Lésions neurologiques a partir des situations de maltraitance

Prof. Francesc Botet

Mars 2019

Universitat de Barcelona

Clínic Barcelona Hospital Universitari

Soins parentaux

Comportement des enfants
Maturation cérébraux
Développement psychologique
et émotionnel

Cassiers LLM. Front Psychiatry. 2018; 9:329

Traumatismes infantiles

Violence sexuelle

Violence physique

Violence psychologique

Négligence

Peuvent avoir des effets sur le cerveau qui persistent jusqu'à l'âge adulte

Cassiers LLM. Front Psychiatry. 2018; 9:329

Pathogenèse

Equilibre = Homéostasie

Facteurs de stress

Réponses physiologiques

Réponses comportementales

Chrousos GP. Nat Rev Endocrinol. 2009;5;374

Stress

L'activité de base optimale

Capacité de réponse

Sentiment de bien-être

Pathogenèse

Axe hypothalamus-hypophyso-surrénalien

Taux anormaux de glucocorticoïdes

Réorganisation plastique de protection

Lupien SJ. Nat Rev Neurosci. 2009;10:434

Chrousos GP. Nat Rev Endocrinol. 2009;5;374

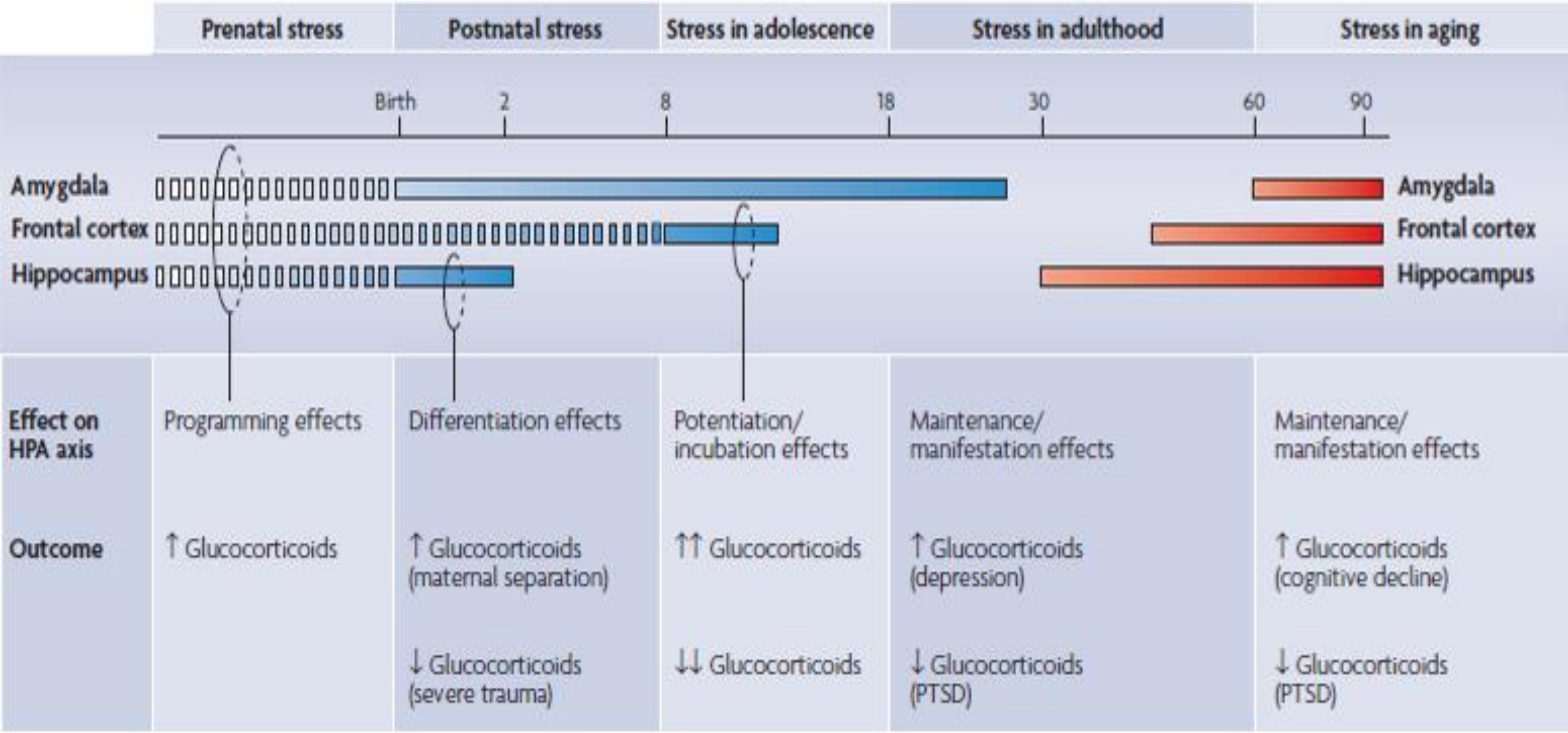
Heim CM.Am J Psychiatry. 2013;170:616

Taux élevé de corticoïdes:

développement de l'hippocampe, de l'amygdale et du cortex frontal

Exposition prolongée aux corticostéroïdes:

