

XXII World Allergy Congress
Cnacun (Mexico), December 6th 2010

Assessing the Sense of Smell



Joaquim Mullol, MD, PhD

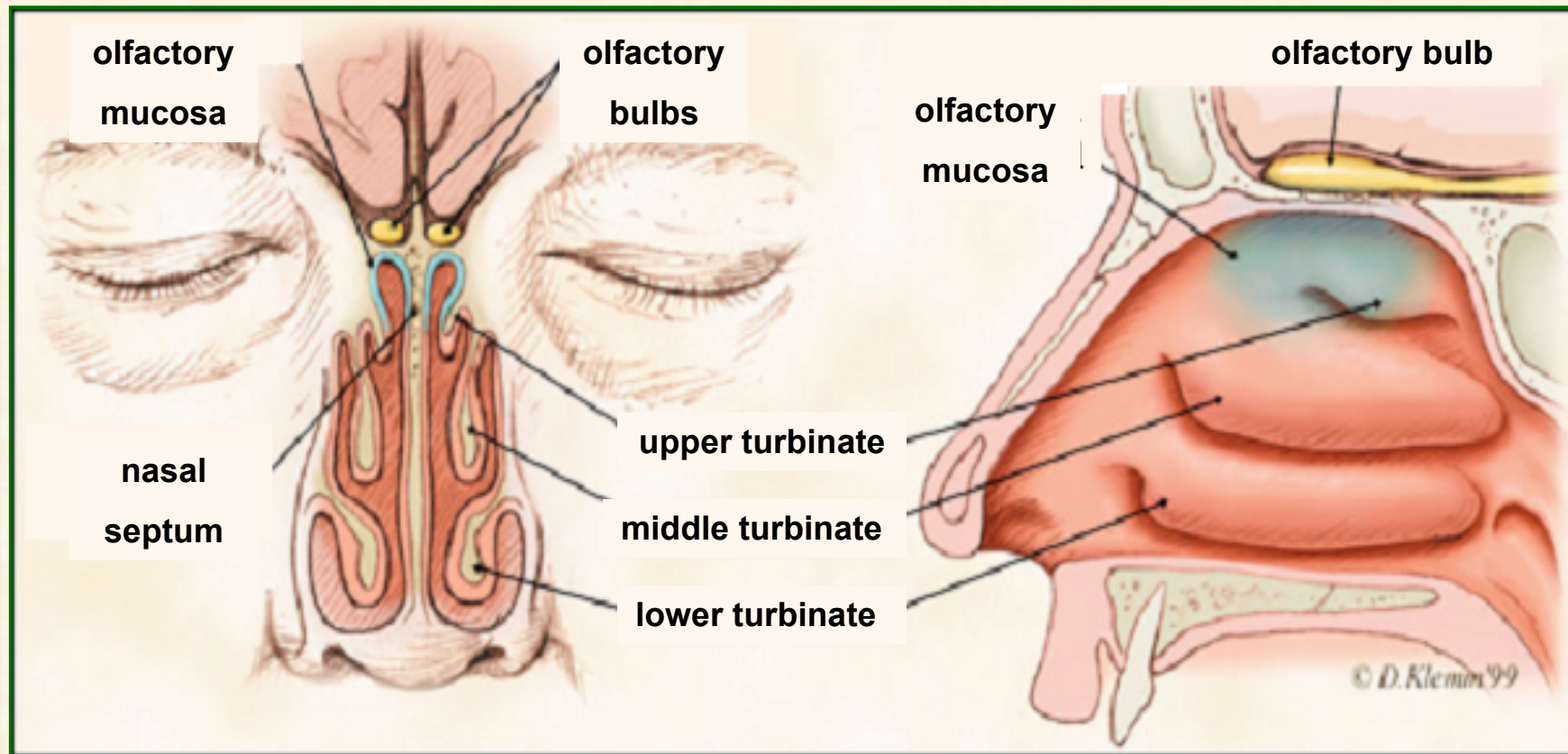
Rhinology Unit & Smell Clinic
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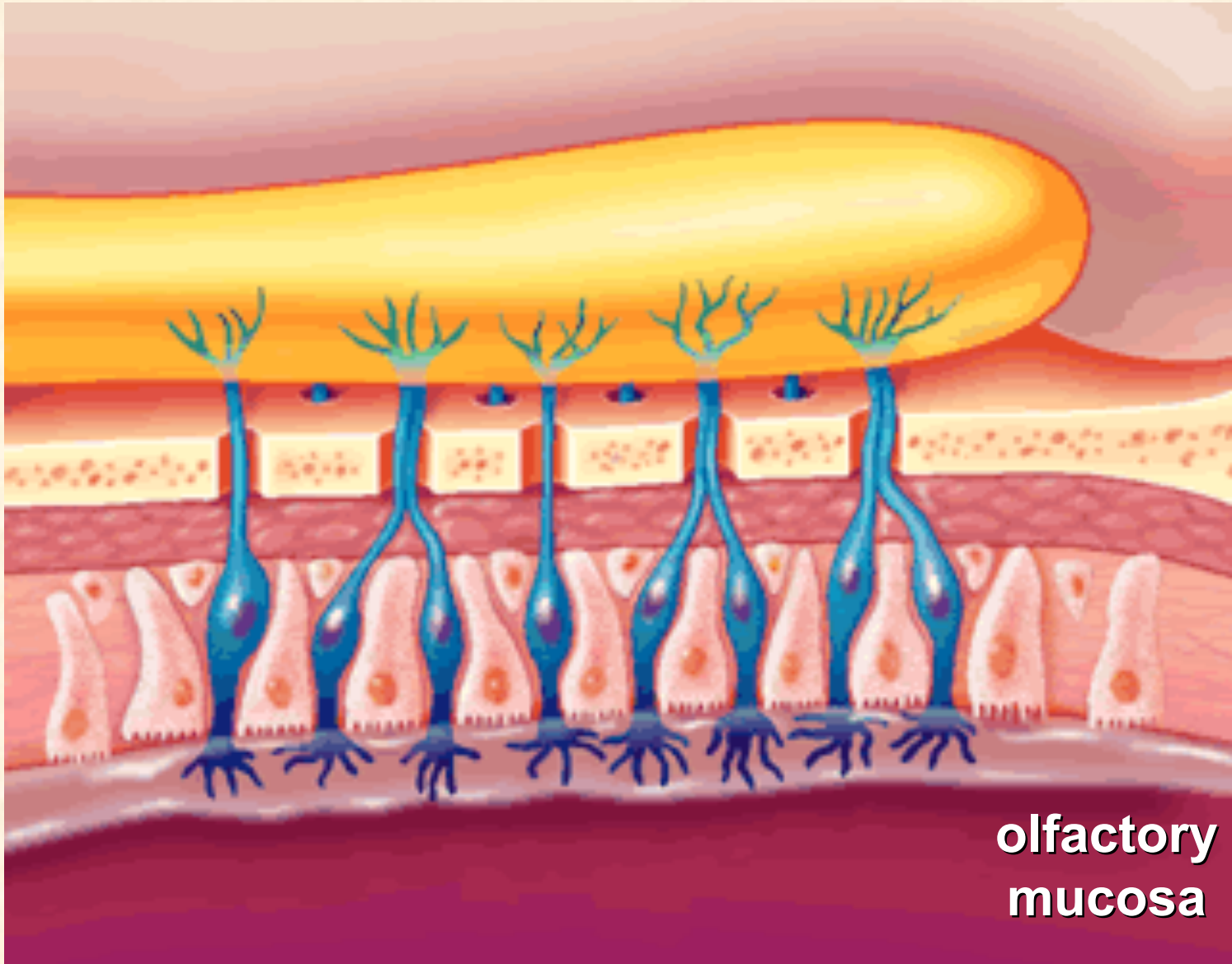
Sense of smell

- 1. The sense of smell**
2. The OLFACT study
3. Measurement of olfaction
4. Smell in upper airway diseases

