Stress, emotion and cognition : role of mineralo- and glucocorticoid receptors

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Chapter 9

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LIST OF ABBREVIATIONS

ACTH	adrenocorticotropin
ADX	adrenalectomy
AHC	ADX with high corticosterone substitution
ALC	ADX with low corticosterone substitution
ANOVA	analysis of variance
CA	closed arms
CA-	cornu ammonis area
CAPS	clinician administered PTSD scale
CORT	corticosterone
CR	conditioned response
CRFR	corticotropin-releasing factor receptor
CRH	corticotropin releasing hormone
CS	conditioned stimulus
DG	dentate gyrus
EPM	elevated plus maze
GABA	gamma-aminobutyric acid
GLM	general linear model
GR	glucocorticoid receptor
GRE	glucocorticoid response elements
HPA	hypothalamus-pituitary-adrenal
IES	impact of events scale
IL	infralimbic
IZ	intermediate zone
KO	knockout
LAL	long attack latency
LTP	long term potentiation
MHB	modified holeboard
MR	mineralocorticoid receptor
MRCaMKCre	MRflox/floxCaMKCre mice
NMDA	N-methyl-D-aspartate
OA	open arms
OD	optical density
PCA	principal component analysis
PCL	PTSD symptoms checklist
PET	positron emission tomography
PFC	prefrontal cortex
PL	prelimbic
PTSD	post traumatic stress disorder

PVN	paraventricular nucleus
SAL	short attack latency
SEM	standard error of means
US	unconditioned stimulus
VP	vasopressin

CURRICULUM VITAE

Vera Brinks werd op 11 september 1980 geboren te Rotterdam. Zij behaalde in 1998 haar VWO diploma aan het Citycollege St. Fransiscus te Rotterdam. Aansluitend begon zij met de studie biofarmaceutische wetenschappen aan de Universiteit van Leiden. Als onderdeel van deze studie heeft zij zich gespecialiseerd in de neurobiologie door middel van een stage bij de afdeling Medische Farmacologie van het LACDR. Tijdens deze stage heeft zij onder begeleiding van Prof. Dr. M.S. Oitzl en dr. I. de Jong het gedrag van muizen en de neuronale expressie van stressgerelateerde genen in de hersenen bepaald na stimulatie met cocaïne. In februari 2003 heeft zij haar doctoraalexamen behaald. Aansluitend is zij begonnen aan haar promotieonderzoek genaamd "Stress hormone effects on cognitive performance" bij de vakgroep Medische Farmacologie (LACDR, Universiteit Leiden). Dit onderzoek werd uitgevoerd onder begeleiding van Prof. Dr. M.S. Oitzl en Prof. Dr. E.R. de Kloet. Sinds 1 februari 2008 is Vera Brinks werkzaam als postdoc bij de afdeling Biofarmacie en Farmaceutische Technologie (UIPS, Universiteit Utrecht), waar zij werkt aan de immunogeniciteit van therapeutische eiwitten onder leiding van Prof. Dr. H. Schellekens en Prof. Dr. W. Jiskoot.

PUBLICATIONS

Publications

Brinks V, de Kloet ER, Oitzl MS. Strain specific fear behaviour and glucocorticoid response to aversive events: modelling PTSD in mice. *Progress in Brain Research* (2008) 167:257-61.

Dalm S, Brinks V, van der Mark MH, de Kloet ER, Oitzl MS. Non-invasive stress-free application of glucocorticoid ligands in mice. *J Neurosci Methods*. (2008) 170(1):77-84.

Brinks V, van der Mark M, de Kloet ER, Oitzl MS. Emotion and cognition in high and low stress sensitive mouse strains: a combined neuroendocrine and behavioral study in BALB/c and C57BL/6J mice. *Frontiers in Behavioral Neuroscience (2007)*1:8 doi 10.3389/neuro.08.008.2007.

Brinks V, van der Mark MH, de Kloet ER, Oitzl MS. Differential MR/GR activation in mice results in emotional states beneficial or impairing for cognition. *Neural Plasticity,* Volume 2007 (2007) 90163.

Brinks V, de Kloet ER, Oitzl MS. Corticosterone facilitates extinction of fear memory in BALB/c mice but strengthens cue related fear in C57BL/6 mice. *Accepted in Experimental neurology*.