réduit la capacité de résister aux agressions, toxines ou par l'âge



Lupien SJ. Nat Rev Neurosci. 2009;10:434

Imagerie cérébrale

Résonance magnétique (IRM): volume, structure

Résonance magnétique fonctionnelle (IRMf): activation

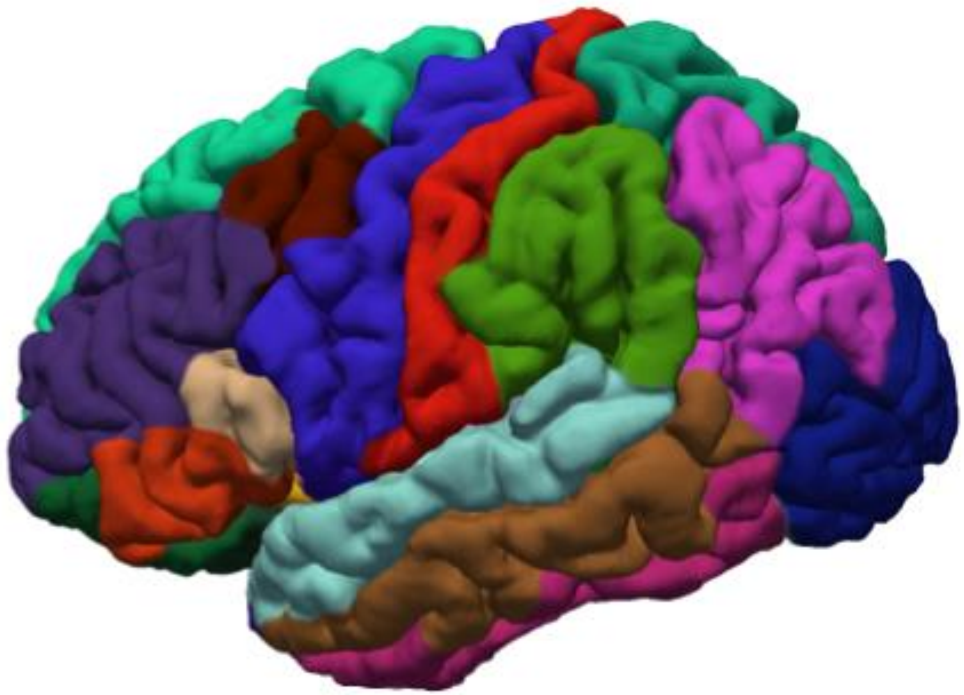
Tenseur de diffusion (DTI): connexions

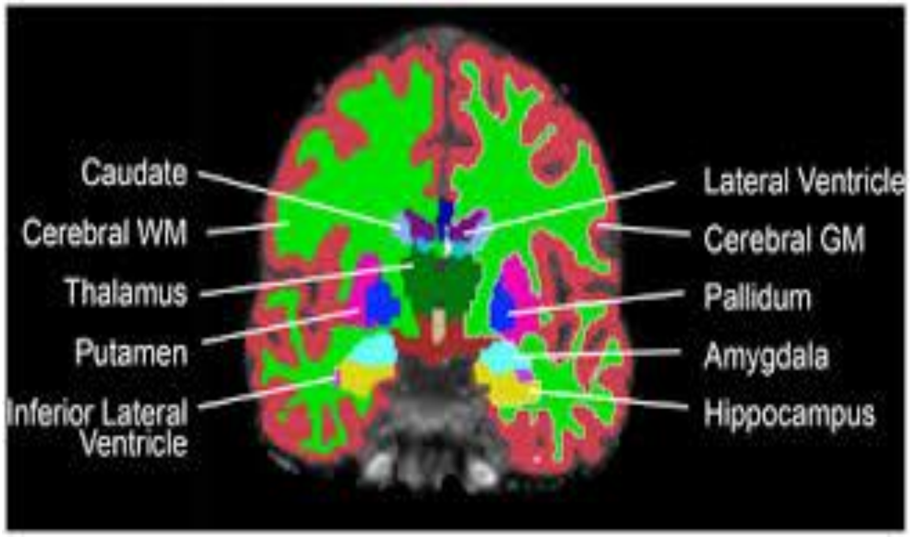
FreeSurfer

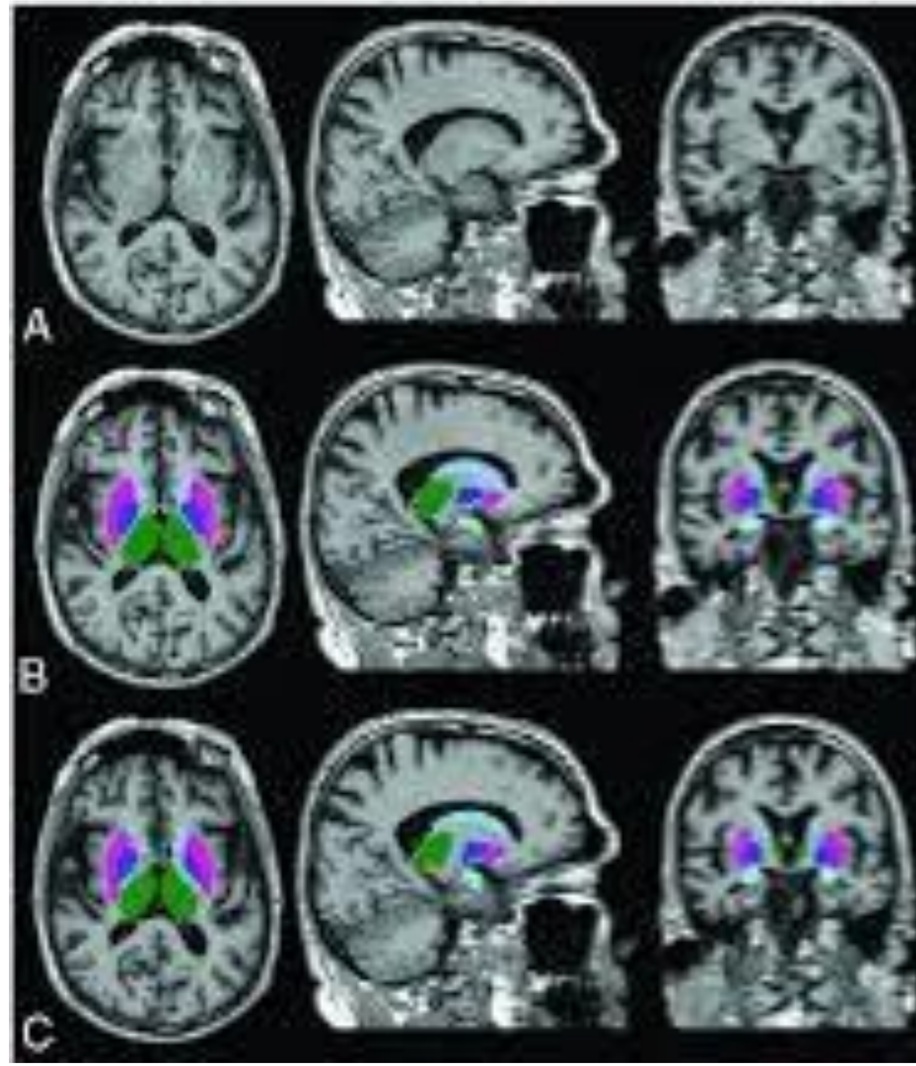
Software d'analyse et de visualisation structurelle et fonctionnelle des neuroimages