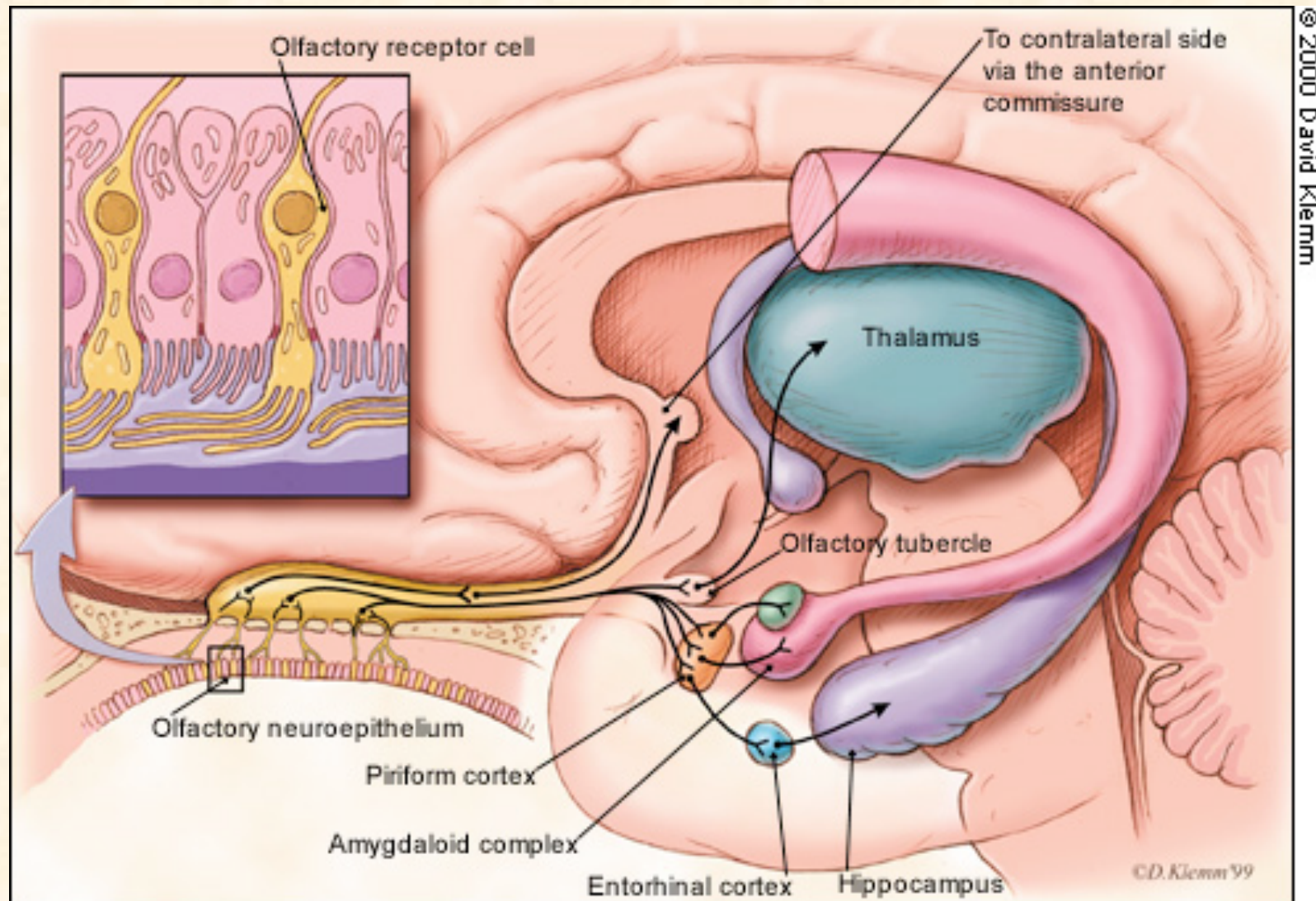
the sense of smell



The sense of smell



Olfactory pathways



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The sense of smell

- animals may smell up to 200,000 odours
- humans may smell up to 10,000 odours
- olfaction has lost evolutive significance
- fetus starts smelling in the uterus



The sense of smell

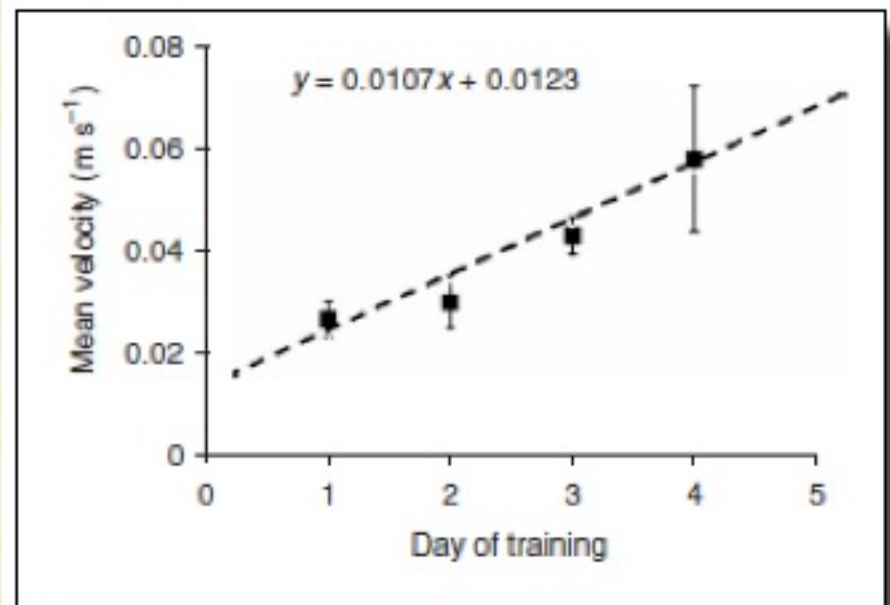
- women smell better than men
- olfaction remains stable between 20 and 40 yr old
- olfaction worsens after 50 yr old
- close relationship between olfaction - emotions - memory

Sense of smell

evolution loss or lack of training?



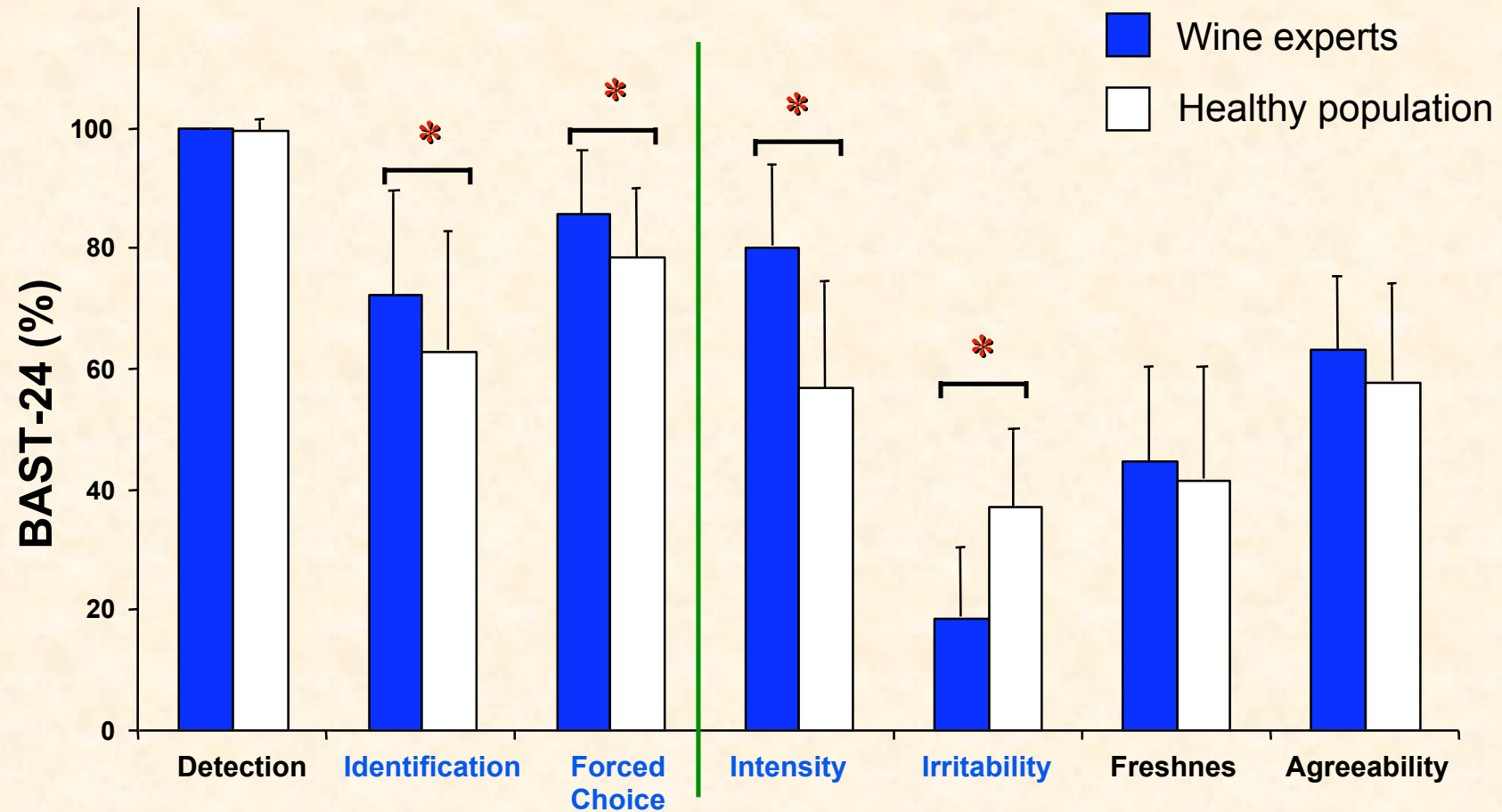
Porter J et al. *Nature Neurosci* 2007



Hummel J et al. *Laryngoscope* 2009

Sense of smell

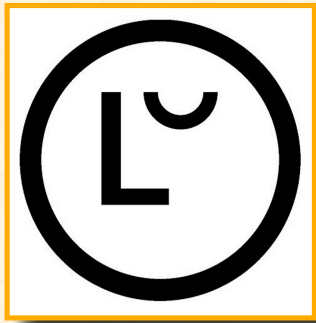
the importance of smell training





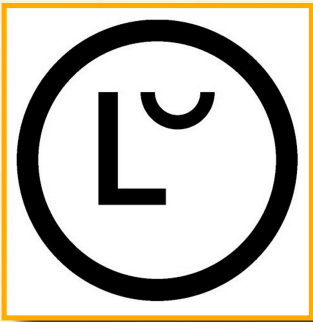
Sense of smell

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OLFACAT Survey **objectives**

