

Autistic features linked to prenatal exposure to fire retardants and phthalates

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Wednesday, 04/13/2015

The Endocrine Disruption Exchange

CHE EDC Strategies Group

Conference Call

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Endocrine disrupting chemicals are present in our daily environment

Phthalates



Resistance
Flexibility
Brightness
Cheap to produce



Flame retardants (PBDEs)



Persistent
Bioaccumulative

Epidemiological studies linked endocrine disruptors with behavioral alterations



Motor Abnormalities

Anxiety



Language

Social Interaction

Repetitive Behavior

Immune Dysfunction



Intellectual Disability

Communications

Sleep Disturbances



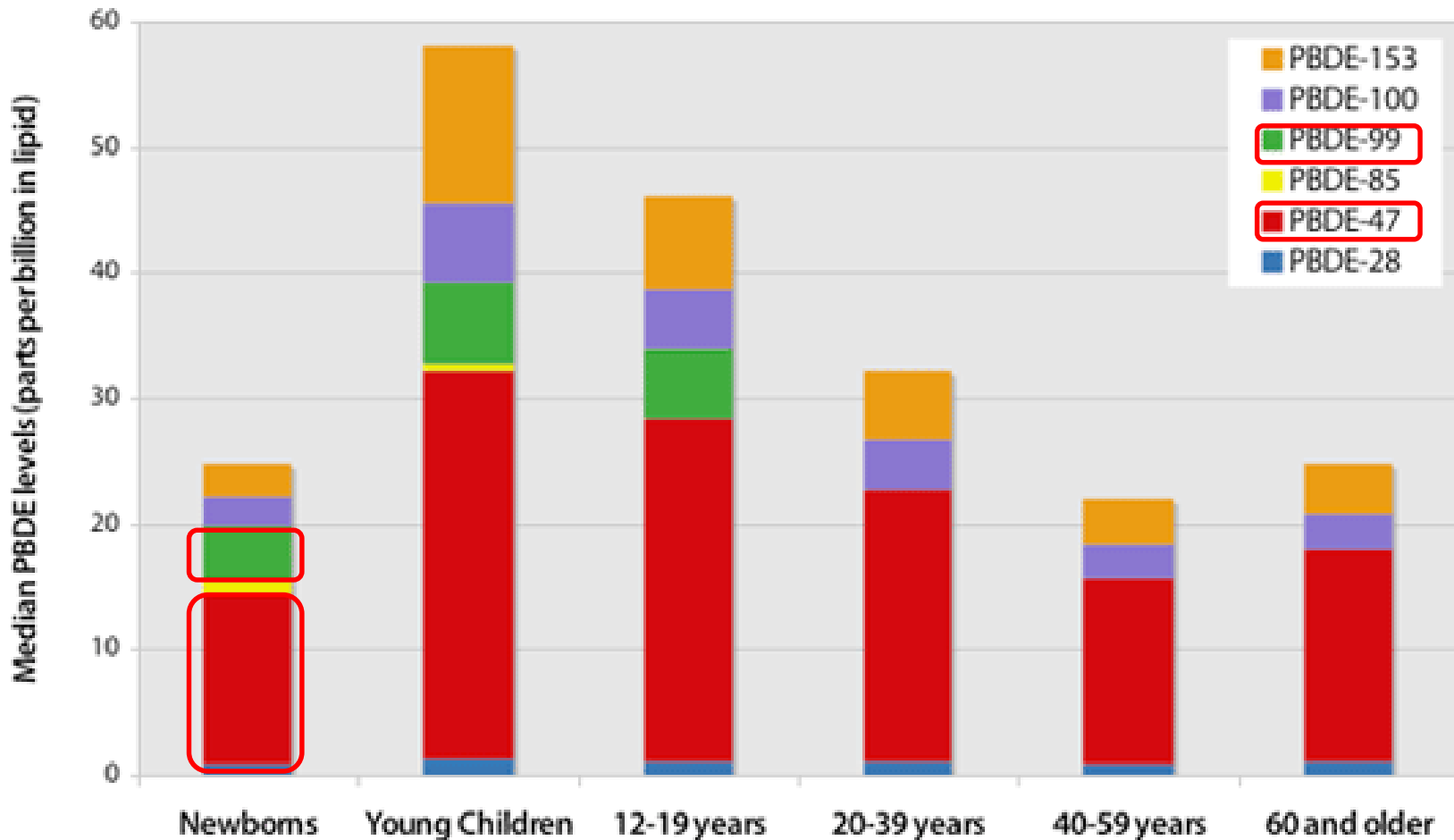
Seizure



www.roseindigo.com
www.wikirecent.com
www.amazon.fr
www.nania.com

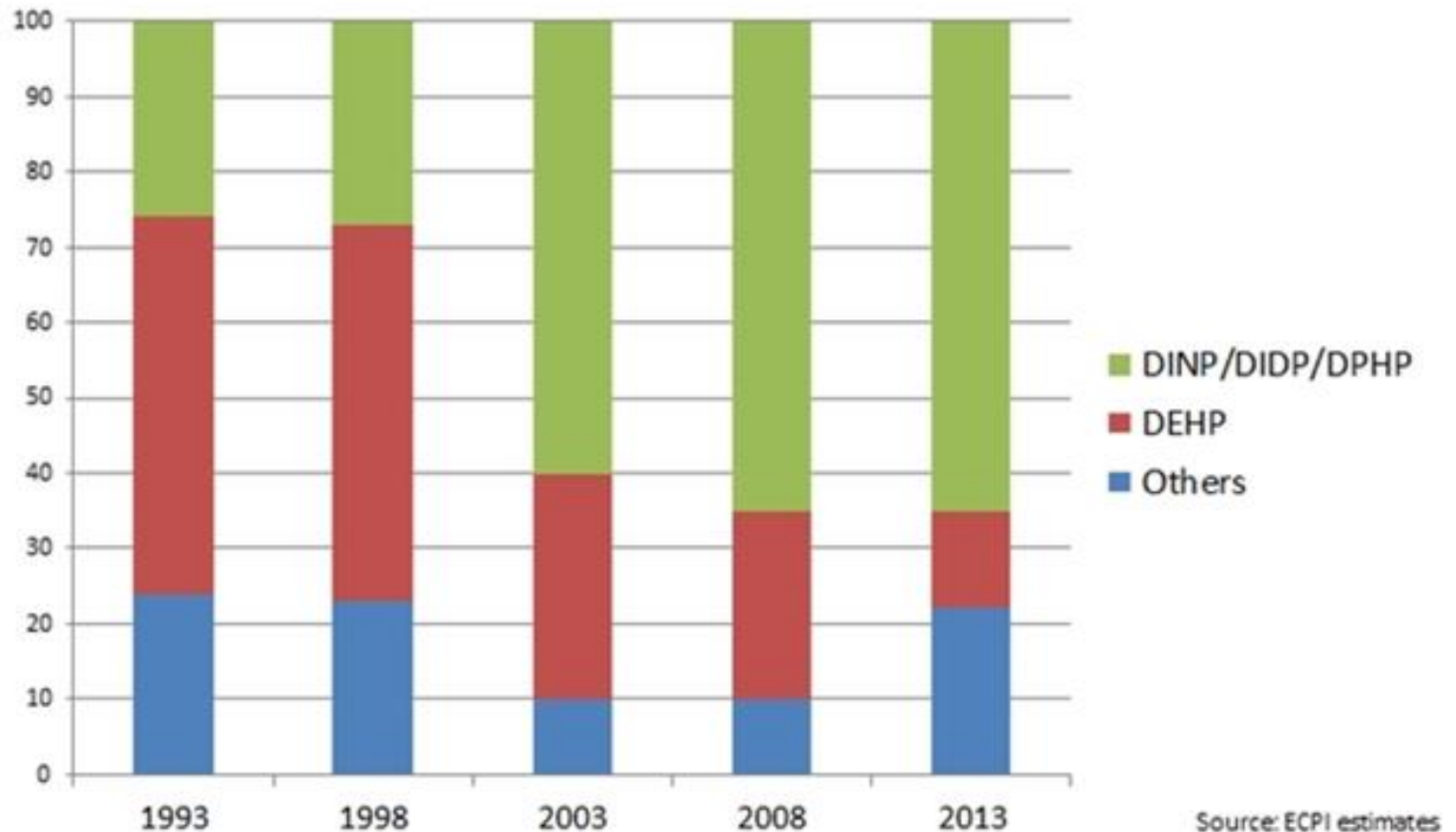
www.thefelicfiles.com
www.medibid.com
www.meublesetatmosphere.com
www.lanc.org.uk/