https://www.martinos.org/lab/lcn/resources

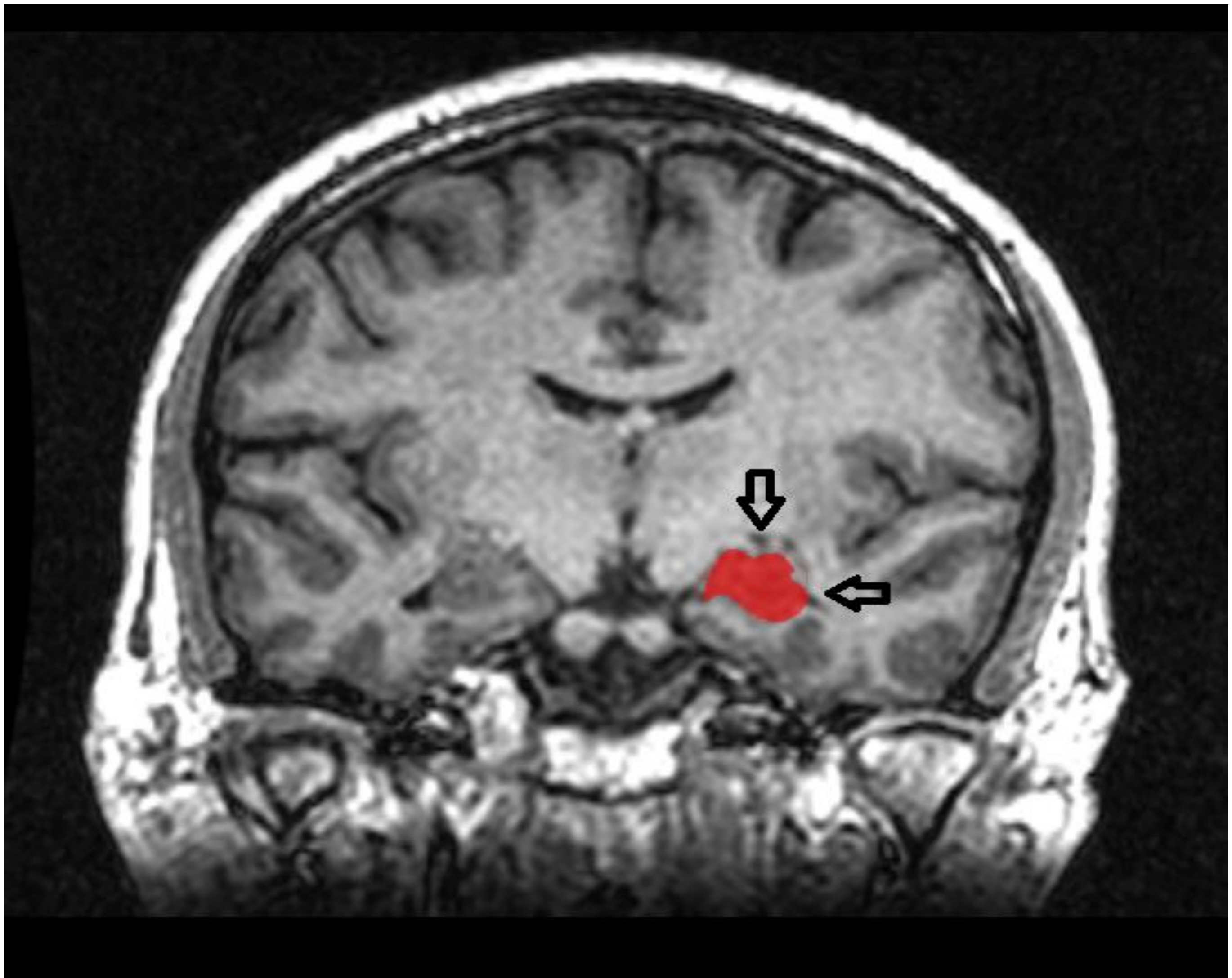
Surface cortical




Caudate
Cerebral WM
Thalamus
Putamen
Inferior Lateral Ventricle
Lateral Ventricle
Cerebral GM
Pallidum
Amygdala
Hippocampus


A
B
C

Structures sous-corticales: hippocampe



Voxel

Voxel: “volume” et “píxel”

C'est la plus petite partie distincte d'une image en trois dimensions

Les voxels sont souvent utilisés pour l'analyse de données médicales

IRMf

Signal dépendant du niveau d'oxygène
BOLD (blod-oxygen-level dependent)

