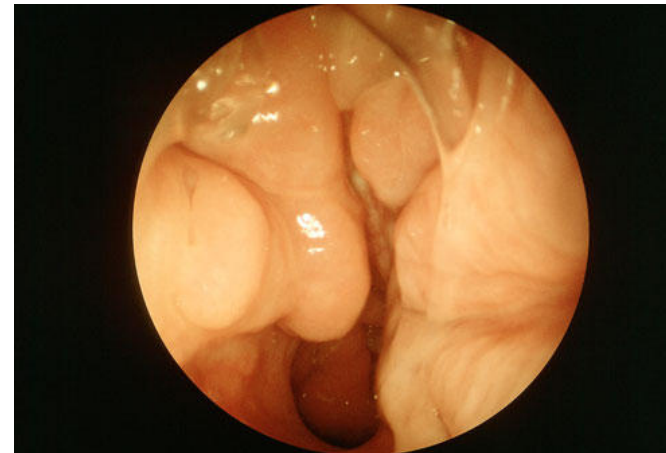
vs.

Senescence is 'pathological' aging that arise from the body or organ injury.



Patologie

- rinoirrea senile,
- rinosinusite cronica con poliposi nasale,
- malattie neurodegenerative,
- parkinsonismi,
- malattia dei corpi di Lewy,
- ecc.

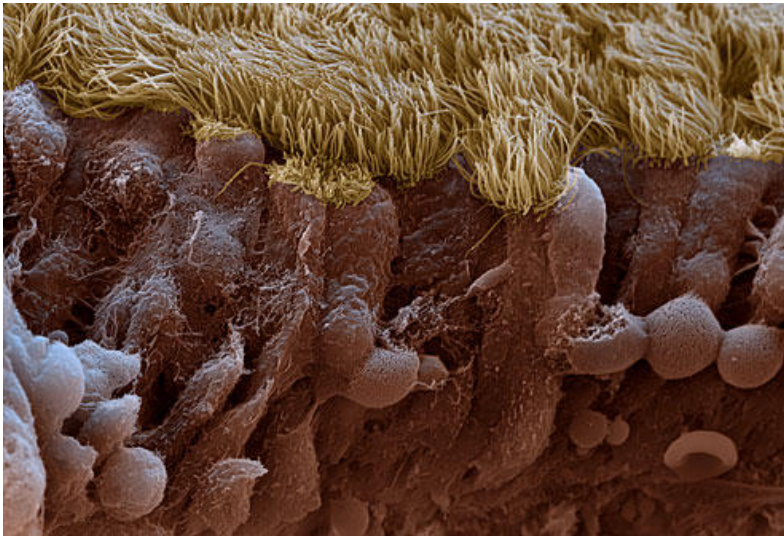


Cambiamenti Anatomici



- la cartilagine diventa spessa e meno elastica,
- la placca cribrosa tende a restringere i fori per il passaggio assonale con conseguente compressione e necrosi dei neuroni, diminuzione dei glomeruli,
- i muscoli facciali diventano lassi e atrofici, con una progressiva retrazione della colummella, che risulta in una progressiva incapacità di fare 'sniffing' e olfazione,
- in aggiunta diminuiscono le capacità immunitarie e aumentano i fattori di senescenza (chemical agents, air pollution, tobacco smoke, allergens, etc.),
- più generali cambiamenti nel SNC.

Cambiamenti Fisiologici



- le secrezioni e la frequenza di movimento ciliare,
- il fingerprint olfattivo individuale cioè l'espressione di subset individuali di OR,
- l'attività mitotica dei precursori degli OR diminuisce,
- cambiamenti nella disponibilità di enzimi, neurotrasmettitori e neuromodulatori,

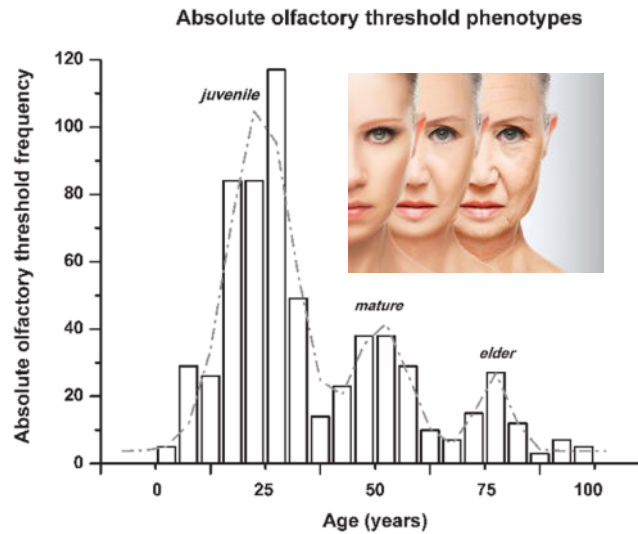
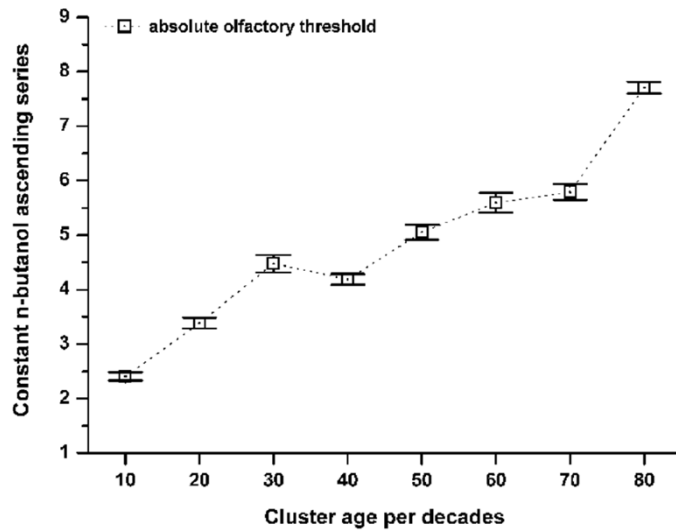
• **i fenotipi olfattivi**

I fenotipi olfattivi

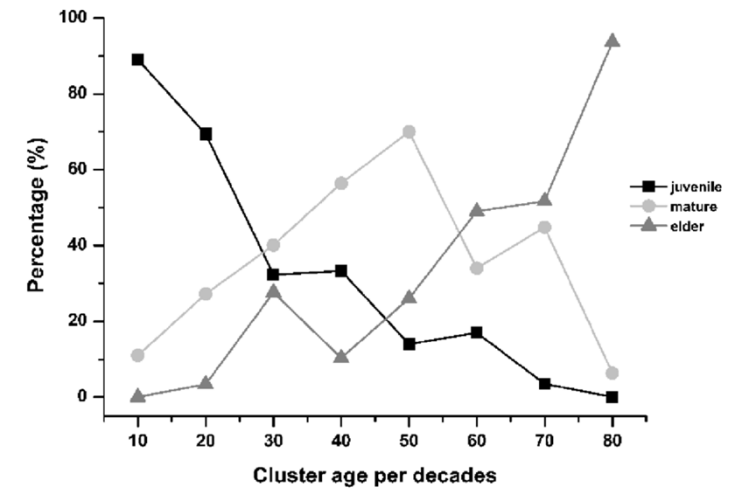
www.impactjournals.com/oncotarget/ Oncotarget, Advance Publications 2016

Olfactory phenotypic expression unveils human aging

Andrea Mazzatenta^{1,*}, Alessandro Cellerino², Nicola Origlia³, Davide Barloscio^{3,4}, Ferdinando Sartucci⁴, Camillo Di Giulio¹ and Luciano Domenici^{3,5}



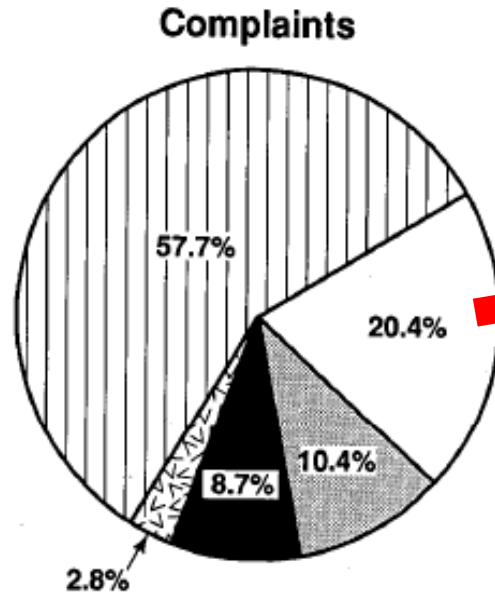
Ageing of the absolute olfactory threshold phenotypes