Global PBDEs exposure



EWG 'Toxic Compounds in Toddlers & Preschoolers 3x Higher Than in Moms'. 2008

Global phthalates exposure



<http://www.plasticisers.org/>

Our study design



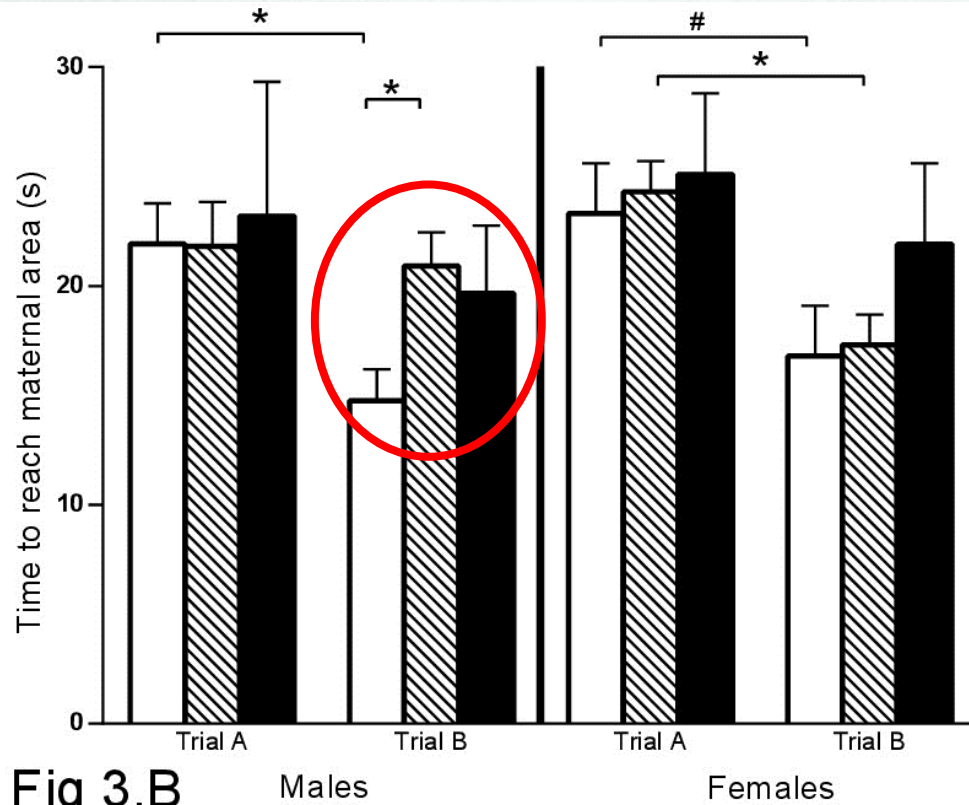
Tests	Age	Behavior tested
Nest-seeking behavior	P8	Maternal Bonding Communication
Open field	P20	Hyperactivity Exploration
Elevated Plus Maze	P25	Hyperactivity Anxiety
Prepulse Inhibition	P35	Sensorimotor gating
Social Interactions	P40	Sociability



Results:

Nest seeking behavior test

- C = Control
N= 20
- ▨ ED = exposed to
Endocrine Disruptors
N= 28
- VA = exposed to
Valproic Acid
N= 18