Variations locales et transitoires

Activité neuronale du cerveau

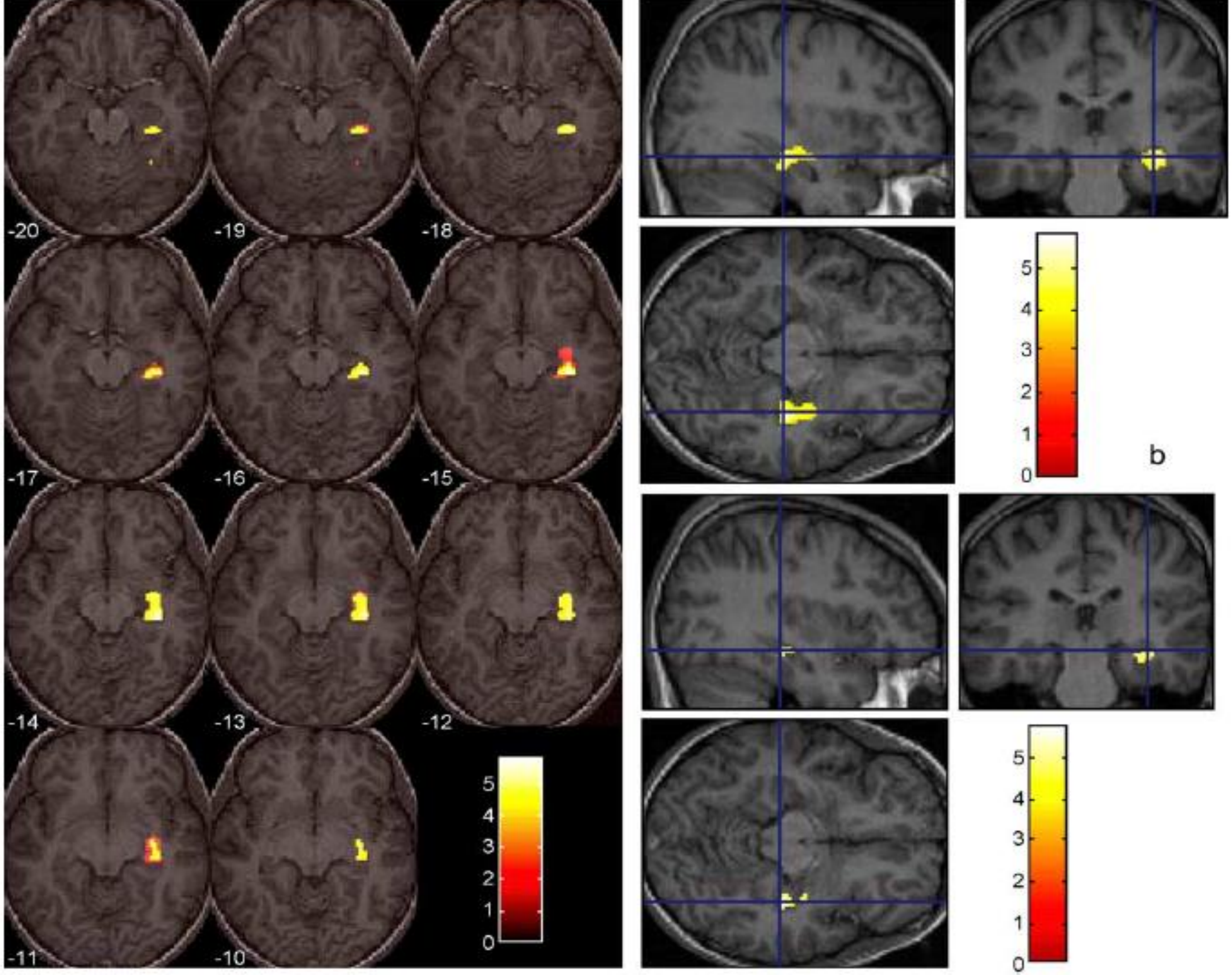


Fig. 2. Functional MRI results. Right hippocampal differences between prematures and controls (prematures > controls) in activation (memory activation task > control task contrast). Statistical Parametric Maps with left as left, according to neurological convention. Axial (a.1) and coronal (a.2) views showing the results of the whole brain analysis (voxel level $P < 0.0001$; clusters > 20 contiguous voxels) (b) hippocampal ROI analysis (FWE-corrected voxel level $P < 0.05$; clusters > 20 contiguous voxels). The global and ROI results are overlapped in a T1 standard control brain.

Gimenez M, Junque C, Botet F, et al. NeuroImage. 2005; 25:561

Tenseur de diffusion

Diffusion molécules d'eau

Axones parallèles et leur couche de myéline

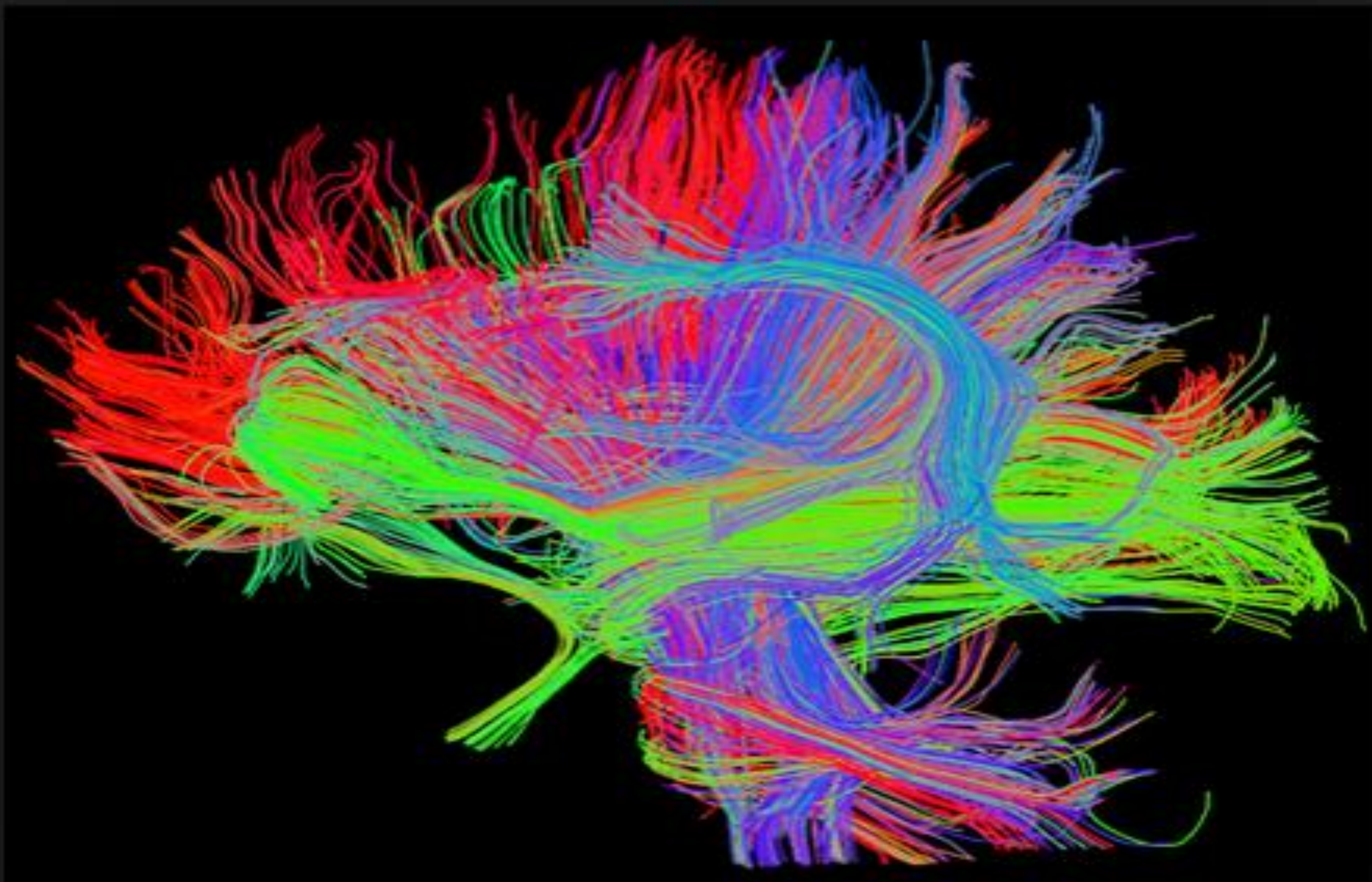
Fibres visibles

L'IRM de diffusion: connectivité cérébrale

GRETNA. https://www.nitrc.org

TrackVis. https://www.martinos.org/lab/lcn/resources

Images de tractographie

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Santander
Bayonne
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Carcassonne
Béziers
Narbonne
Marseille
Toulon
Vitoria-Gasteiz
Pamplona
Foix
Perpignan
Burgos
Logroño

Bouchon !