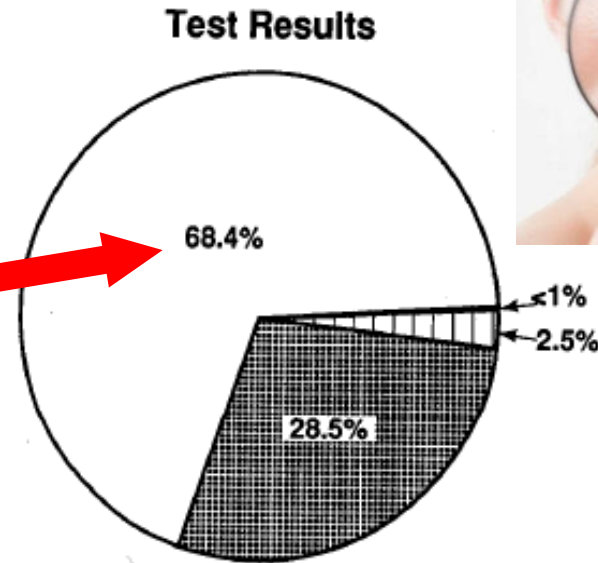
Le metodiche di indagine



SELF REPORT



- Smell and Taste Loss
- Smell Loss Only
- Dysosmia, Dysgeusia or Burning Mouth
- Taste Loss Only
- Other



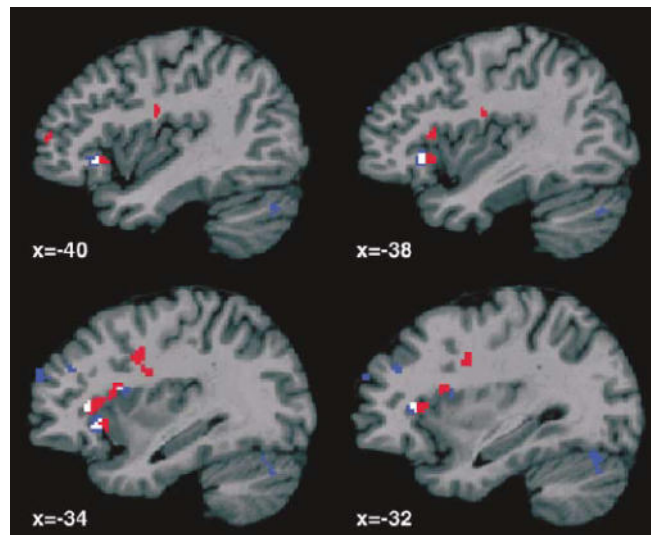
- Smell and Taste Loss
- Smell Loss Only
- Taste Loss Only
- No Identifiable Smell or Taste Loss



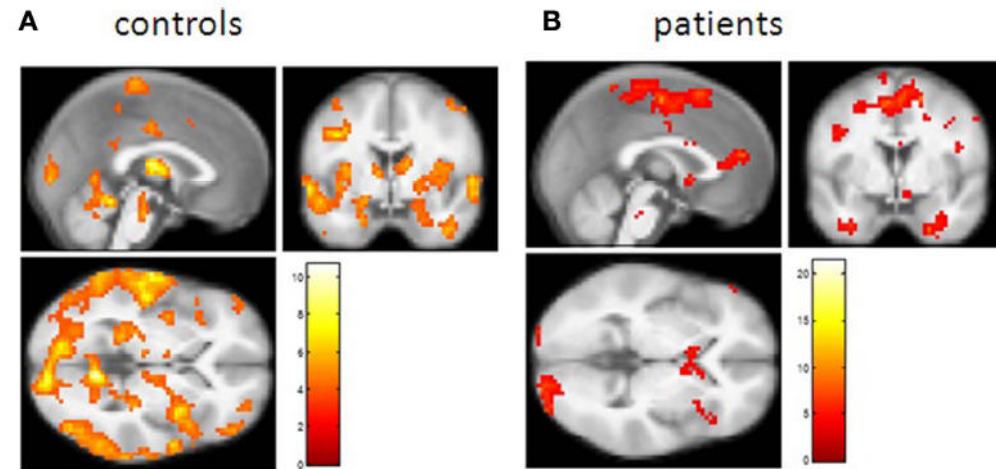
TEST

Le metodiche di indagine: imaging

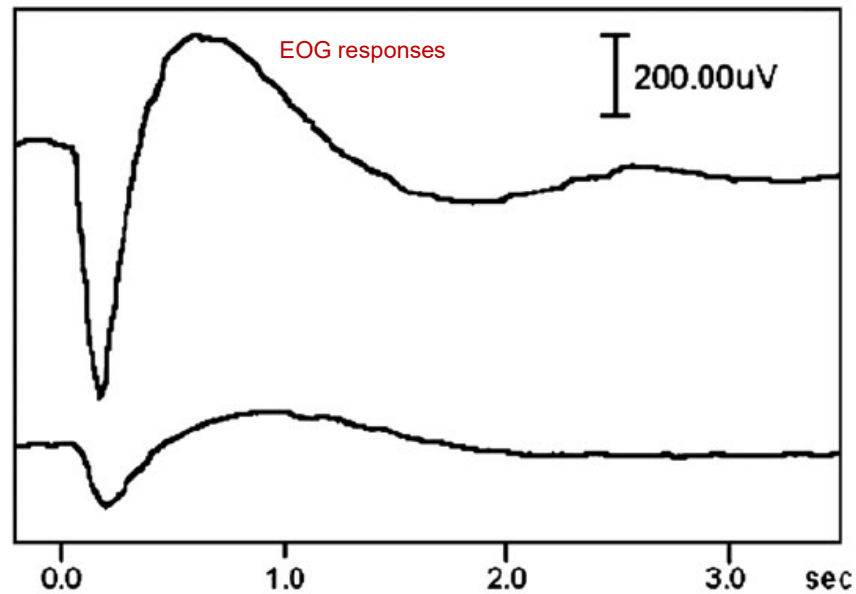
- Olfactory functional Magnetic Resonance (O.f.M.R.I.);
- Olfactory Positron Emission Tomography (PET);
- etc.



stimulus:
phenyl
ethylalcohol



Le metodiche di indagine: EOG

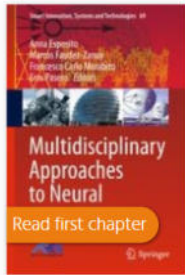


Electro-olfactogram (EOG)
(extracellular recording)

Le metodiche di indagine: OERP

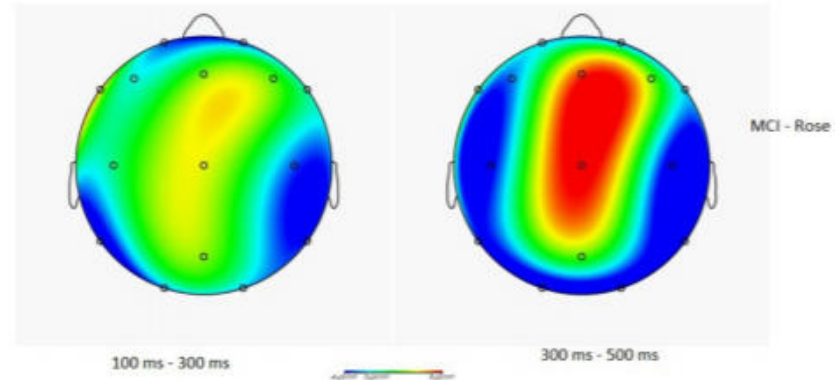
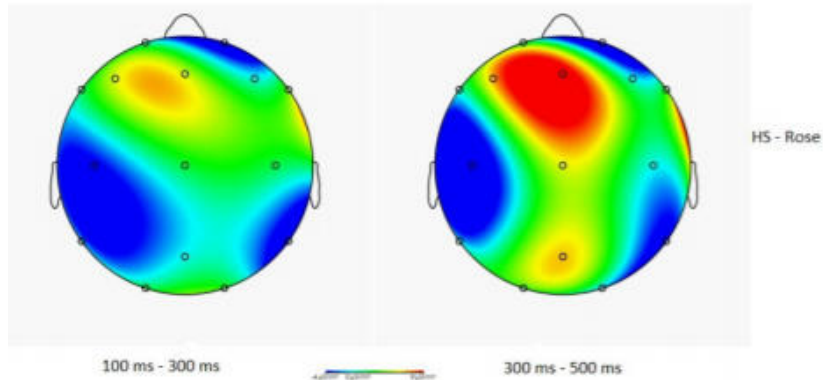
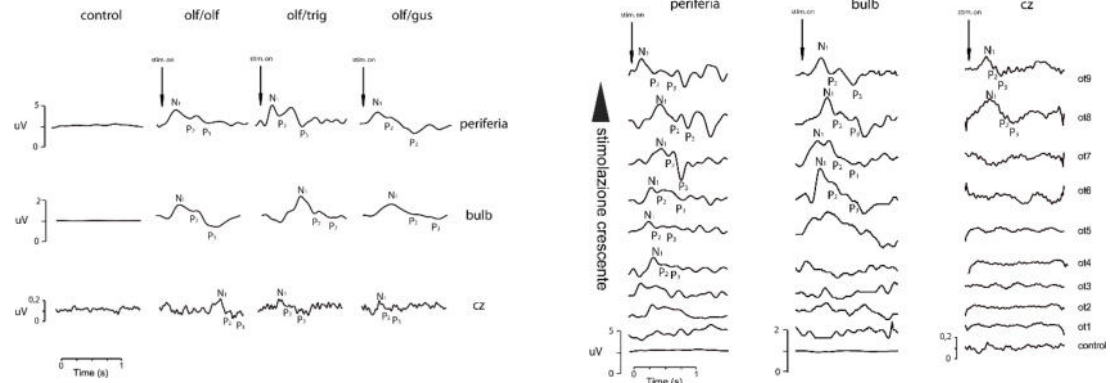
I potenziali evocati olfattivi