Endocrine disruptors



Specific to males
Less maternal bonding

Degroote, et al. *Endocrine Disruptors*. 2014

Results

Open Field et Elevated Plus Maze



- C = Control
N = 20
- ▨ ED = exposed to
Endocrine Disruptors
N = 28
- VA = exposed to
Valproic Acid
N = 18

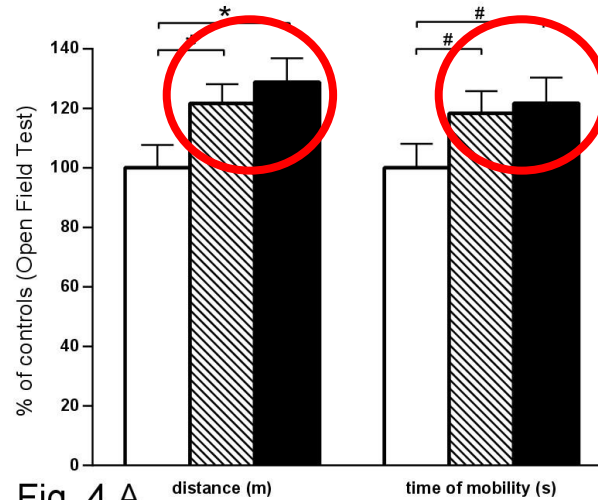


Fig. 4.A

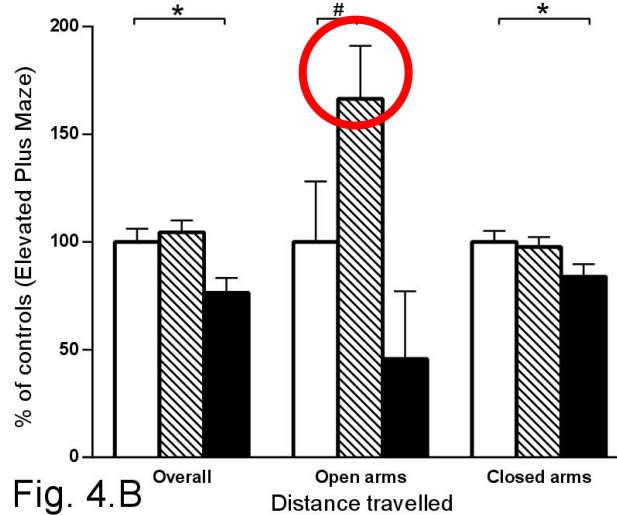
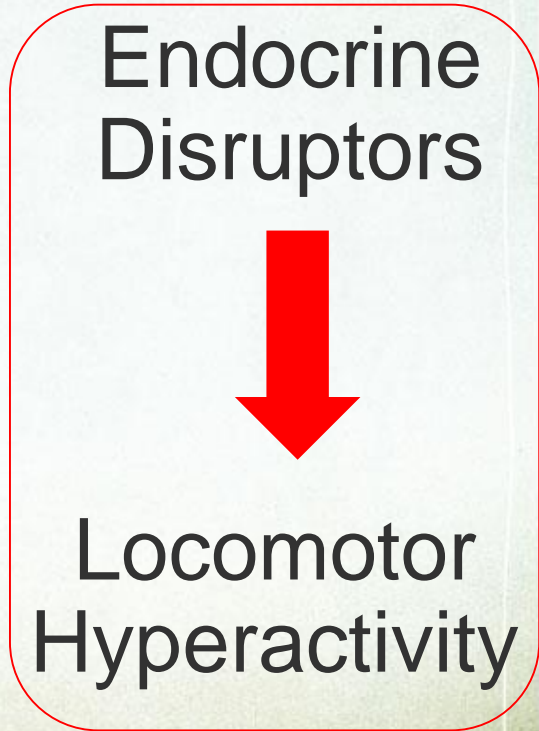