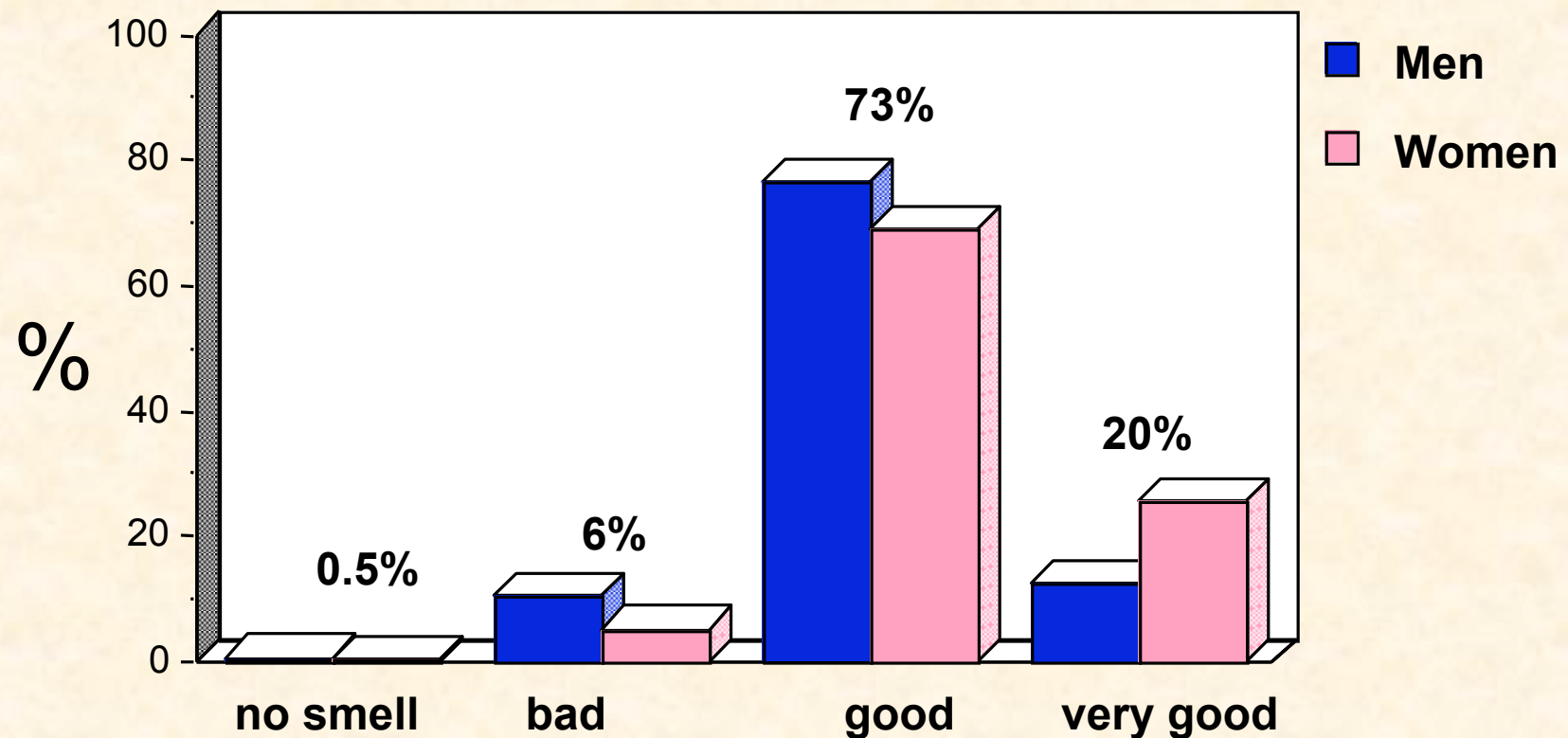
- 1. To evaluate the status of the sense of smell in the general population.**
- 2. To study the prevalence of olfactory disfunctions: anosmia - hyposmia.**
- 3. To investigate the factors associated with the sense of smell: protection - risk.**



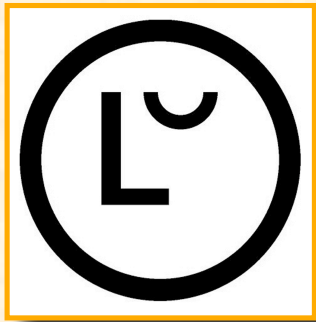
OLFACAT Survey

subjective perception

how do you consider your own sense of smell ?



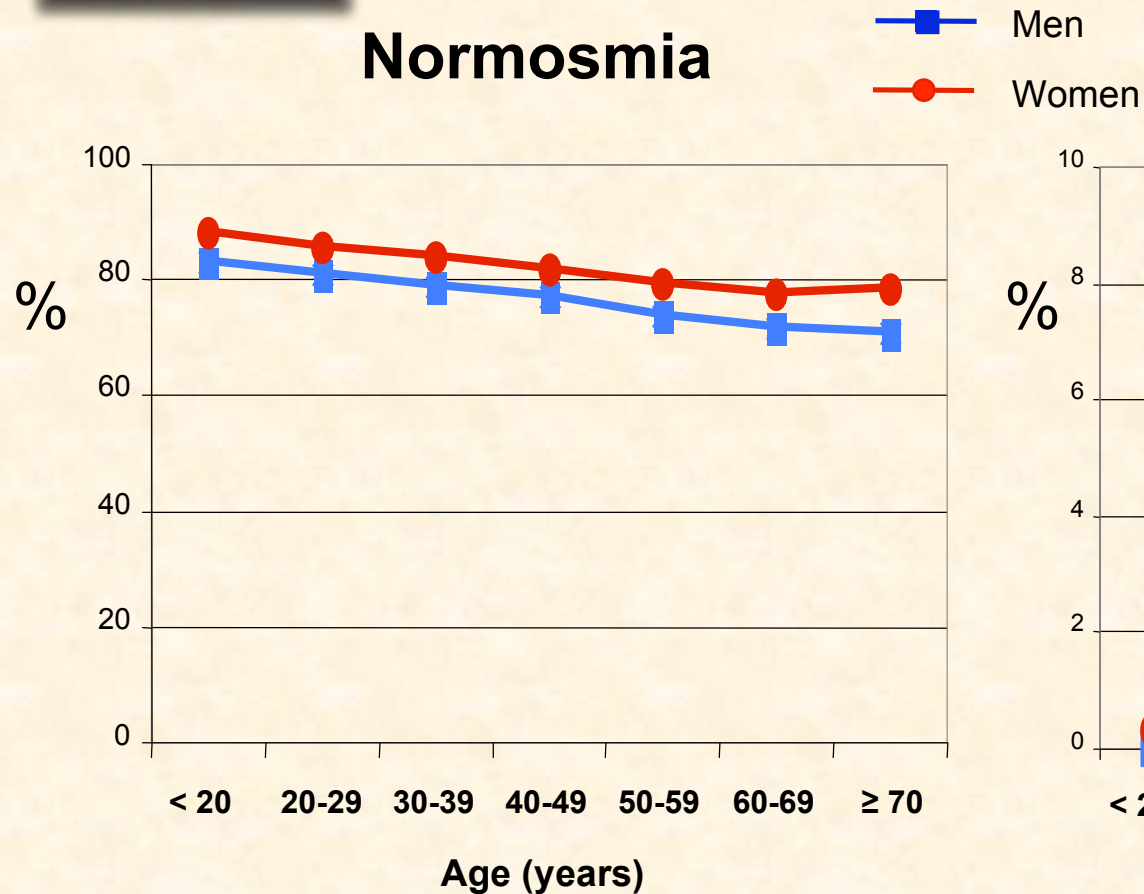
Alobid I, et al, J Mullol. *Otolaryngol Head Neck Surg* 2006
Mullol J et al. *Lancet* [Submitted]