28. Smell and Meaning: An OERP Study



Authors: Sara Invitto, Giulia Piraino, Arianna Mignozzi, Simona Capone, Giovanni Montagna, Pietro Aleardo Siciliano, Andrea Mazzatenta, Gianbattista Rocco, Irio De Feudis, Gianpaolo F. Trotta, Antonio Brunetti, Vitoantonio Bevilacqua

Publisher: Springer International Publishing

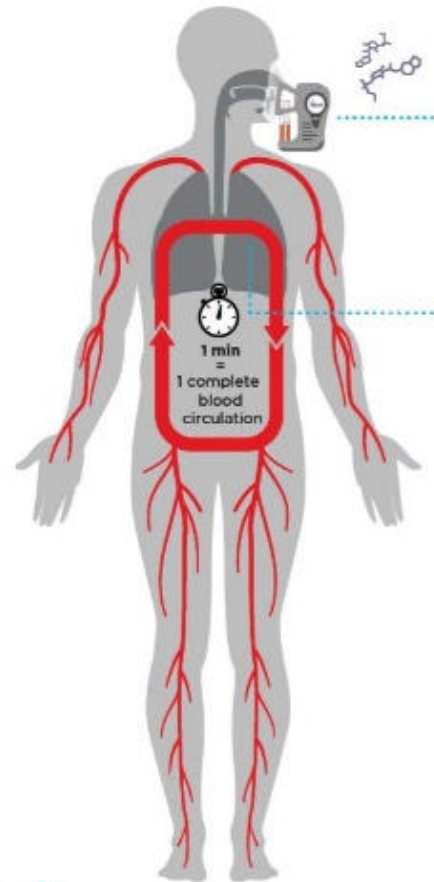


Le metodiche di indagine: la biopsia respiratoria

Nulla di nuovo anzi il primo metodo di analisi della fisiologia umana.



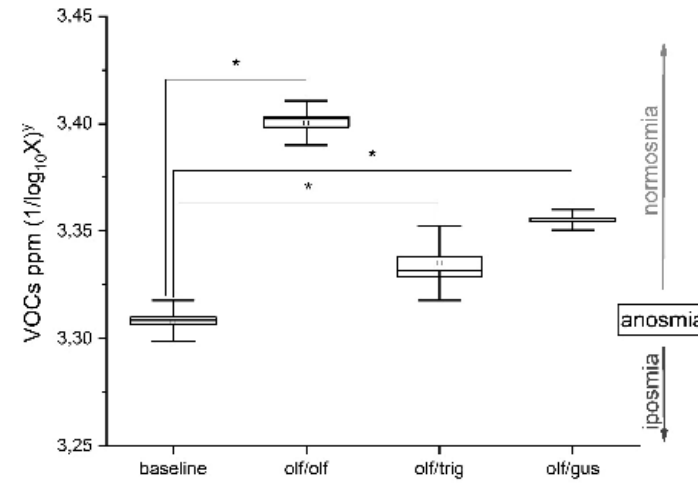
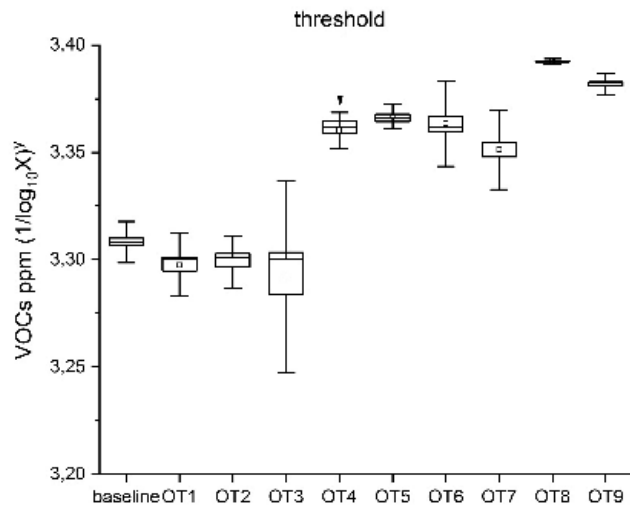
I Composti Organici Volatili sono metaboliti prodotti dallo stato fisiologico e in risposta a stimolazione.



Si misurano in tempo reale con l'e-nose in tempo reale.



Le metodiche di indagine: VOCs



*statistical significant one-way ANOVA $p < .05$



2015 | Online First | Chapter

Influence of Sensory Stimulation on Exhaled Volatile Organic Compounds

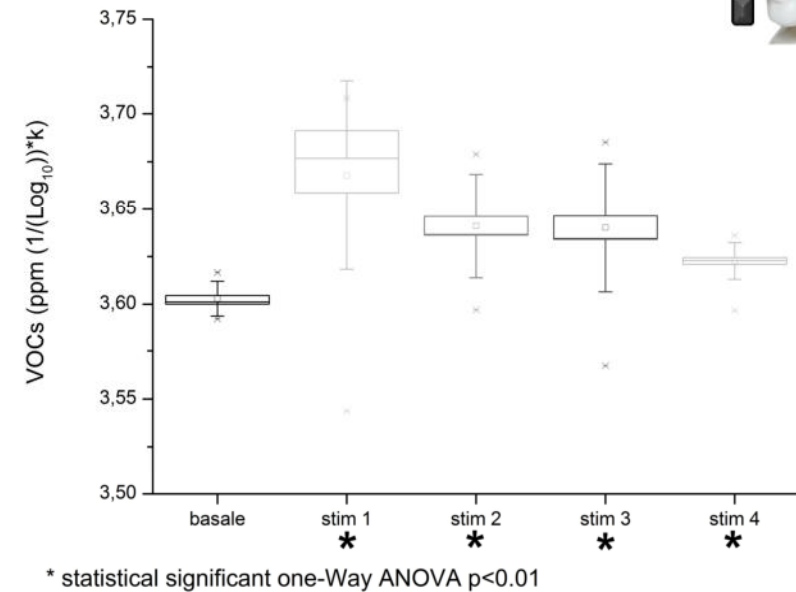
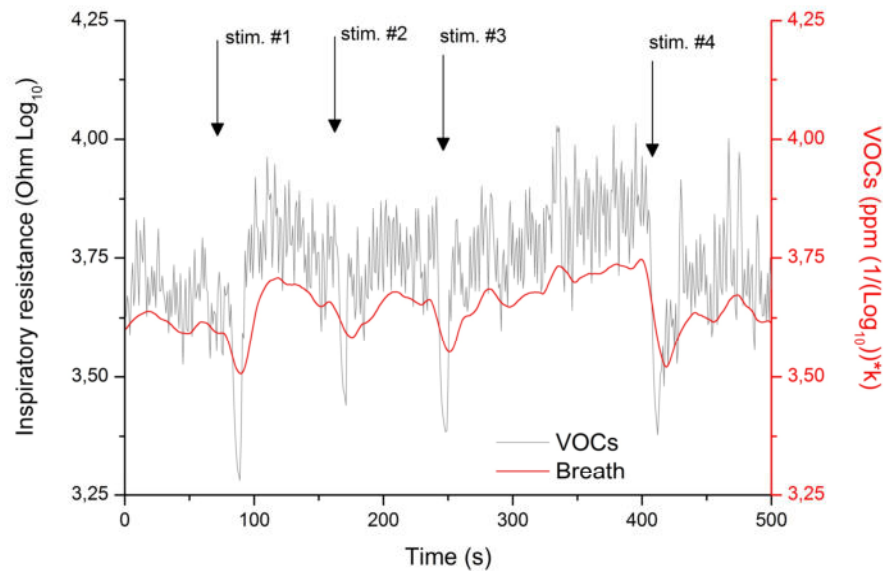