Fig. 4.B

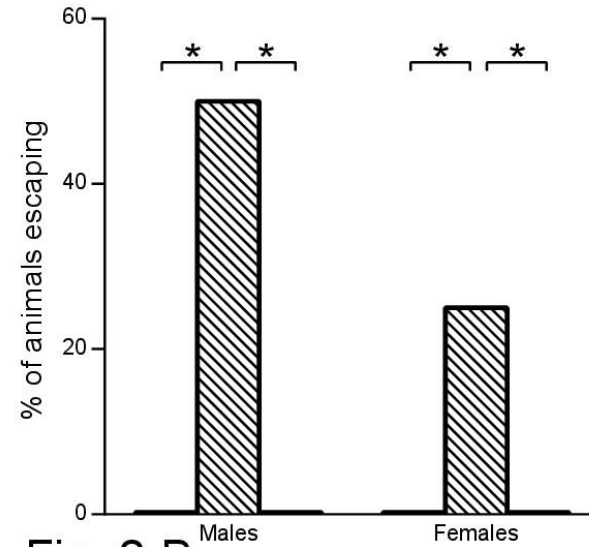
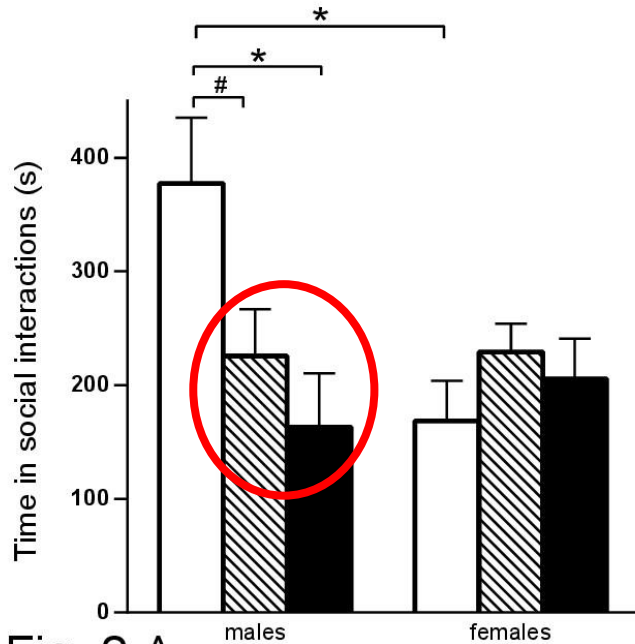


Degroote, et al. *Endocrine Disruptors*. 2014

Results

Social Interactions

- C = Control
N= 4
- ▨ ED = exposed to
Endocrine Disruptors
N= 8
- VA = exposed to
Valproic Acid
N= 6



Endocrine Disruptors



Alteration of social behavior in males only
Development of strong social avoidance

Results

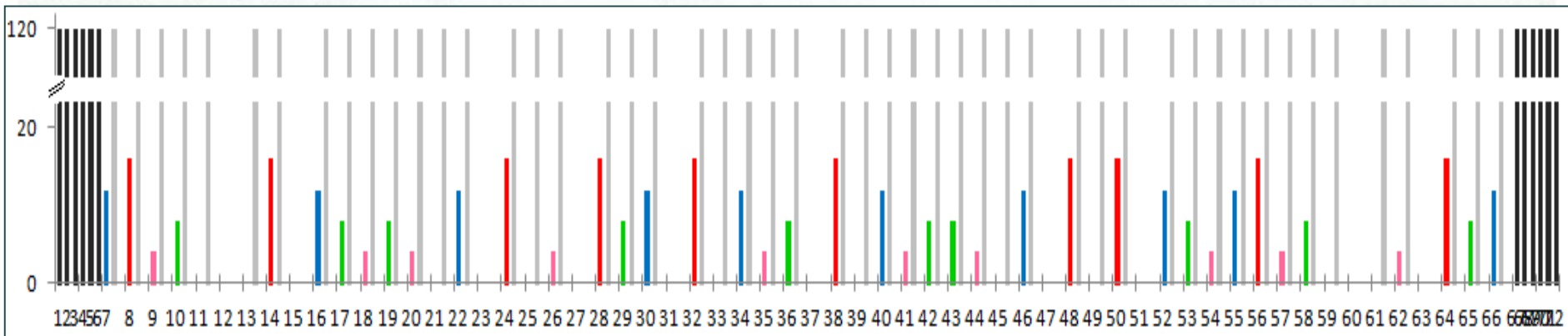
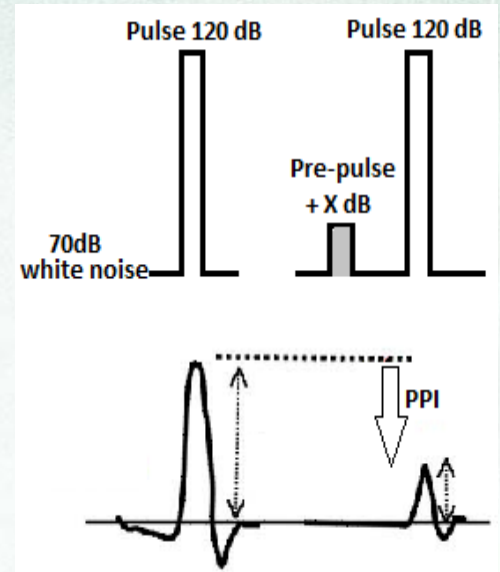
PrePulse Inhibition of the acoustic startle reflex test (PPI)