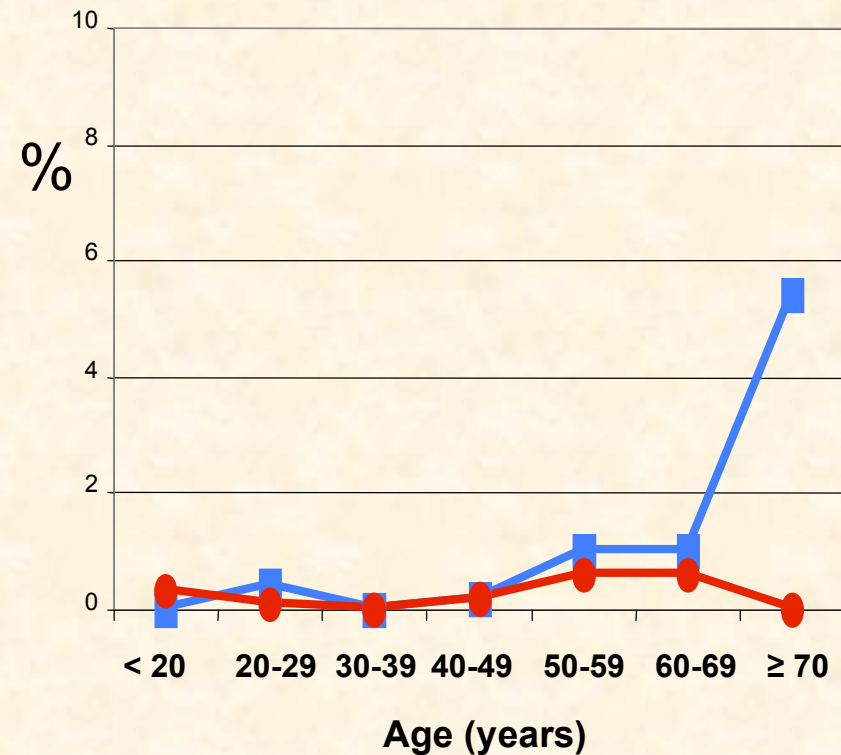
OLFACAT Survey

smell detection

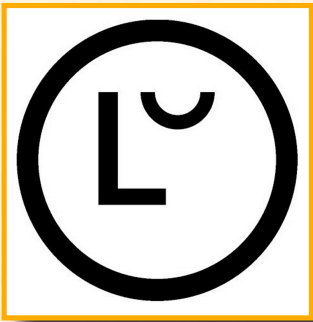
Normosmia



Anosmia



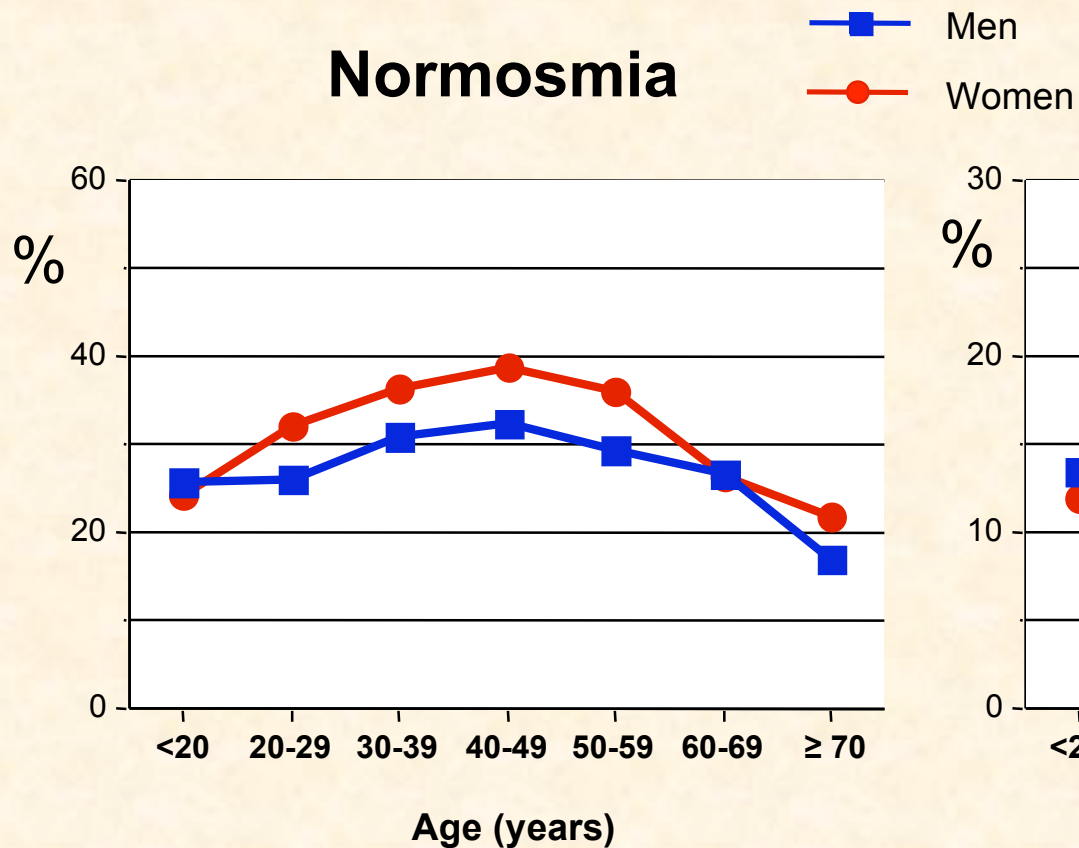
Alobid I, et al, *J Mullol. Otolaryngol Head Neck Surg* 2006
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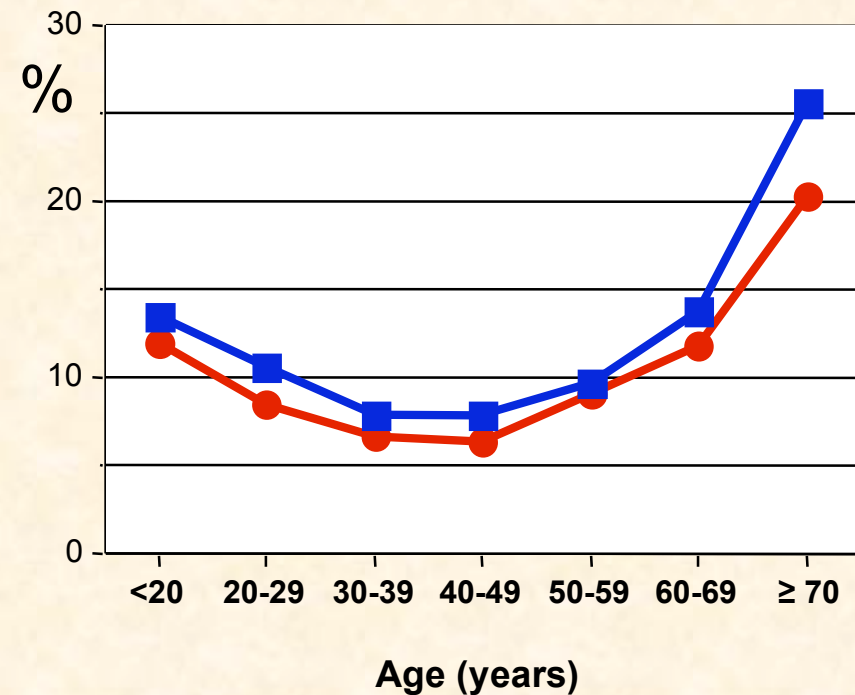
OLFACT Survey

smell identification

Normosmia



Anosmia



Alobid I, et al, *J Mollol. Otolaryngol Head Neck Surg* 2006
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Sense of smell

1. The sense of smell
2. The OLFACAT study
- 3. Measurement of olfaction**
4. Smell in upper airway diseases



Subjective olfactometry

outcomes

- **Detection** - supraliminar
 - threshold (butanol)
- **Memory** recognize odours
- **Identification** identify odours with no help
- **Forced choice** identify odours with help
- **Characteristics:** agreeability, intensity
 freshness, irritability
- **Sensory (1st CN) vs sensitive (5th CN) perception**
- **Unilateral vs bilateral studies**
- **Discrimination**

Fokkens W, V Lund, J Mullol et al. *Rhinology* 2007 [EP³OS]

Rombaux P, et al. *B-ENT* 2009

Guilemany JM, J Mullol, et al. *Allergy* 2010



Subjective olfactometry

University of Pennsylvania Smell Identification Test (UPSIT)

30. This odor smells most like	30	29	28	27	26	25	24	23	22	21
a. chili	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
b. menthol	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)
c. orange	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)
d. watermelon	(d)	(d)	(d)	(d)	(d)	(d)	(d)	(d)	(d)	(d)

INSTRUCTIONS: Release first odor with tip of pencil or pen. Read response alternatives to patient & circle patient's answer. If desired, test each nostril separately. Repeat with other two odors. One or more incorrect responses suggests olfactory dysfunction. To fully characterize problem, administer the 40-item Smell Identification Test™.	THIS ODOR SMELLS MOST LIKE: Root Beer Watermelon Banana Smoke	THIS ODOR SMELLS MOST LIKE: Dill Pickle Bubble Gum Wintergreen Watermelon	THIS ODOR SMELLS MOST LIKE: Banana Garlic Cherry Motor Oil
	24	2	7

Date: _____

Check forced-function. To be covered by identification with sexes of means for

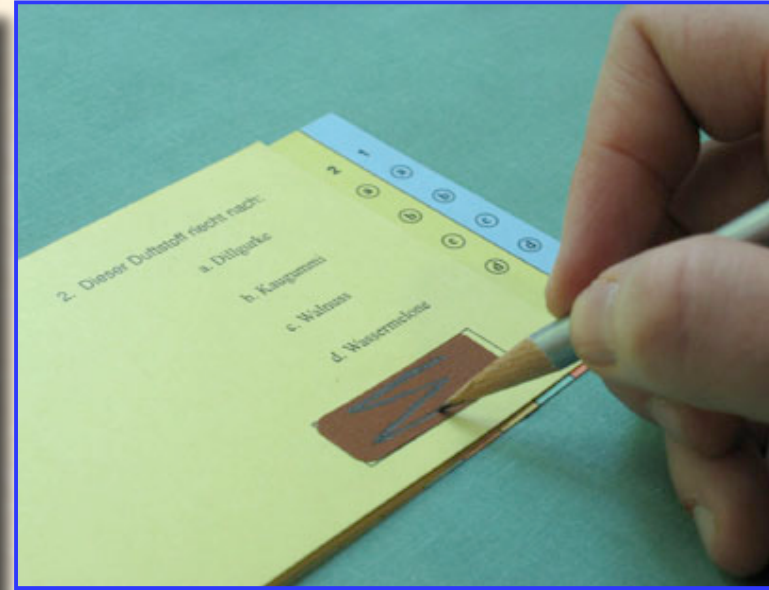
The Pocket Smell Test™

© 1984



Subjective olfactometry

University of Pennsylvania Smell Identification Test (UPSIT)



- ID test: 4 booklets, 10 odours & questions each
- scratch the odour patch and smell
- forced choice (4 options)
- cost: US\$ 27.5



Subjective olfactometry

Connecticut Chemosensory Clinical Research Center (CCCRC)