Authors: A. Mazzatenta, M. Pokorski, A. Di Tano, M. Cacchio, C. Di Giulio

Publisher: Springer International Publishing



ORTt-VOCs: normosmia



Influence of Sensory Stimulation
on Exhaled Volatile Organic Compounds

Andrea Mazzatenta, M. Pokorski, A. Di Tano, M. Cacchio,
and C. Di Giulio

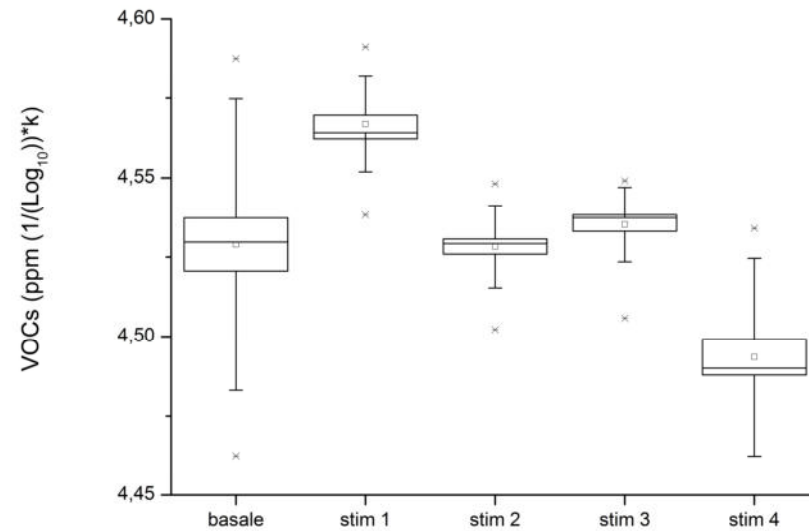
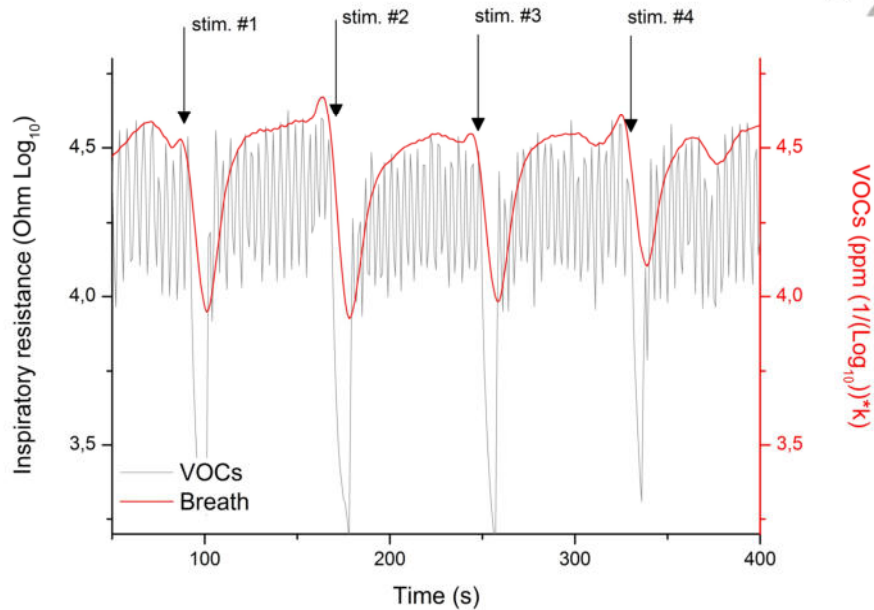
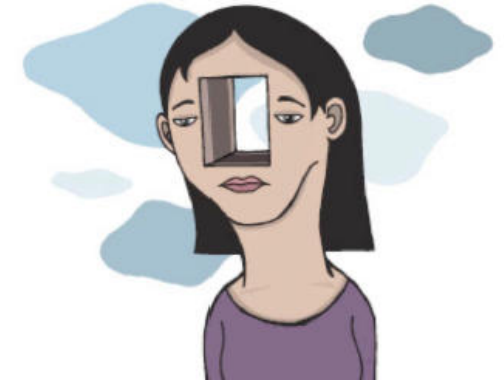
Adv. Exp. Medicine, Biology - Neuroscience and Respiration
DOI 10.1007/978-1-4939-9176-6_176

ORTt-VOCs: anosmia

Adv. Exp. Medicine, Biology - Neuroscience and Respiration (2015) 6: 35–39
DOI 10.1007/978-3-319-11414-4_6
© Springer International Publishing Switzerland 2014
Published online: 14 October 2014

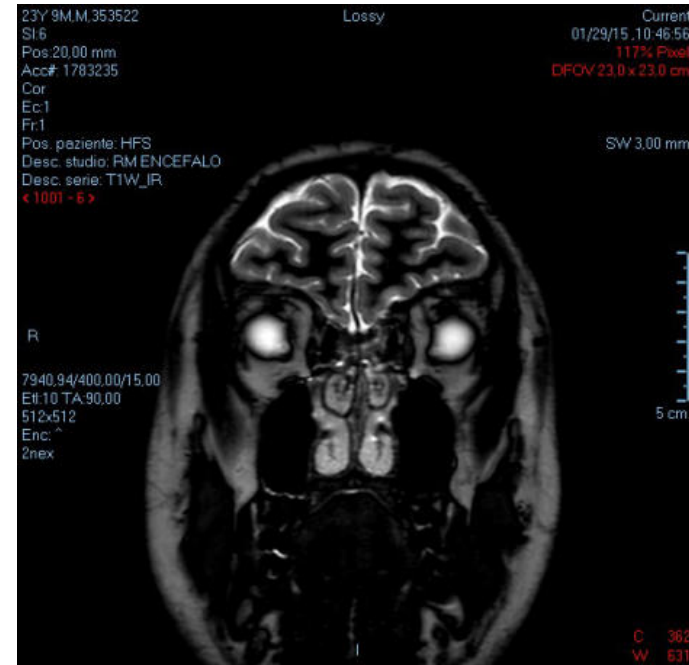
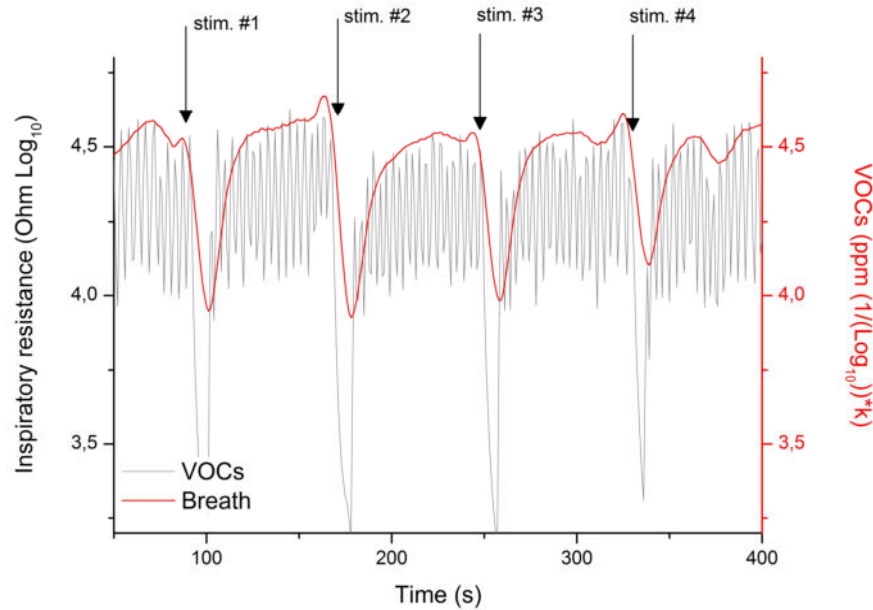
Chemoresponsiveness and Breath Physiology in Anosmia