Goscinny & Uderzo.   (50 av J.-C.)

Acta Psychiatrica Scandinavica

Acta Psychiatr Scand 2015: 132: 244–256

DOI: 10.1111/acps.12455

ACTA PSYCHIATRICA SCANDINAVICA

Childhood neglect predicts disorganization in schizophrenia through grey matter decrease in dorsolateral prefrontal cortex

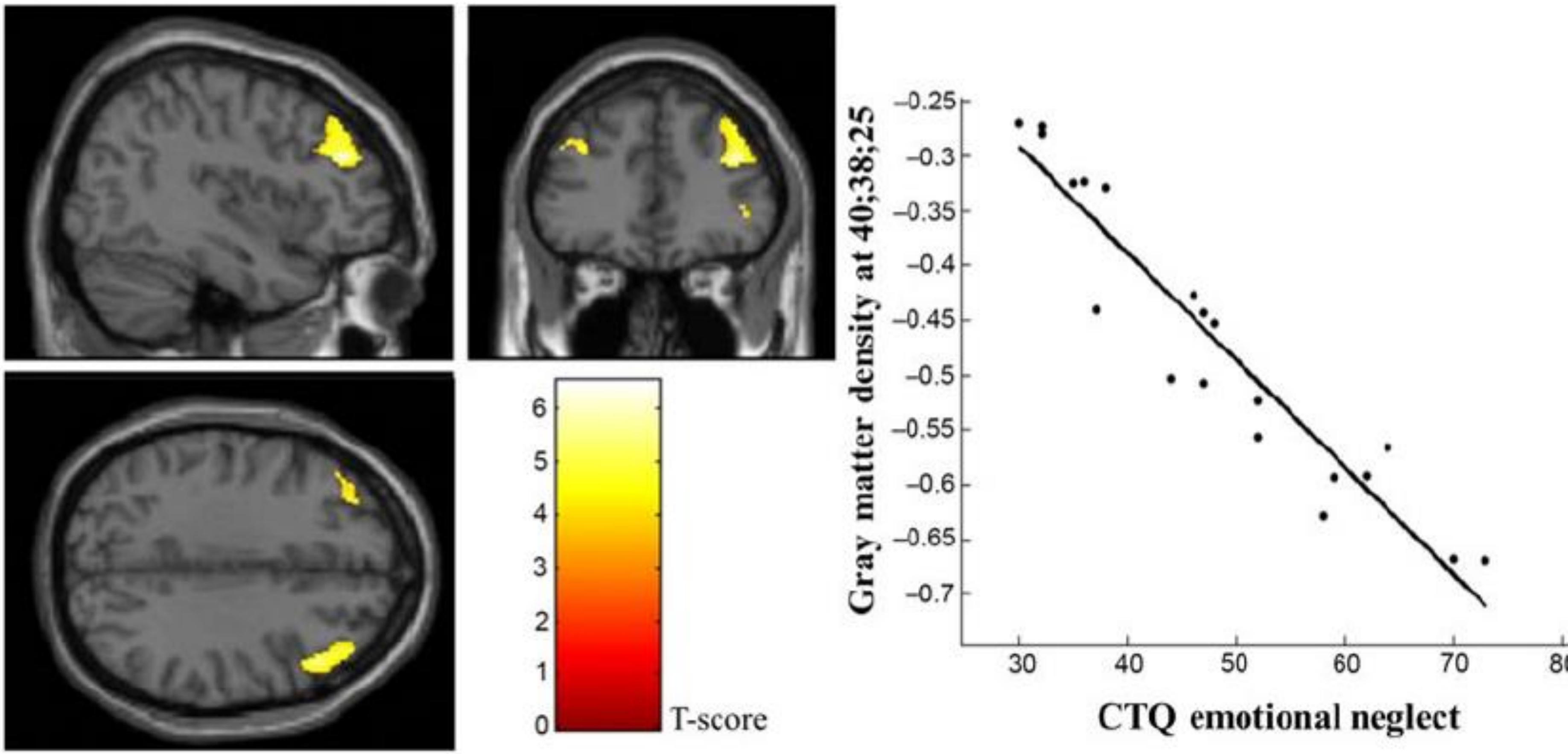
Cancel A, Comte M, Truillet R, Boukezzi S, Rousseau P-F, Zendjidjian XY, Sage T, Lazerges P-E, Guedj E, Khalfa S, Azorin J-M, Blin O, Fakra E. Childhood neglect predicts disorganization in schizophrenia through grey matter decrease in dorsolateral prefrontal cortex.

Objective: Psychosocial trauma during childhood is associated with schizophrenia vulnerability. The pattern of grey matter decrease is similar to brain alterations seen in schizophrenia. Our objective was to explore the links between childhood trauma, brain morphology and schizophrenia symptoms.
Method: Twenty-one patients with schizophrenia stabilized with atypical antipsychotic monotherapy and 30 healthy control subjects completed the study. Anatomical MRI images were analysed using

A. Cancel[1,2], M. Comte[1], R. Truillet[3], S. Boukezzi[1], P.-F. Rousseau[1,4], X. Y. Zendjidjian[5], T. Sage[6], P.-E. Lazerges[7], E. Guedj[1,8], S. Khalfa[1], J.-M. Azorin[1,7], O. Blin[1,3], E. Fakra[1,2]

[1]Timone Institute of Neuroscience, UMR 7289, CNRS and Aix-Marseille University, Marseille, [2]Department of Psychiatry, University Hospital of Saint-Etienne, Saint-Etienne, [3]Public Assistance for Marseille Hospitals (APHM) Unit for Clinical Pharmacology and Therapeutic Evaluation (CIC-UPCET), CHU Timone Hospital,

Cancel A. Acta Psychiatr Scand.2015; 132:244



p FWE	p FDR	k	Anatomical region	Z-score	MNI Coordinates
Right dorsolateral prefrontal cortex					
0.003	0.007	1 113	Middle frontal gyrus	4.33	40;38;25
			Brodmann area 9	3.65	42;36;39