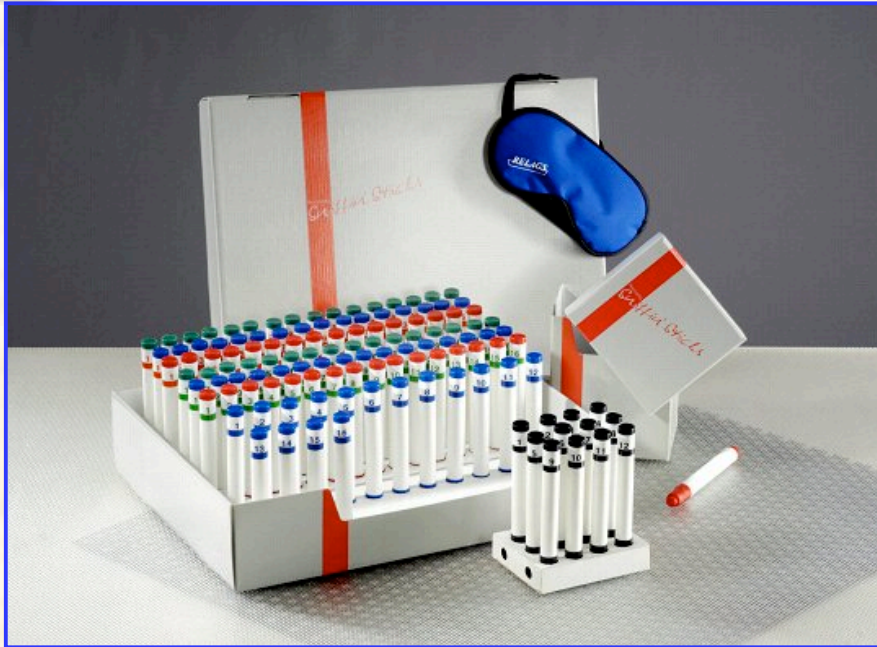
- butanol test: smell threshold
- supraliminar test: smell discrimination
- cost: US\$ 1,295 / box

Cain et al. *Laryngoscope* 1988



Subjective olfactometry

Sniffin' Sticks



- butanol test: smell threshold
- discrimination: 15 odours
- identification: 16 odours (forced choice, 4 options)



Subjective olfactometry

Zurich Olfaction Screening Test (ZOST)



- 8 odours in individual cartridges (7+1)
- identification and discrimination
- healthy (7- 8), pathology (0 - 6)



Subjective olfactometry

BArcelona Smell Test (BAST) -24



- odours: olfactory (20) and sensitive (4)
- detection, characteristics, memory, identification
- associated to a gustometry: sweet, salted, acid, bitter, umami



Sense of smell

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4. **Smell in upper airway diseases**

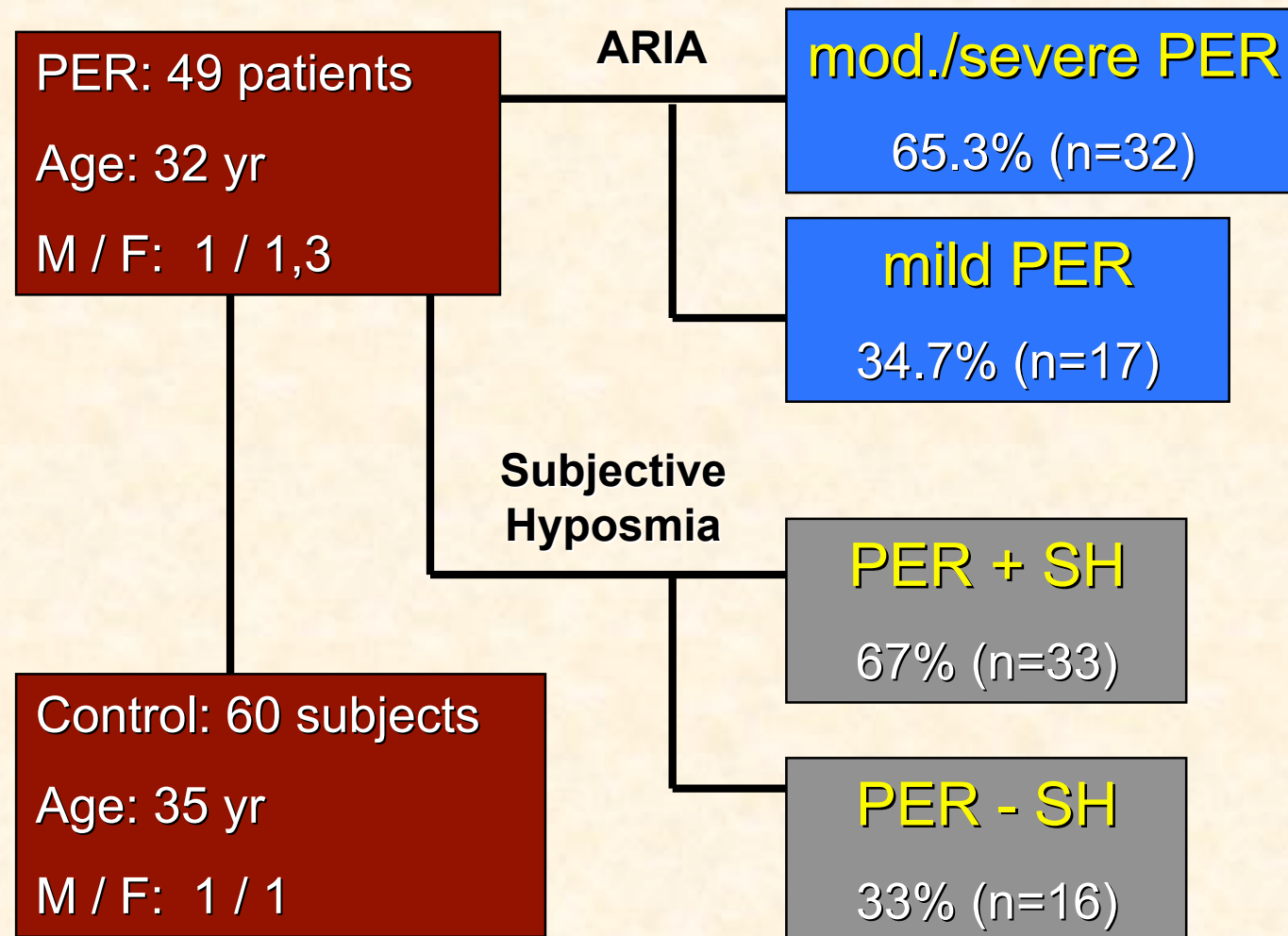


Smell disorders

common causes

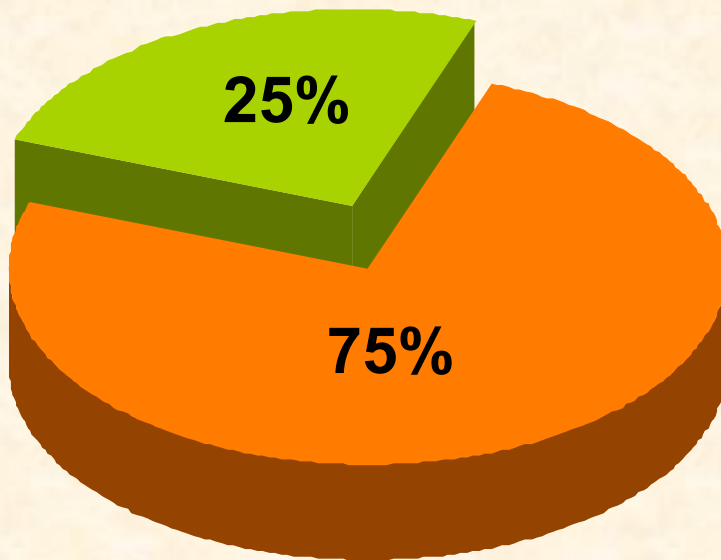
- **sinonasal infections**
 - common cold, flu, bacterial
- **inflammation of sinonasal mucosa**
 - chronic rhinosinusitis, nasal polyps, allergic rhinitis
- **head trauma**
 - impairment of olfactory bulbs & olfactory fibers
- **neurodegenerative diseases**
 - multiple sclerosis, Parkinson & Alzheimer diseases
- **smoking habit**