Andrea Mazzatenta, Mieczyslaw Pokorski, Danilo Montinaro, and Camillo Di Giulio

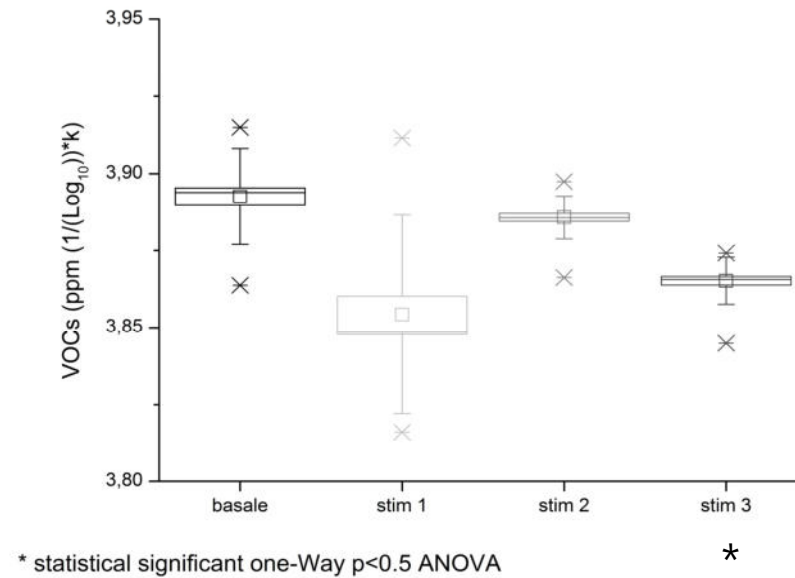
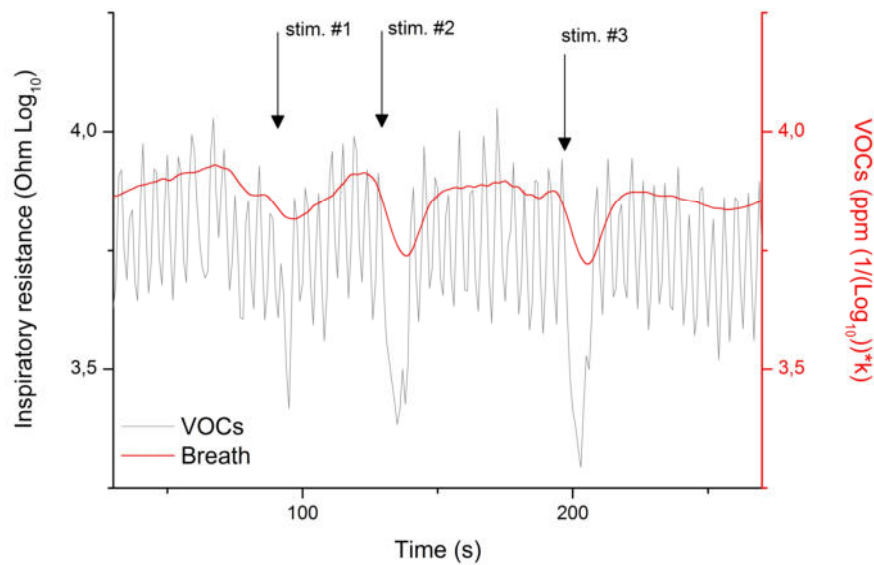


no statistical significant one-Way ANOVA

Kallmann syndrome (Kal5 - gene) natural model of anosmia

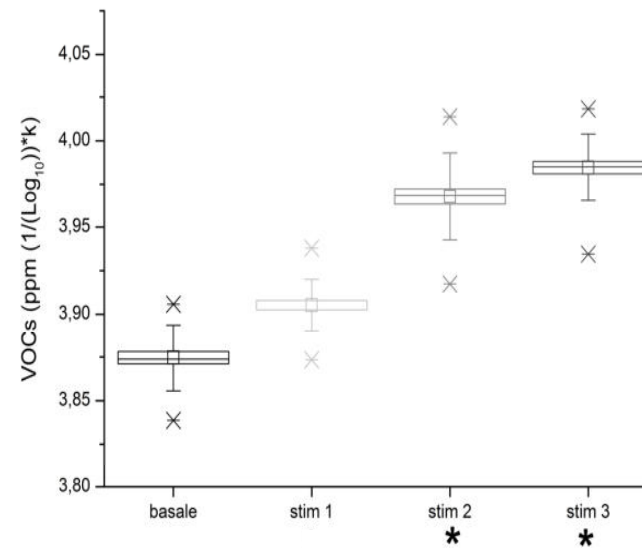
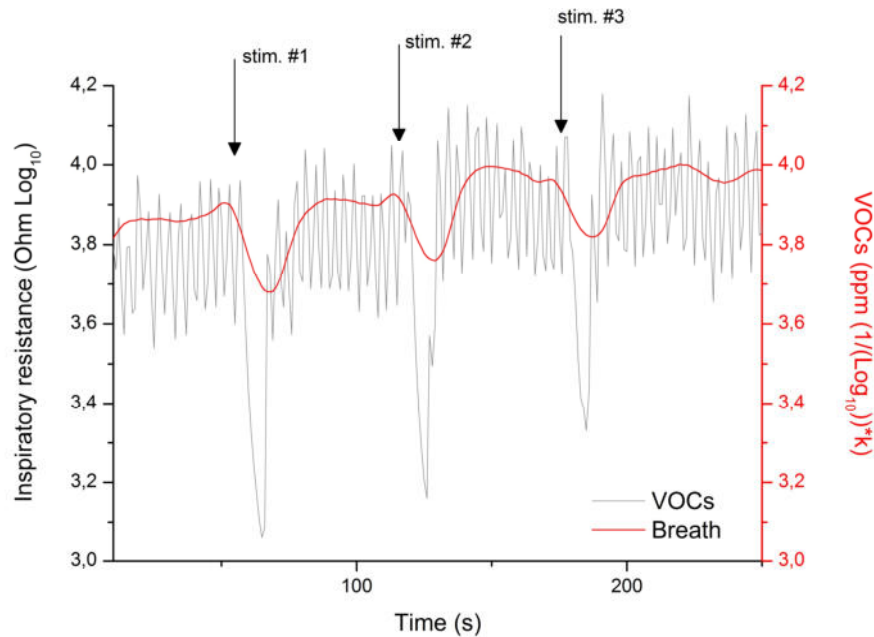


ORTt-VOCs: disosmia



- no response to olfacto-olfactive and olfacto-gustative stimulations;
- response to olfacto-trigeminal stimulation.