Négligence et schizophrénie

Négligence: diminution matière gris dans le cortex préfrontal

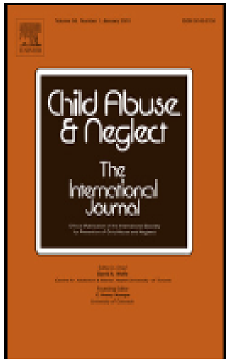
Lié à la gravité de la désorganisation

Susceptibilité génétique au stress

Évaluer la négligence envers les enfants dans la schizophrénie

Contents lists available at ScienceDirect

Child Abuse & Neglect



Full Length Article

Altered brain network topology in left-behind children: A resting-state functional magnetic resonance imaging study

Youjin Zhao[a,b,1], Meimei Du[a,1], Xin Gao[a,b,1], Yuan Xiao[b], Chandan Shah[b], Huaiqiang Sun[b], Fuqin Chen[b], Lili Yang[a], Zhihan Yan[a], Yuchuan Fu[a], Su Lui (MD, PhD) (Professor of Radiology)[a,b,*]

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[b] *Huaxi MR Research Center (HMRRC), Department of Radiology, West China Hospital of Sichuan University, Chengdu 610041, PR China*

Zhao Y. Child Abuse Neglect. 2016; 62:89

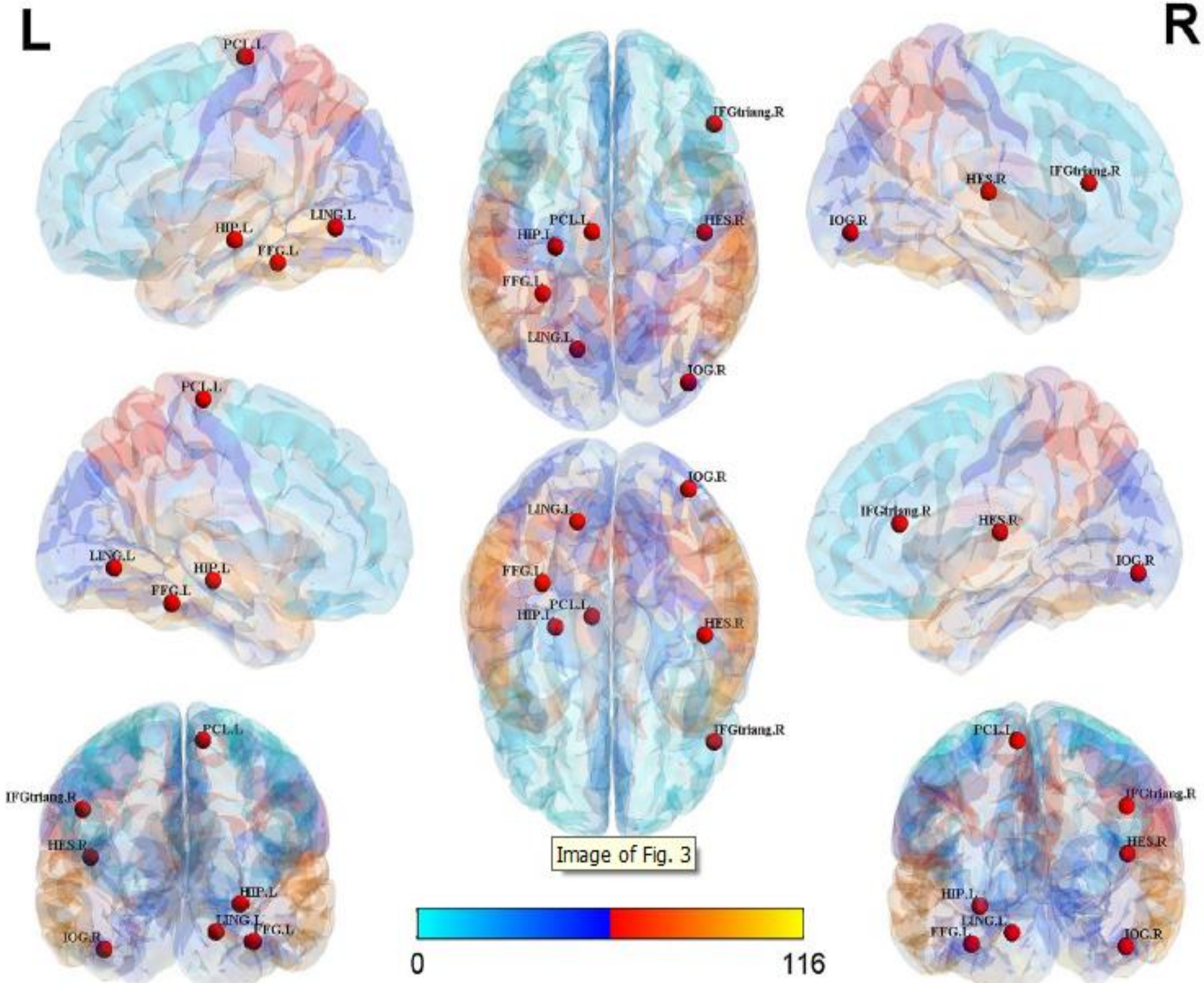

Fig. 3. LBC showed significantly increased nodal centralities in comparison with non-LBC controls. Abbreviations: FFG.L, left fusiform; HES.R, right Heschl; HIP.L, left hippocampus; IFGtriang.R, right inferior frontal gyrus triangular part; IOG.R, right inferior occipital; L, left; LBC, left-behind children; Ling.L, left lingual; non-LBC, children living within the nuclear family; PCL.L, left paracentral lobule; R, right.

Altered Brain Network Integrity After Childhood Maltreatment: A Structural Connectomic DTI-Study

V.B. Puetz,[1†*] D. Parker,[2†] N. Kohn,[3] B. Dahmen,[4] R. Verma,[2‡] and K. Konrad[4,5,6‡]

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[2]*Section of Biomedical Image Analysis, Perelman School of Medicine, University of Pennsylvania, Philadelphia*
[3]*Radboud University Medical Centre, Donders Institute for Brain, Cognition and Behaviour, Nijmegen, Netherlands*
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[5]*JARA-Brain Institute II, Molecular Neuroscience and Neuroimaging, RWTH Aachen & Research Centre Juelich, Germany*
[6]*Child Neuropsychology Section, Department of Child and Adolescent Psychiatry, Psychotherapy and Psychosomatics, University Hospital RWTH Aachen, Germany*