Olfaction in Allergic Rhinitis

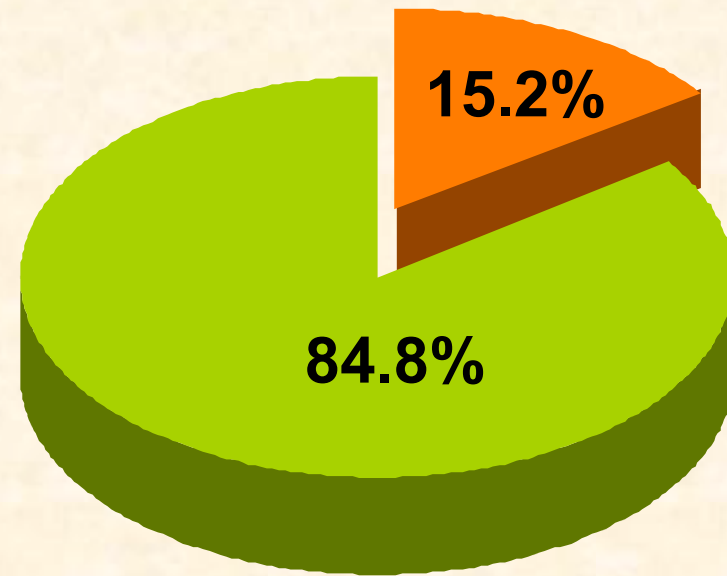


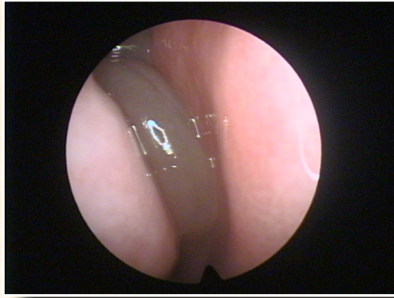
Loss of smell in AR

WITHOUT loss of smell

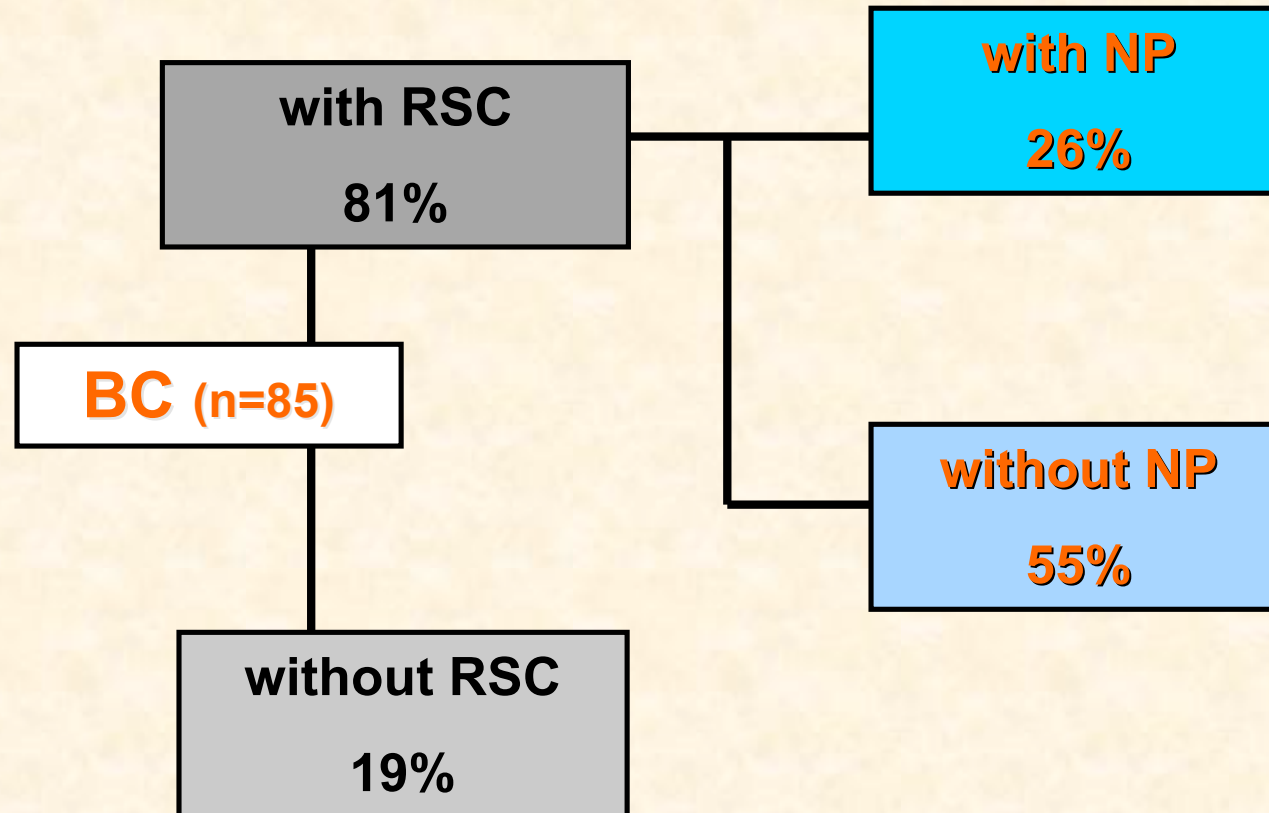


WITH loss of smell

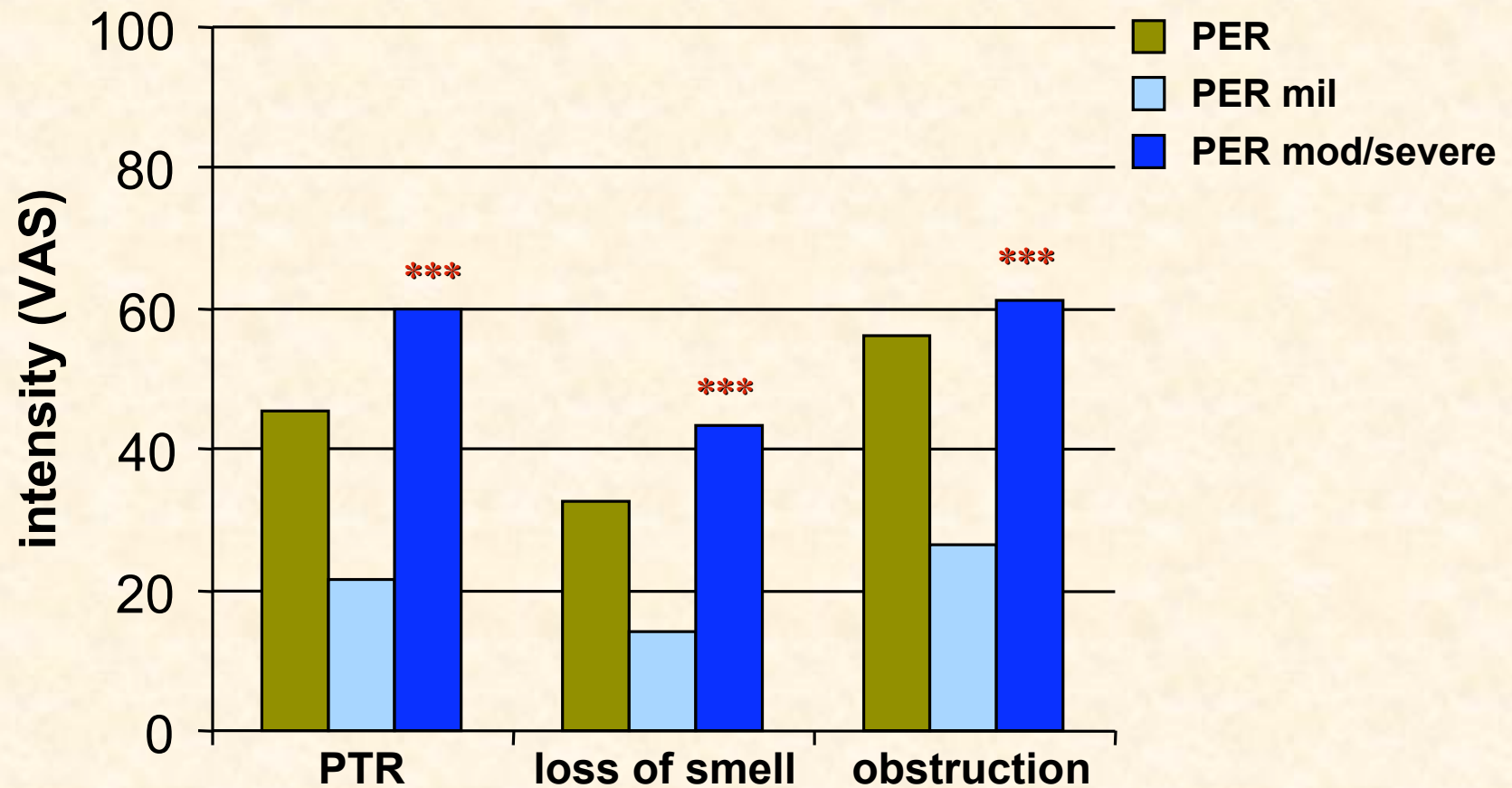


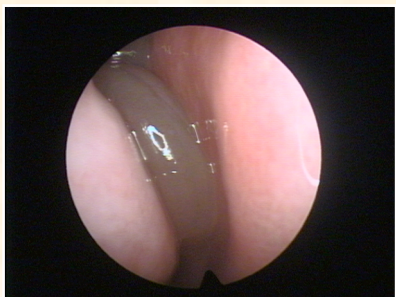


Olfaction in bronchiectasies rhinosinusitis / nasal polyps



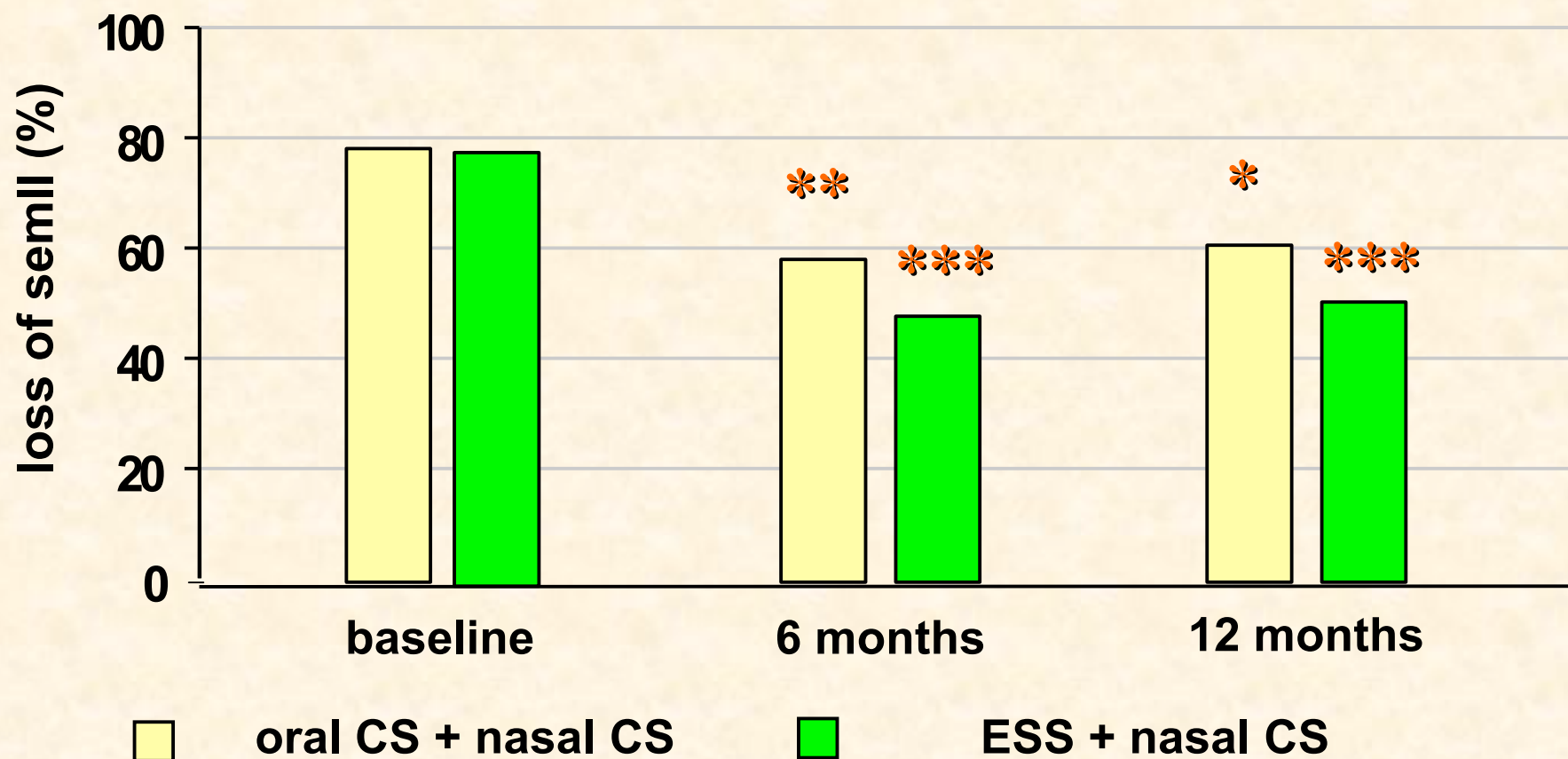