Brinks V, Berger S, Gass P, de Kloet ER, Oitzl MS. Mineralocorticoid receptors control emotional arousal and fear extinction. *Submitted to Hormones & Behavior*.

Bookchapter

Brinks V, Dalm S, Oitzl MS. Genetic mouse models of neurobehavioural disorders: Stress-related psychiatric disorders In Wim E. Crusio, Frans Sluyter, and Robert T. Gerlai (eds). *Handbook of Behavioral Genetics of the mouse*. Elsevier, Amsterdam *(submitted)*.

Poster presentations

Corticosterone effects on fear memory depend on time of injection and genetic background of mice

- Endo-Neuro-Psycho Meeting, Doorwerth, June 2006.

Molecular and behavioural characterisation of male BALB/c and C57BL/6J mice
- LACDR spring symposium, April 2005, Amsterdam.
- Endo-Neuro-Psycho Meeting, June 2005, Doorwerth.
- ULLA summerschool, July 2005, Uppsala.
- Published in Acta Neurobiologiae Experimentalis, vol 65, suppl 2005, p72-73.

Emotional and cognitive performance in response to Mineralo-(MR) and Glucocorticoid receptor (GR) activation in male C57BL/6J mice
- FENS, July 2004, Lissabon.
- Endo-Neuro-Psycho Meeting, June 2004, Doorwerth.
- NWO cognitiedag, December 2004, Den Haag.

Cognitive processes: a synergy of glucocorticoid action between mineralo-MR and glucocorticoid-GR receptors
- LACDR, Spring symposium, April 2003, Amsterdam.

Invited oral presentations
Glucocorticoid effects on learning and memory. Seminar, January 6, 2009, Bochum University, Germany.

Veteran mice: How do Traumatic memories develop and can we disrupt them? LACDR Spring Symposium, April 4, 2007, Amsterdam and Figon Dutch Medicine Days, Oktober 3, 2007, Lunteren.

Differential contribution of memory systems in C57BL/6J and BALB/c mice during fear conditioning. Opening of the IRTG, July 2007, Trier, Germany.

The impact of genetic backround and corticosterone administration on memory for a negative event. TeaP congress, March 26-28, 2007, Trier, Germany.

Distinct influence of corticosterone on fear conditioning in C57BL/6J and BALB/c mice. SILS Masterclass, "Influence of stress hormones on behaviour", December 11, 2006, Amsterdam.

Stress hormones in emotion and cognition: Developing a behavioural task for Post Traumatic Stress Disorder. KNAW masterclass "stress hormones and post traumatic stress disorder", August 30, 2006, Amsterdam.

Involvement of the stress system in fear conditioning. Endo-Neuro-Psycho Meeting, June 7, 2006, Doorwerth.

MR/GR balance in emotion and cognition: C57BL/6 and BALB/c mouse strains as model for MR/GR mediated differences in emotion and cognition. Workshop "Animal models in cognitive neuroscience", October 25, 2005, Oud Poelgeest, Leiden.

Emotional and cognitive processes: a synergy of glucocorticoid action via the mineralocorticoid (MR) and glucocorticoid (GR) receptors. Endo-Neuro-Psycho Meeting, June 2, 2005, Doorwerth.

Stress, emotions and cognition. NWO cognitiedag, December 22, 2004, Den Haag.

Awards

Poster presentations

- 1st prize at the Endo-Neuro-Psycho meeting, June 2005. Title: Molecular and behavioural characterisation of male BALB/c and C57BL/6J mice.
- 2nd prize at the NWO cognitiedag, December 2004, Den Haag. Title: Emotional and cognitive performance in response to Mineralo-(MR) and Glucocorticoid receptor (GR) activation in male C57BL/6J mice.

Oral presentations

- 2nd prize at the Figon Dutch Medicine Days, Oktober 3, 2007, Lunteren. Title: Veteran mice: How do Traumatic memories develop and can we disrupt them?
- 1st prize at the LACDR Spring Symposium, April 4, 2007, Amsterdam. Title: Veteran mice: How do traumatic memories develop and can we disrupt them?

Scholarships:

Dr. J.L. Dobberke Stichting voor Vergelijkende Psychologie, Title: Lange termijn angstgeheugen en uitdoving van een negatieve ervaring, 2008.

Hamilton Kinder Scholarship for the 2nd Annual Experimental Neurogenetics of the Mouse, University of Tennessee, Memphis 2005, USA.