Puetz VB. Hum Brain Mapp 2017; 38: 855-868

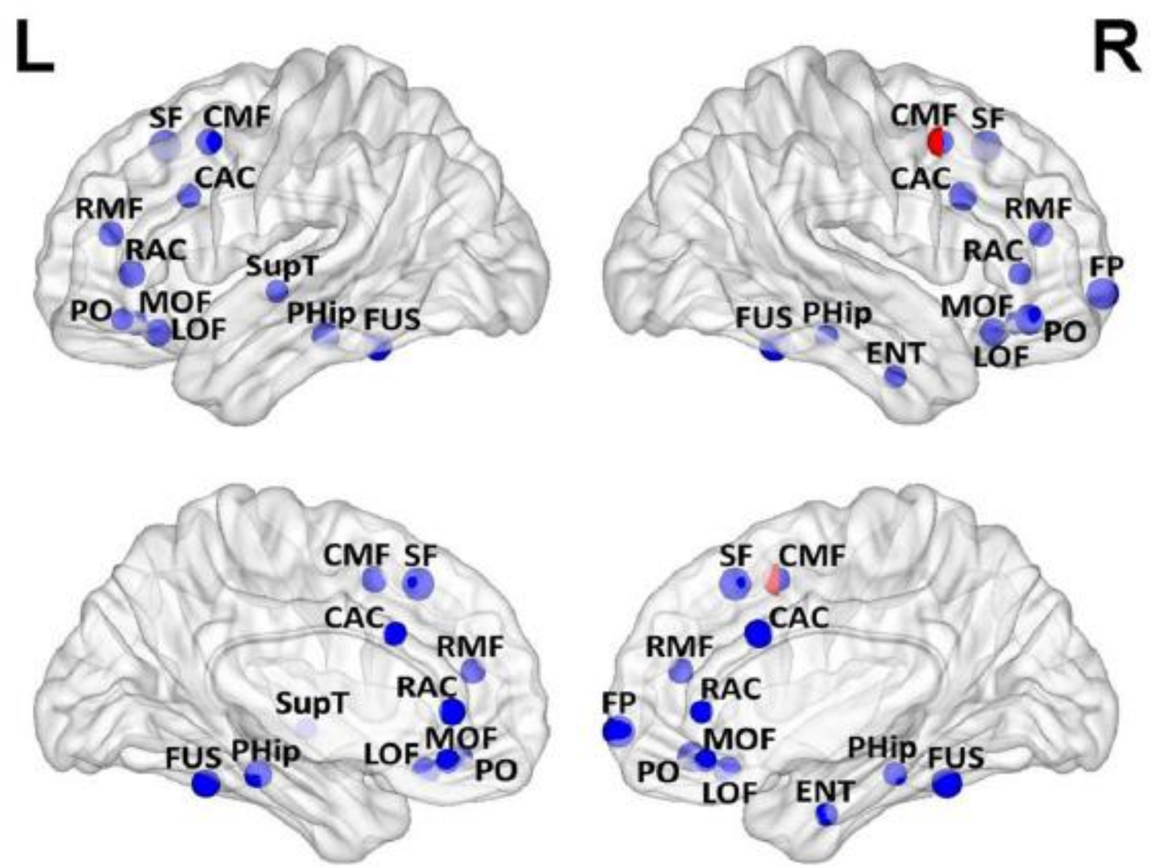

Figure 1.

Node measures of the individual regions of the frontal and temporal lobe ($n = 25$ MT; $n = 24$ Controls), placed in the brain according to the coordinates of their centroids. Blue spheres represent statistically significantly higher UNS in controls, with asterisks denoting results that survive FDR correction for multiple comparisons. Red spheres represent statistically significantly higher local efficiency in controls. In two nodes with significant results for both node strength and local efficiency, half of each sphere has been depicted. The diameter of each sphere is proportional to the Cohen's d effect size measure (Min: 0.68, Max: 1.21). Nodes were plotted using the BrainNet Viewer software [Xia et al., 2013]. Abbreviations: L = Left; R = Right; RMF= rostral middle frontal gyrus; SF= superior frontal gyrus; CAC= caudal anterior cingulate; CMF= caudal middle frontal gyrus; PC= precentral gyrus; RAC= rostral anterior cingulate; PT= pars triangularis; LOF= lateral orbitofrontal gyrus; TP= temporal pole; SupT= superior temporal gyrus; PHip= parahippocampal gyrus; FUS= fusiform gyrus; BSS=; IC= isthmus cingulate; FP= frontal pole; MOF= medial orbitofrontal gyrus; ENT= entorhinal gyrus; PO= pars orbitalis.

frontiers in Psychiatry

SYSTEMATIC REVIEW
published: 03 August 2018
doi: 10.3389/fpsyt.2018.00329

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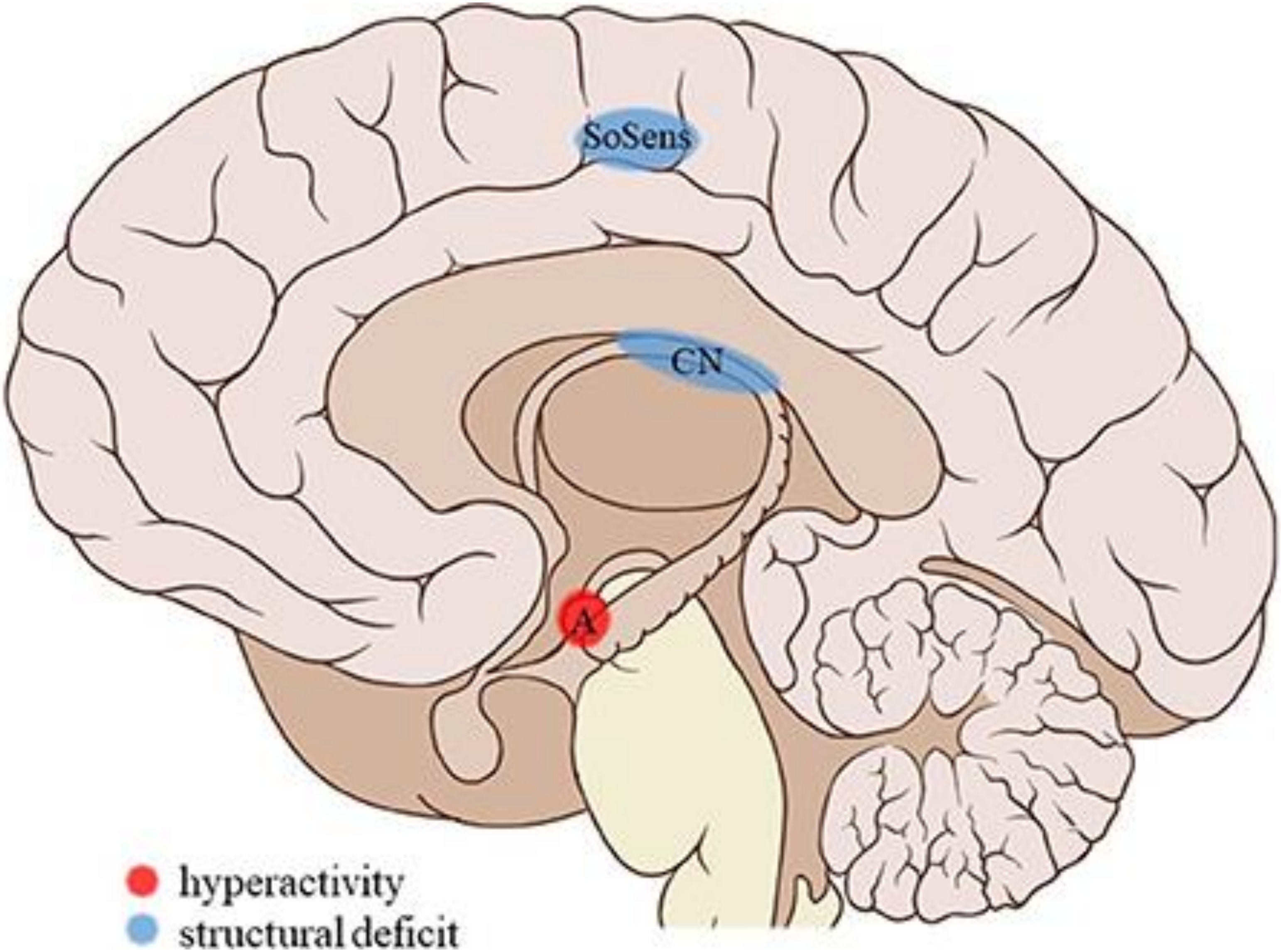
Structural and Functional Brain Abnormalities Associated With Exposure to Different Childhood Trauma Subtypes: A Systematic Review of Neuroimaging Findings