Persistent allergic rhinitis severity and olfaction

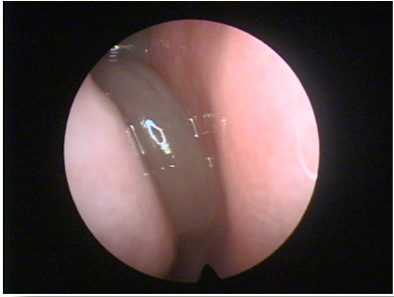




Nasal polypsis

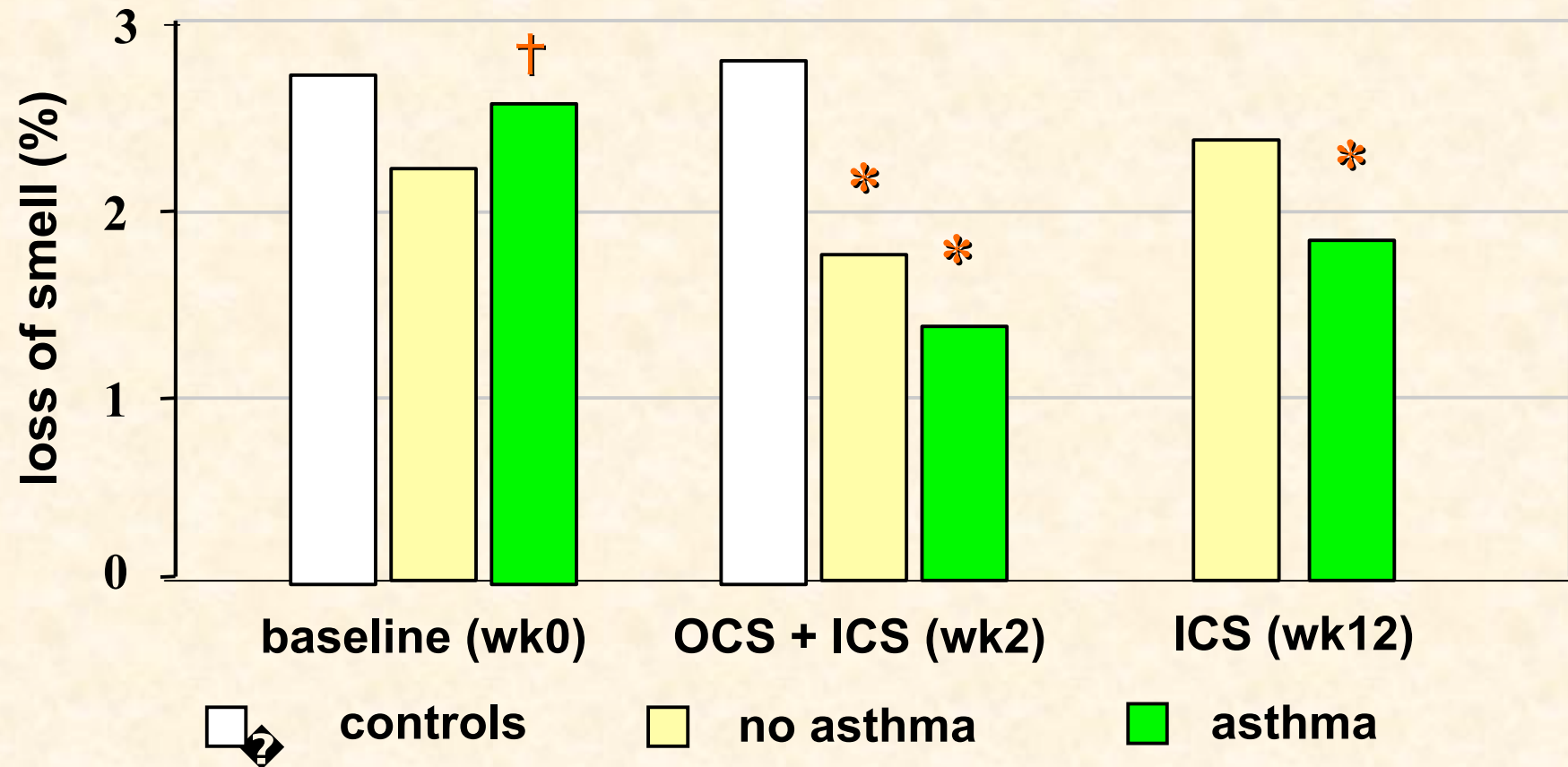
ESS vs oral steroids in olfaction

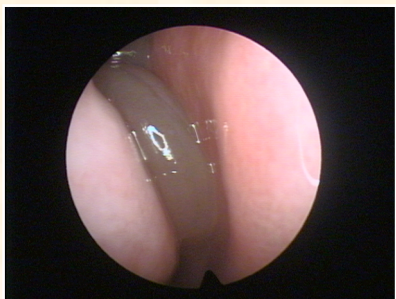




Severe nasal polypsis

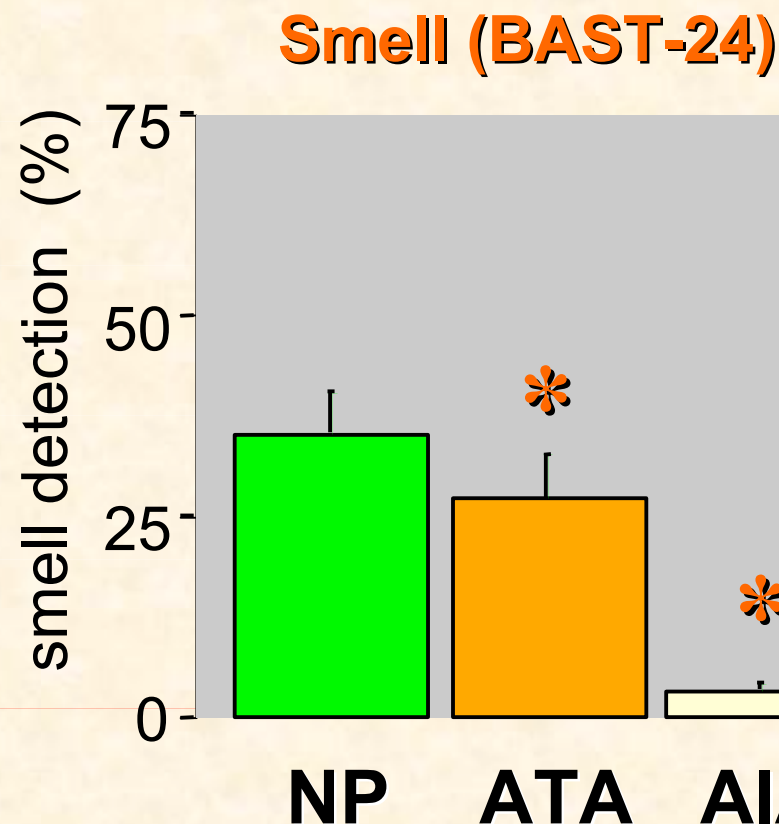
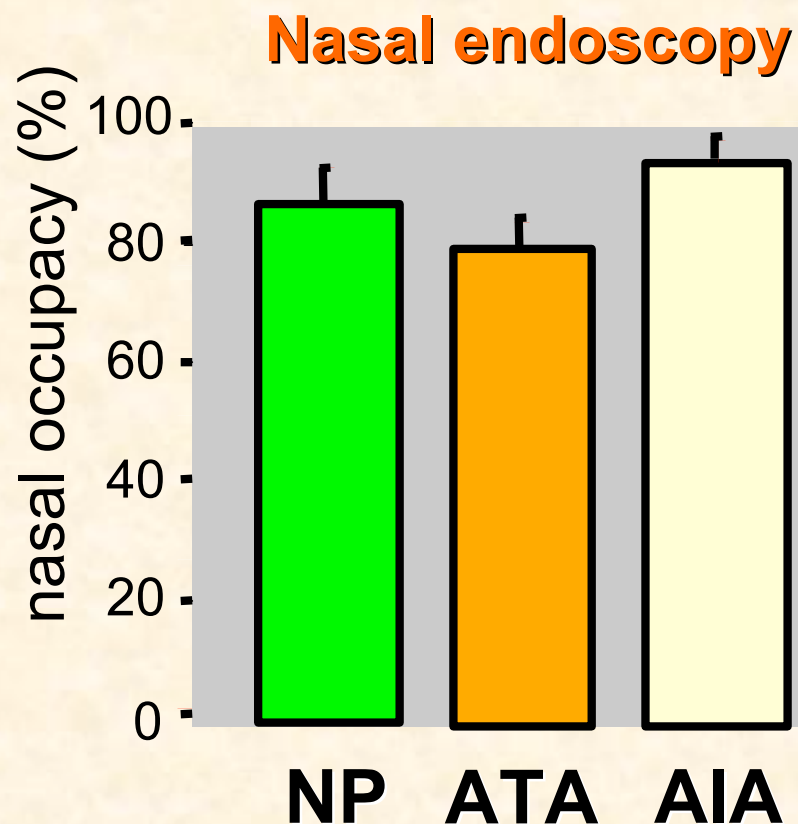
oral & nasal steroids in olfaction