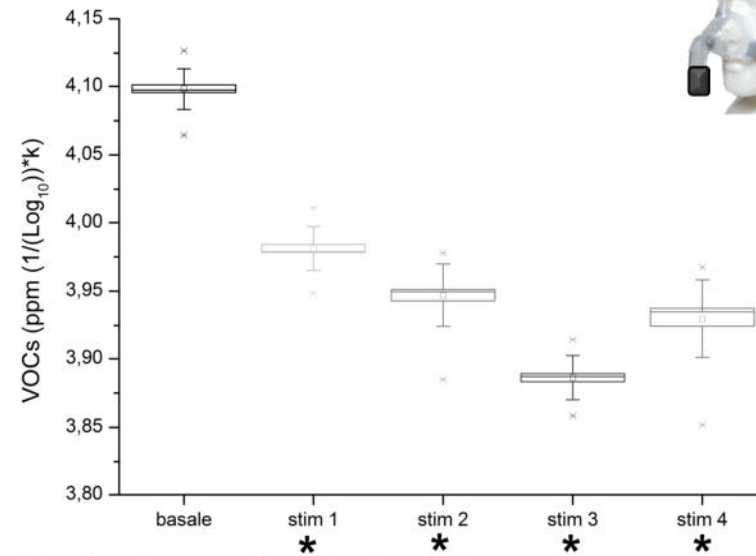
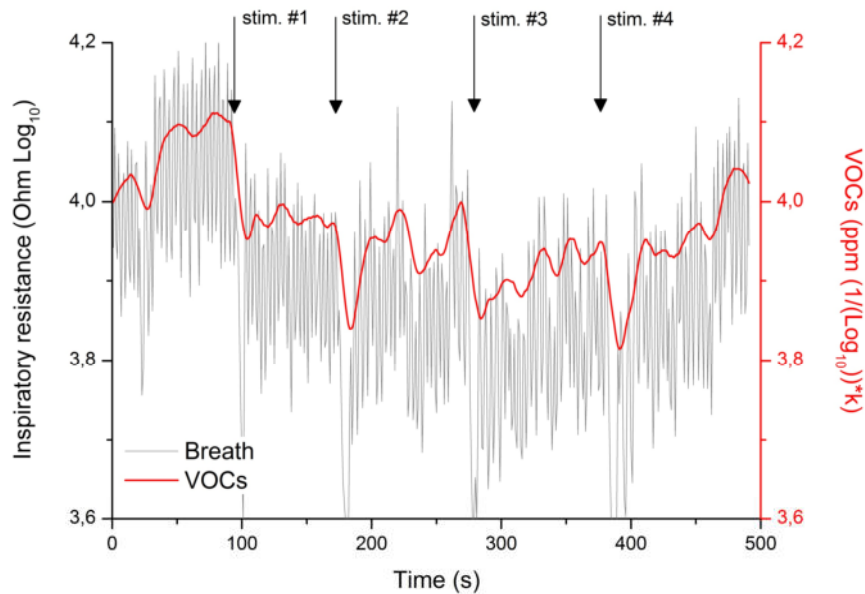
ORTt-VOCs: disosmia



* statistical significant one-Way ANOVA $p < 0.01$

- no response to olfacto-olfactive stimulation;
- response to olfacto-gustative and olfacto-trigeminal stimulations.

ORTt-VOCs: Multiple Chemical Sensitivity

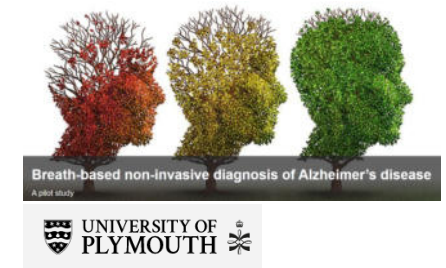
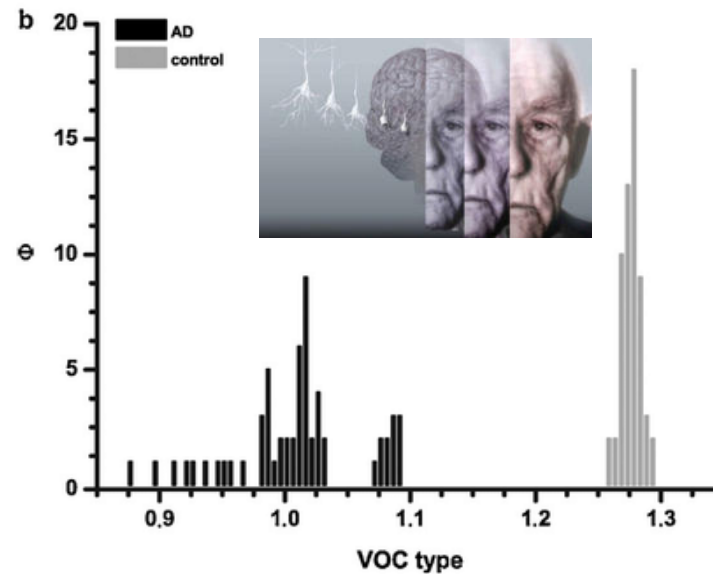
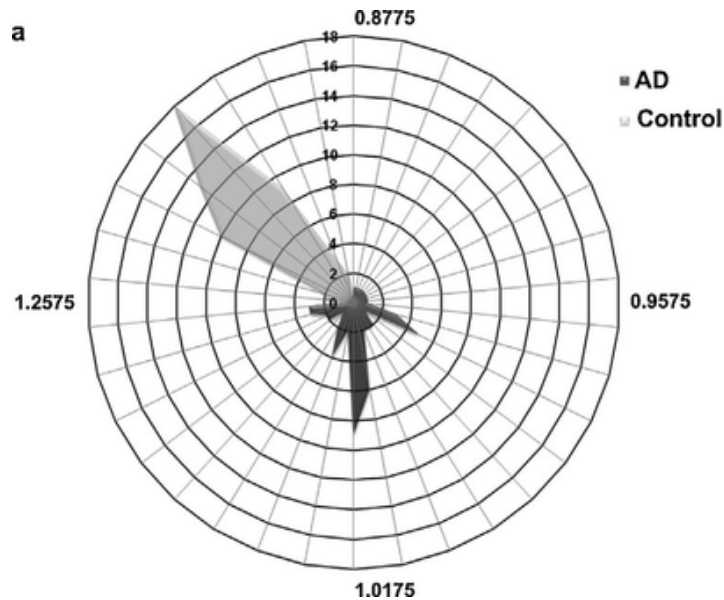


* statistical significant one-Way ANOVA $p < 0.01$

Chapter 23 Non-invasive Assessment of Exhaled Breath Pattern in Patients with Multiple Chemical Sensibility Disorder

Andrea Mazzatenta, Mieczyslaw Pokorski, Sergio Cozzutto,
Pierluigi Barbieri, Vittore Veratti, and Camillo Di Giulio

La neurodegenerazione



Respiratory Physiology & Neurobiology
Volume 209, April 2015, Pages 81-84
ELSEVIER

Volatile organic compounds (VOCs)
fingerprint of Alzheimer's disease ☆

Andrea Mazzatenta^{a, b, c, R, B}, Mieczyslaw Pokorski^{d, e}, Ferdinando Sartucci^{b, c, f}, Luciano Domenici^{b, f}, Camillo Di Giulio^g



La fisiologia dell'invecchiamento

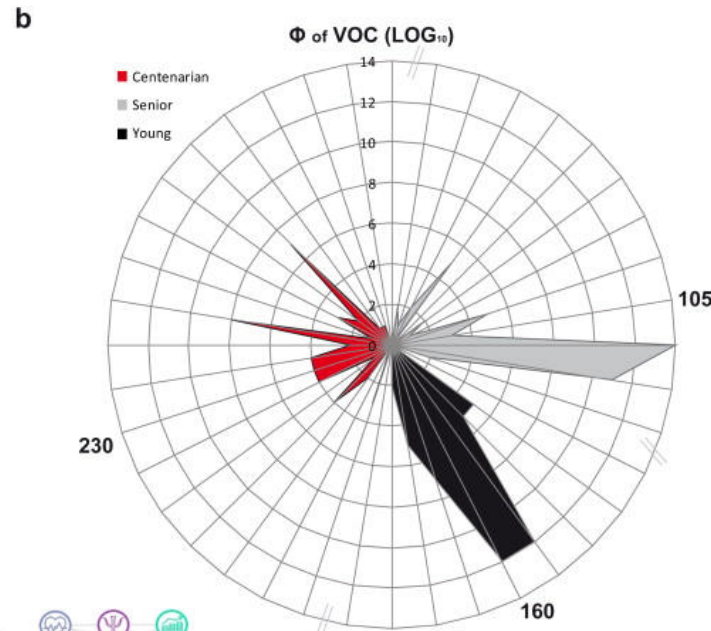
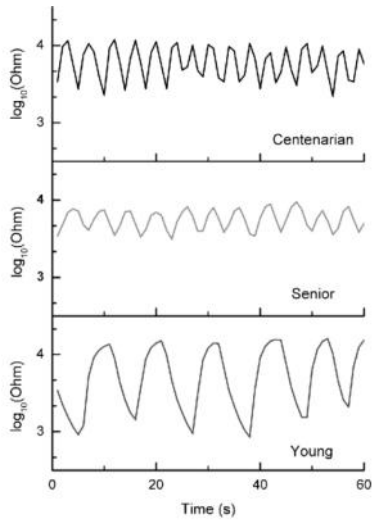
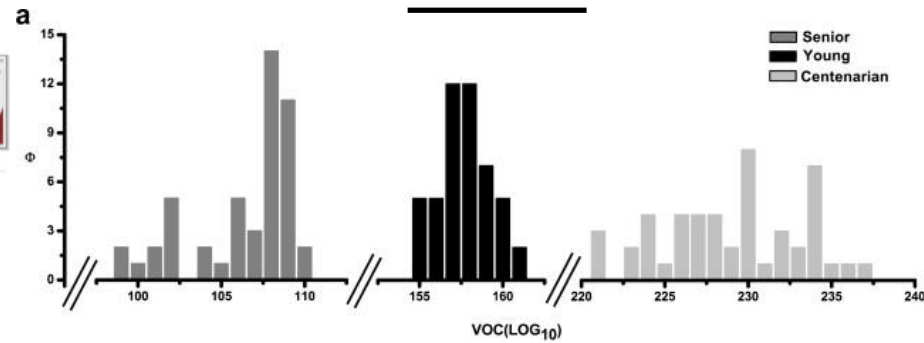