Pulse 120 dB :

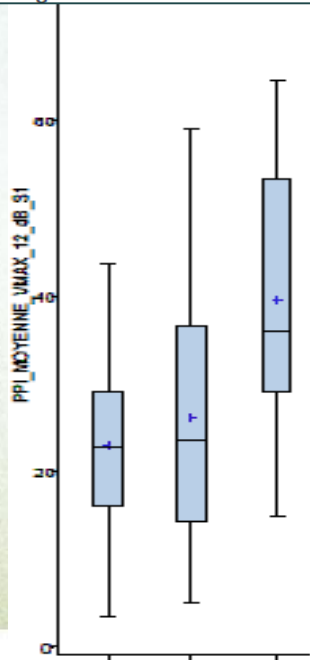
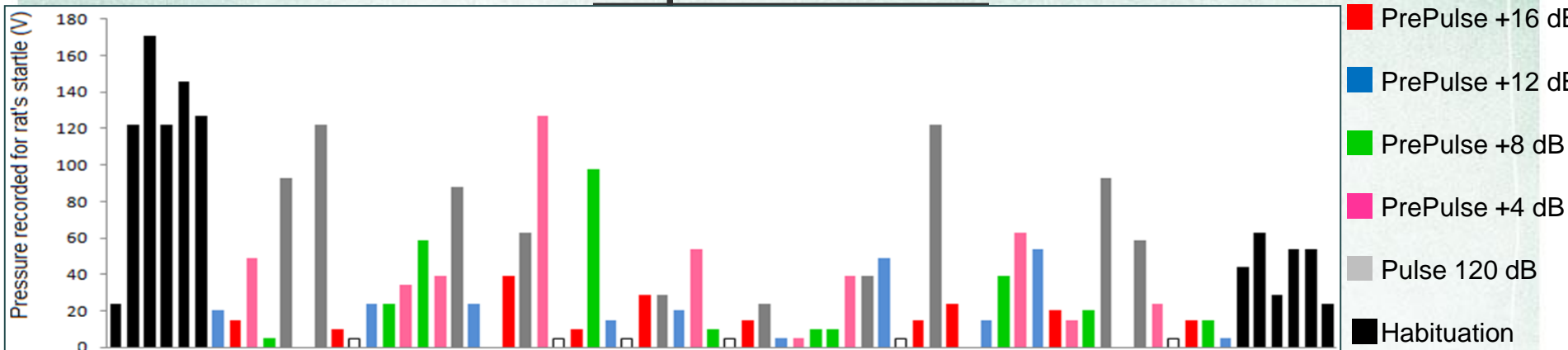
- For test session
- Evaluation for habituation

