



## Olfaction

**Pamela Dalton, PhD MPH**  
**Monell Chemical Senses Center**  
**Philadelphia, PA**

**October 27, 2008**

For more information, please visit [www.nihtoolbox.org](http://www.nihtoolbox.org)  
Richard C. Gershon, PhD, PI [gershon@northwestern.edu](mailto:gershon@northwestern.edu)



This study is funded in whole or in part with Federal funds from the Blueprint for Neuroscience Research, National Institutes of Health under Contract No. HHS-N-260-2008-00007-C

---

---

---

---

---

---

---

---



## Olfaction

- The function of the olfactory system in humans is to detect and process volatile airborne chemicals and food volatiles and thus provide information about our environment that is critical to our health and well-being.
- The primary functional properties of the olfactory system are:
  - to *detect* odor sensation,
  - to *recognize* odor quality
  - to *identify* the source of the odor

*Odor identification tests tap into all three of these abilities and thus are the best, most comprehensive way to evaluate normal olfactory function*

---

---

---

---

---

---

---

---



## Issues Among Extant Measures

- Little validation/norms for children 3-5 yrs of age
- Cognitive demands of many tests confound results from young children or the cognitively-impaired
- Measures with highest reliability are not brief
  - Reliability/specificity of odor id increases with # of items
  - Reliability of threshold tests increases with # of trials
- Cultural & experiential specificity of items in many odor id tests limit use across diverse populations

---

---

---

---

---

---

---

---

## Adult Test Development

- Goal: to determine the optimal number and type of stimuli for odor identification evaluation
  - Brief Smell ID Test (R. Doty 1996)
    - 12 item scratch-n-sniff (subset of UPSIT broader x-cultural familiarity) with 4 AFC response
  - San Diego Odor ID Test (C. Murphy)
    - 8 common items presented in opaque bottles
    - Matched to appropriate line drawing (out of 20 possible)
  - Toolbox Odor ID test (Olfaction team)
    - 12 item scratch-n-sniff using items selected from B-SIT & SDOIT
    - Matched to picture/label with 4 AFC response
- All adult tests will be validated against 40-item UPSIT.

---

---

---

---

---

---

---

---

## Toolbox Odor ID Stimuli: Micro-encapsulated 'scratch-n-sniff'

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>■ Set A           <ul style="list-style-type: none"> <li>■ Banana<sup>2</sup></li> <li>■ Lemon<sup>1,2</sup></li> <li>■ Play Doh<sup>1</sup></li> <li>■ Coffee<sup>1</sup></li> <li>■ Cinnamon<sup>1,2</sup></li> <li>■ Bubble Gum<sup>1</sup></li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>■ Set B           <ul style="list-style-type: none"> <li>■ Peanut Butter<sup>1</sup></li> <li>■ Chocolate<sup>1,2</sup></li> <li>■ Flower<sup>2</sup></li> <li>■ Baby Powder<sup>1</sup></li> <li>■ Play Doh<sup>1</sup></li> <li>■ Grape</li> </ul> </li> </ul> |
|--|---|

<sup>1</sup> Odorant used in SDOIT

<sup>2</sup> Odorant used in B-SIT

---

---

---

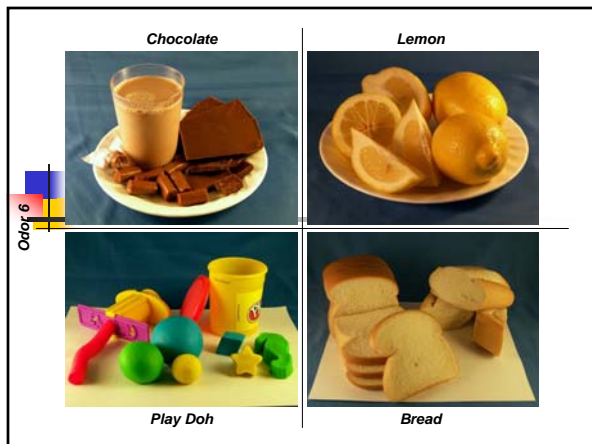
---

---

---

---

---




---

---

---

---

---

---

---

---



### Pre-Testing: Adult Olfactory Assessment

- Adults in 3 broad age groups will be tested
  - 18-45
  - 45-65
  - 65+
- Questionnaire will obtain information on
  - Allergy status
  - Frequency of colds
  - Prior head injury
  - Occupational exposure history

---

---

---

---

---

---

---

---



### Pre-Testing: Pediatric Olfactory Assessment

- Children between 3-17 years old will be tested
- To determine familiarity with stimuli, accompanying parent or guardian will also take test and answer questionnaire about their and their child's familiarity with the food or odor items on the test
- Parent/guardian will also complete short health screening for child focusing on:
  - Allergy status
  - Frequency of colds
  - Prior head injury

---

---

---

---

---

---

---

---



### Pediatric Testing Results

Age Group	n	# Correct
3-5	30	2.93
6-8	44	3.77
9-11	35	3.90
12-14	14	4.08
15-17	16	4.09

---

---

---

---

---

---

---

---



## Timeline for Toolbox

- Data collection for adults and children in progress
- Development/pre-test/validation phase will continue through January 2009
- Following that, test/item selection will be finalized
- Norming phase will begin in early-mid 2009 and continue through 2010
- Norming will take place at multiple sites

---

---

---

---

---

---

---

---



## Acknowledgments

### PEDIATRIC STUDY TEAM

Julie Mennella & Beverly Cowart  
Monell Chemical Senses Center

Edmund Pribitkin  
Dept of Otorhinolaryngology  
Thomas Jefferson University

James Reilly & Carly Jorlin  
Department of Surgery  
Nemours/A.I. duPont Hospital for Children

### TOOLBOX OLFACTION TEAM

Julie Mennella  
Monell Chemical Senses Center

Claire Murphy  
San Diego State University

Richard Doty  
University of Pennsylvania

Robert Frank  
University of Cincinnati

*Supported by Blueprint for Neuroscience Research,  
NIH Contract No: HHS-N-260-2006-00007-C  
and by Nemours/ A.I. duPont Hospital*

---

---

---

---

---

---

---

---



## NIH Toolbox

Assessment of Neurological and Behavioral Function

## Olfaction

**Pamela Dalton, PhD MPH**  
**Monell Chemical Senses Center**  
**Philadelphia, PA**

**October 27, 2008**

For more information, please visit [www.nihtoolbox.org](http://www.nihtoolbox.org)  
Richard C. Gershon, PhD, PI [gershon@northwestern.edu](mailto:gershon@northwestern.edu)



This study is funded in whole or in part with Federal funds from the Blueprint for Neuroscience Research, National Institutes of Health under Contract No. HHS-N-260-2006-00007-C

---

---

---

---

---

---

---

---