Respiratory Physiology & Neurobiology
Volume 209, April 2015, Pages 47-51



Real time analysis of volatile organic compounds (VOCs) in centenarians ☆

Andrea Mazzatenta^a, Mieczyslaw Pokorski^{b,c}, Camillo Di Giulio^a

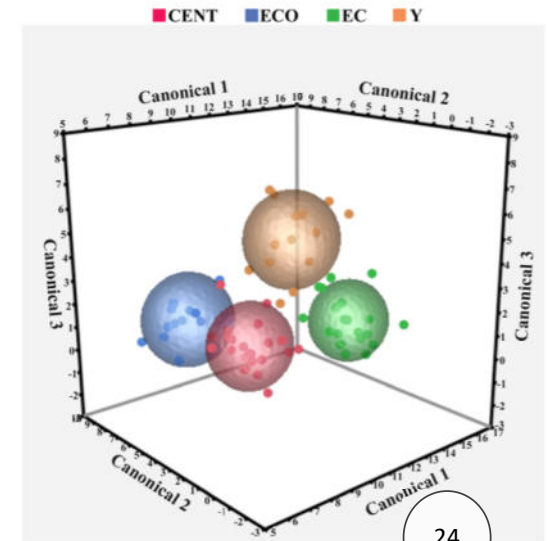


GeroScience (2020) 42:201–216
<https://doi.org/10.1007/s11357-019-00143-6>

ORIGINAL ARTICLE

The smell of longevity: a combination of Volatile Organic Compounds (VOCs) can discriminate centenarians and their offspring from age-matched subjects and young controls

Maria Conte^a, Giuseppe Conte^a, Morena Martucci^a,
Daniela Monti^a, Laura Casarosa^a, Andrea Serra^a,
Marcello Mele^a, Claudio Franceschi^a, Stefano Salvioli^a



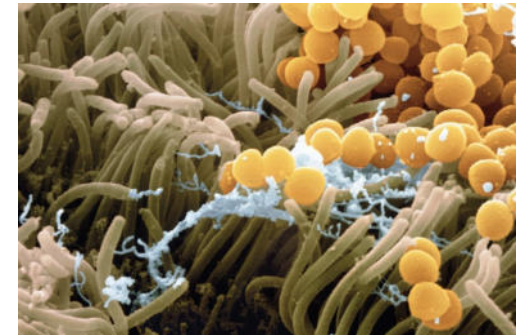
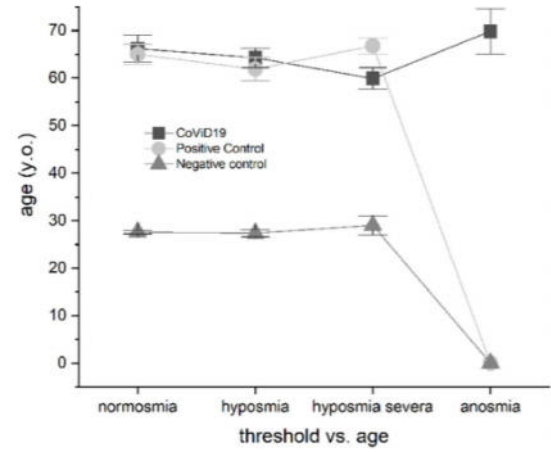
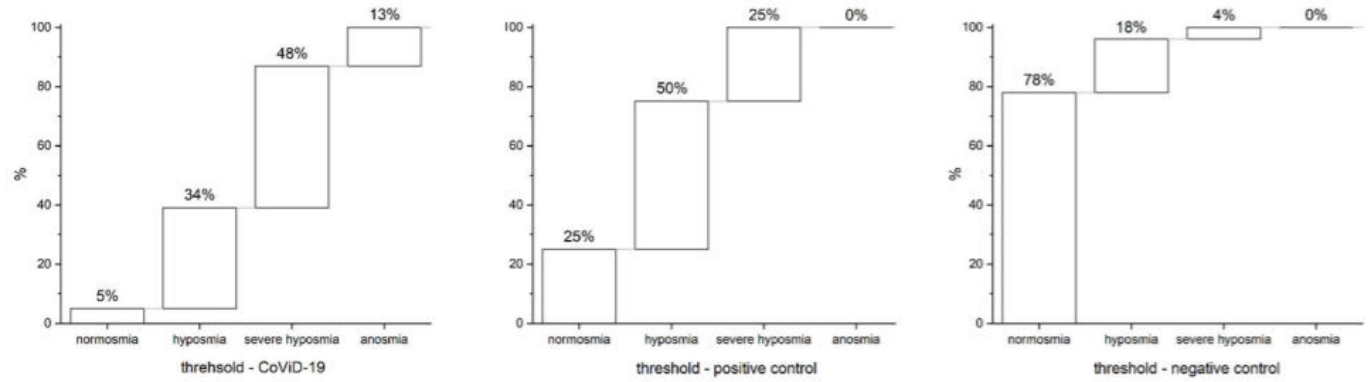
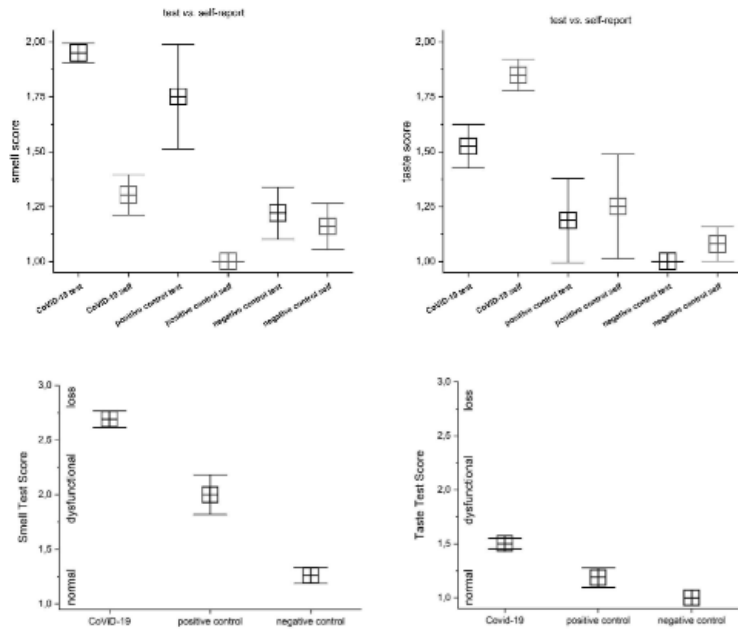
In epoca CoViD-19 è necessario misurare



La neurofisiologia: CoViD-19 e olfatto

Smell and Taste in Severe CoViD-19: Self-Reported vs. Testing

Andrea Mazzatenta ^{1*}, Giampiero Neri ¹, Damiano D'Ardes ², Carlo De Luca ¹, Stefano Marinari ³, Ettore Porreca ⁴, Francesco Cipollone ⁵, Jacopo Vecchiet ⁵, Chiara Falcicchia ⁶, Vincenzo Panichi ⁷, Nicola Origlia ⁶ and Camillo Di Giulio ¹