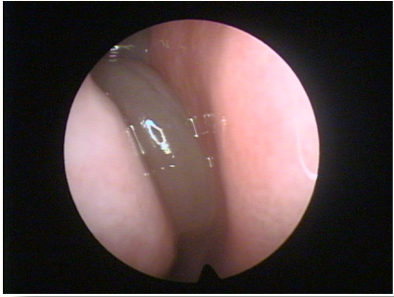




Severe nasal polyps

inflammation vs obstruction in olfaction

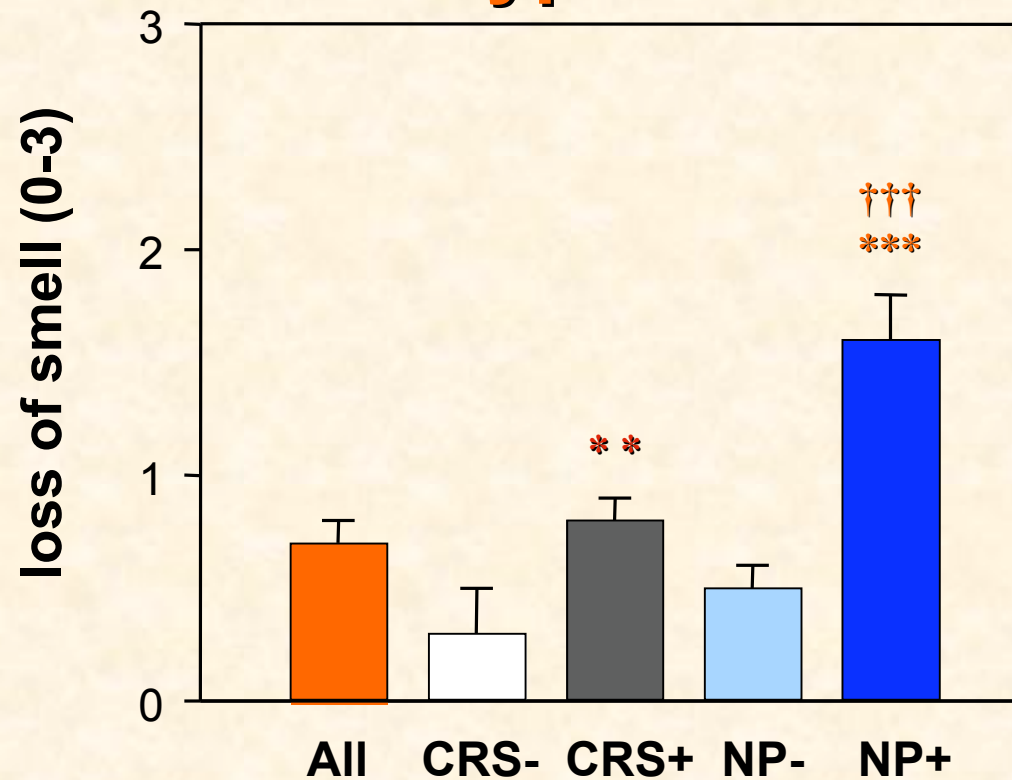


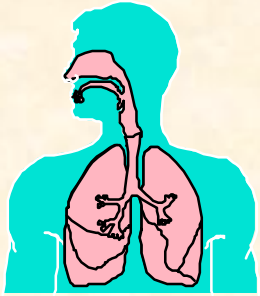


Bronchiectasis

CRS / nasal polyps in olfaction

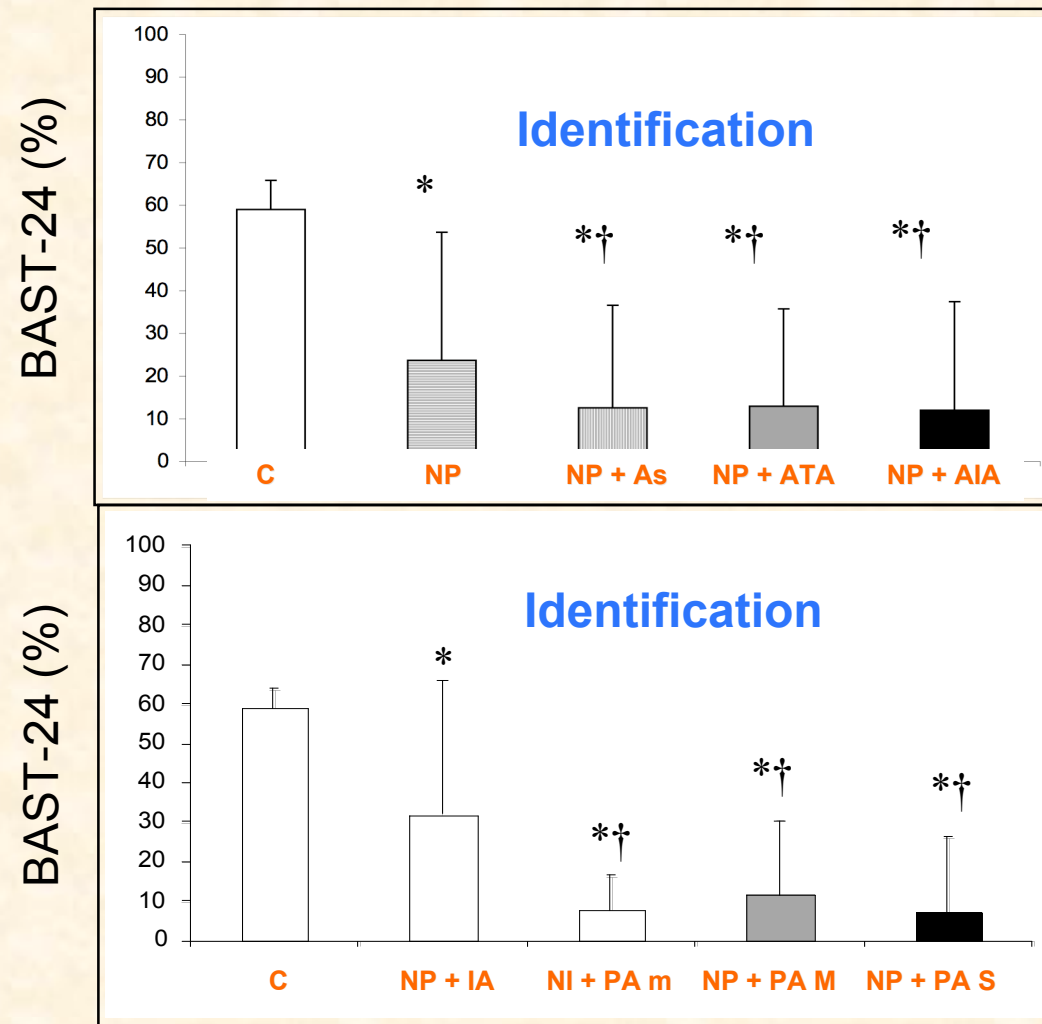
Hyposmia





Loss of smell and asthma

CRS / nasal polyps





The Smell of Smell

messages to take home

- 1. Partial, (hyposmia, 0.5-1%) and total (anosmia, 15-20%) loss of smell is a very prevalent symptom in the general population.**
- 2. Main causes of loss of smell are: common cold, CRS $\pm$ nasal polyps, and traumatic brain injury.**
- 3. Allergic rhinitis (moderate) and CRS $\pm$ nasal polyps (moderate to severe) have an important impact on the loss of smell.**



Smell and Taste Diseases

conclusions

- 4. Due to its association to CRS $\pm$ nasal polyps, the loss of smell may predict the severity of asthma.**
- 5. Intranasal and oral corticosteroids improve the sense of smell when due to inflammatory diseases.**
- 6. The sense of smell should always be assessed, by symptom or/and by olfactometry, in both upper and lower airway chronic inflammatory diseases.**