- Prepulse :
- +4 dB
 - +8 dB
 - +12 dB
 - +16 dB



Preliminary Results

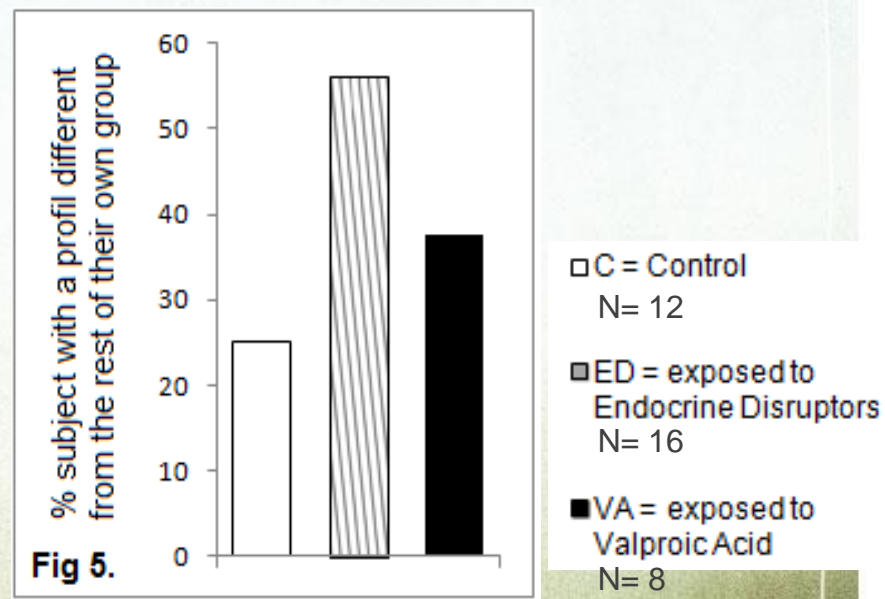
Prepulse Inhibition



Endocrine disruptors

↓

Intra individual
Intra group
Variability



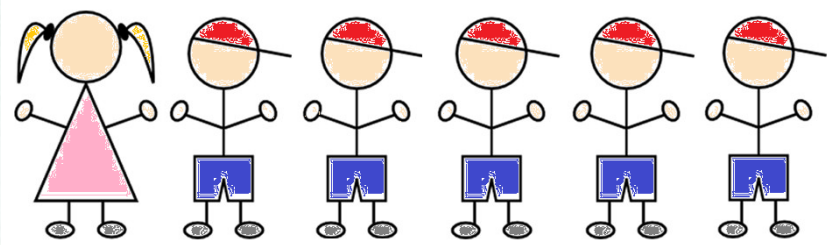
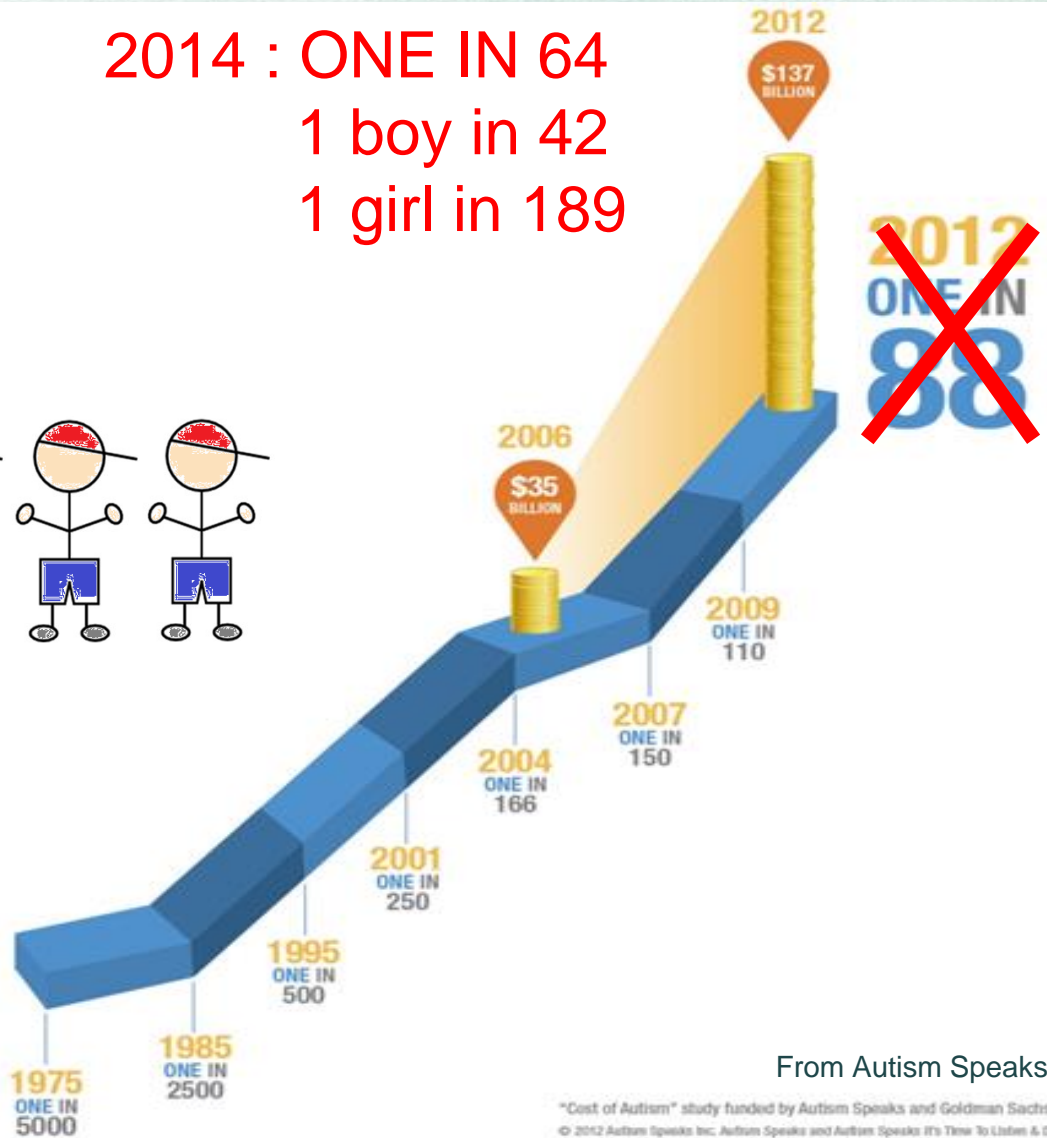
Results Summary

Tests	Behavior tested	EEDs	VPA
Nest-seeking behavior	Maternal bonding Communication	↓ ♂	↓ ♂
Open field	Hyperactivity	↑	↑
Elev Plus Maze	Hyperactivity	↑	
Elev Plus Maze	Anxiety		↑
Prepulse Inhibition	Sensorimotor gating Sensory profile	variability ++	variability ++
Social Interaction	Sociability	↓ ♂	↓ ♂

We characterized behavioral changes in juvenile rats relevant to autistic features

Autism is one of the major public health concerns

2014 : ONE IN 64
1 boy in 42
1 girl in 189



From Autism Speaks

*"Cost of Autism" study funded by Autism Speaks and Goldman Sachs.
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The developing brain is extremely sensitive to the endocrine disrupting chemicals found in our daily environment



These chemicals can contribute to the development of autism

www,gec2014.sciencesconf.org

How to reduce our daily exposure ?



<http://www.ewg.org/>
<http://healthychild.org/>



www.tdsniort.fr www.bebe.org www.customercareinfo.in
www.surprisedefrance.fr www.monquotidiennautrement.com
www.adepem.com www.fisher-price.com www.oransi.com
www.bharatmoms.com

Thank you



My supervisors

Our lab team
The animal facility staff

Thank you for your attention



QTNPR: Réseau de formation en recherche périnatale du Québec

CENTRE DE RECHERCHE



Centre d'excellence de L'Université de Sherbrooke en recherche Mère-Enfant



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