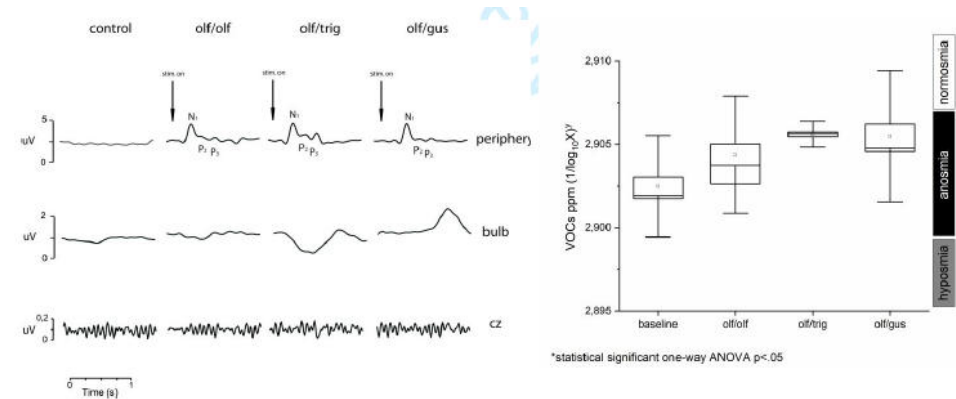
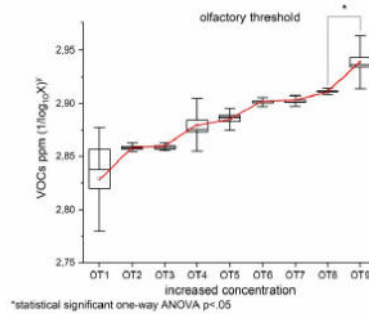
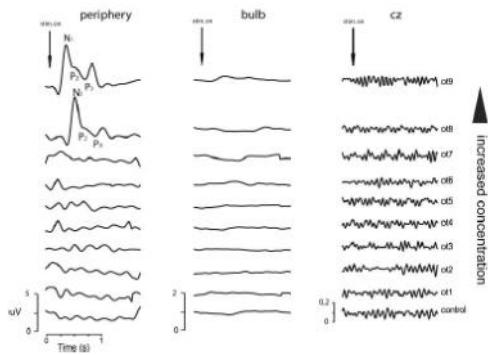
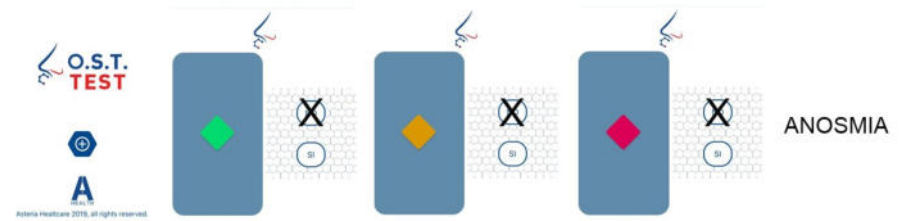
La neurofisiologia: CoViD-19 e olfatto

Physiological Reports

Open Access

Electrophysiological and olfactometric evaluation of long term CoViD-19

Andrea Mazzatenta^{1,*}, Claudia Montagnini², Andrea Brasacchio³, Ferdinando Sartucci^{4,5}, Giampiero Neri¹



La neurofisiologia: CoViD-19 e olfatto

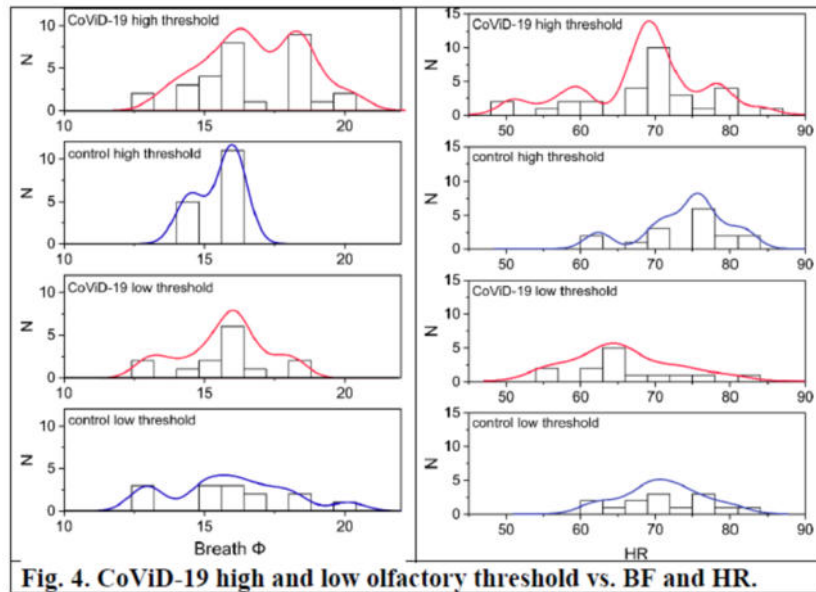
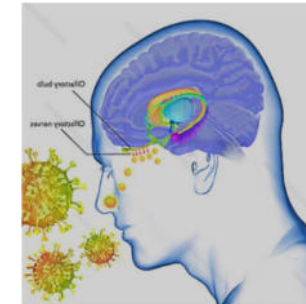


Fig. 4. CoViD-19 high and low olfactory threshold vs. BF and HR.

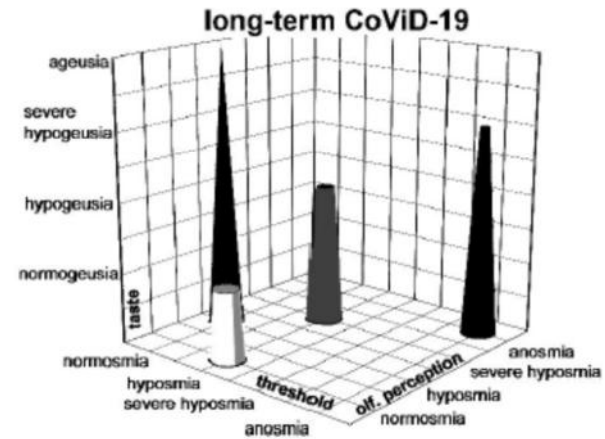
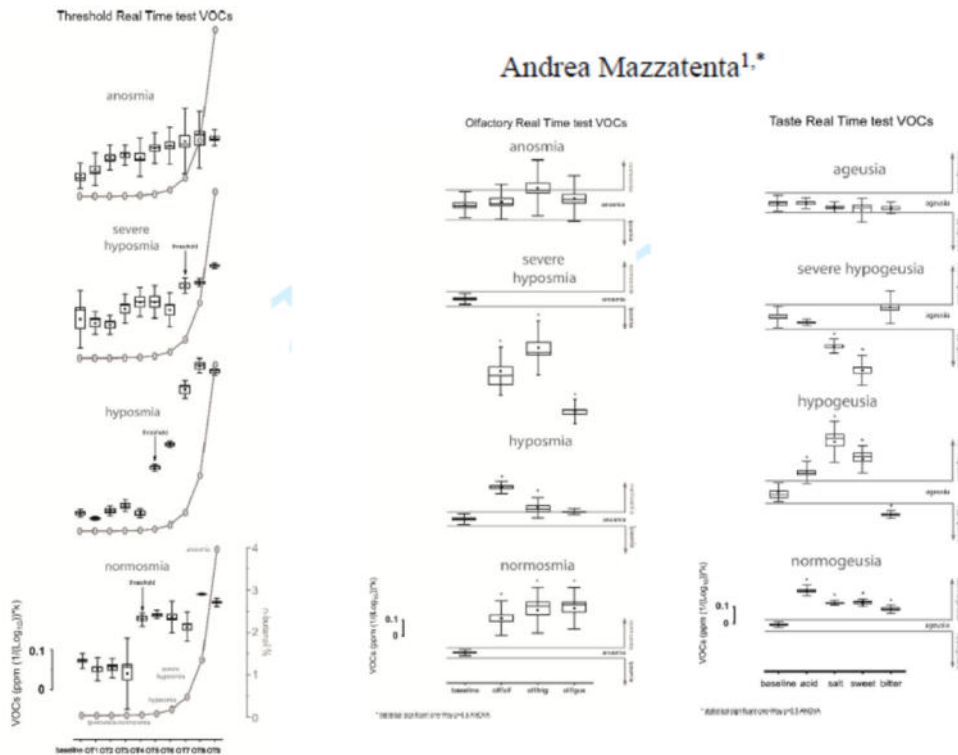
PLOS ONE
 Unmasking the 'asymptomatic' CoViD-19 a nose question
 Andrea Mazzatenta ^{1*}, Anna Berardi ², Gabriele Alessandro Novarria ², Giampiero Neri ¹



La neurofisiologia: CoViD-19 e olfatto

Physiological discrimination and correlation between olfactory and gustatory dysfunction in long-term CoVid-19

Andrea Mazzatenta^{1,*}



Physiological Reports [Open Access](#)

La neuroriabilitazione olfattiva: anti-senescenza