Laura L. M. Cassiers[1,2*], Bernard G. C. Sabbe[1,3], Lianne Schmaal[4,5,6], Dick J. Veltman[6,7], Brenda W. J. H. Penninx[6,7] and Filip Van Den Eede[1,2]

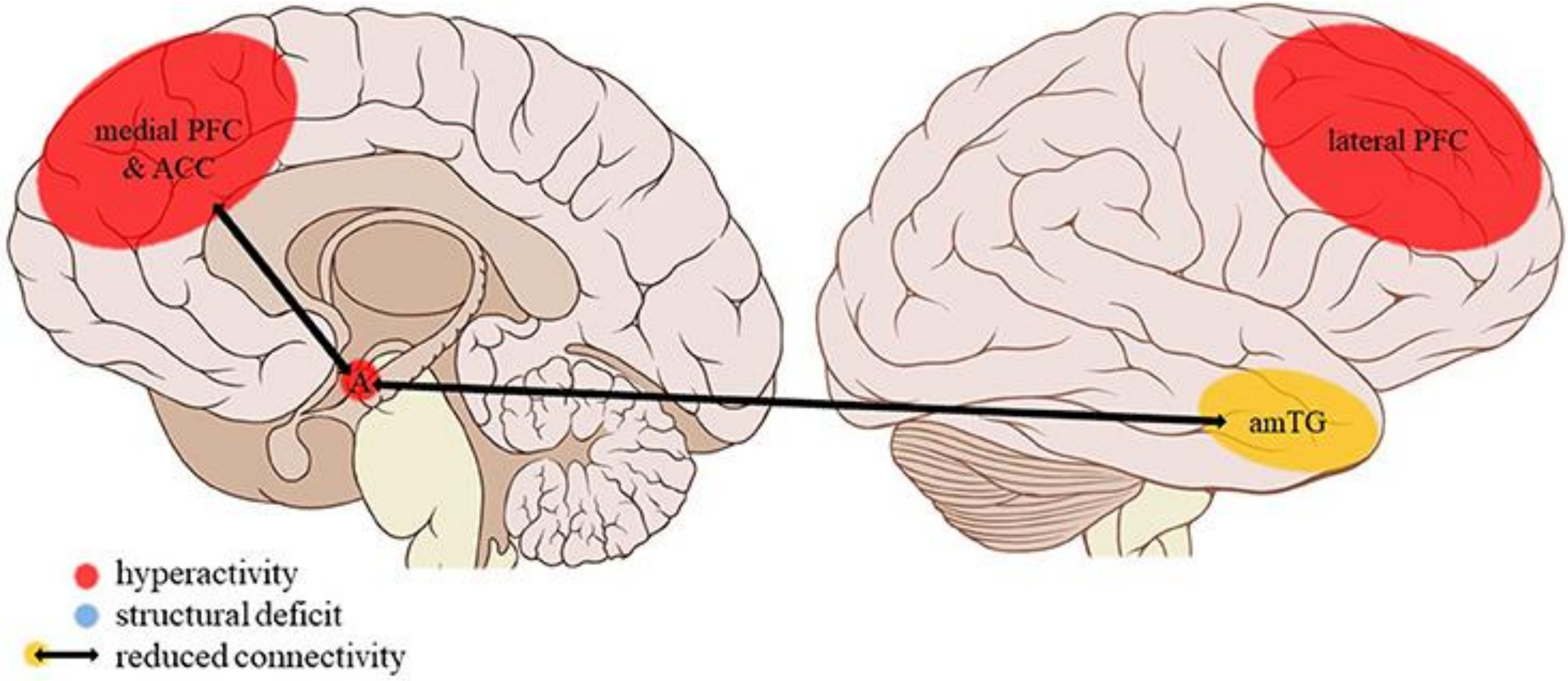
[1] Collaborative Antwerp Psychiatric Research Institute, University of Antwerp, Antwerp, Belgium, [2] University Department of Psychiatry, Campus Antwerp University Hospital, Antwerp, Belgium, [3] University Department of Psychiatry, Campus Psychiatric Hospital Duffel, Antwerp, Belgium, [4] Orygen, The National Centre of Excellence in Youth Mental Health, Parkville, VIC, Australia, [5] Centre for Youth Mental Health, University of Melbourne, Melbourne, VIC, Australia, [6] Department of Psychiatry, VU University Medical Center, Amsterdam, Netherlands, [7] Amsterdam Neuroscience, VU University Medical Center, Amsterdam, Netherlands

OPEN ACCESS

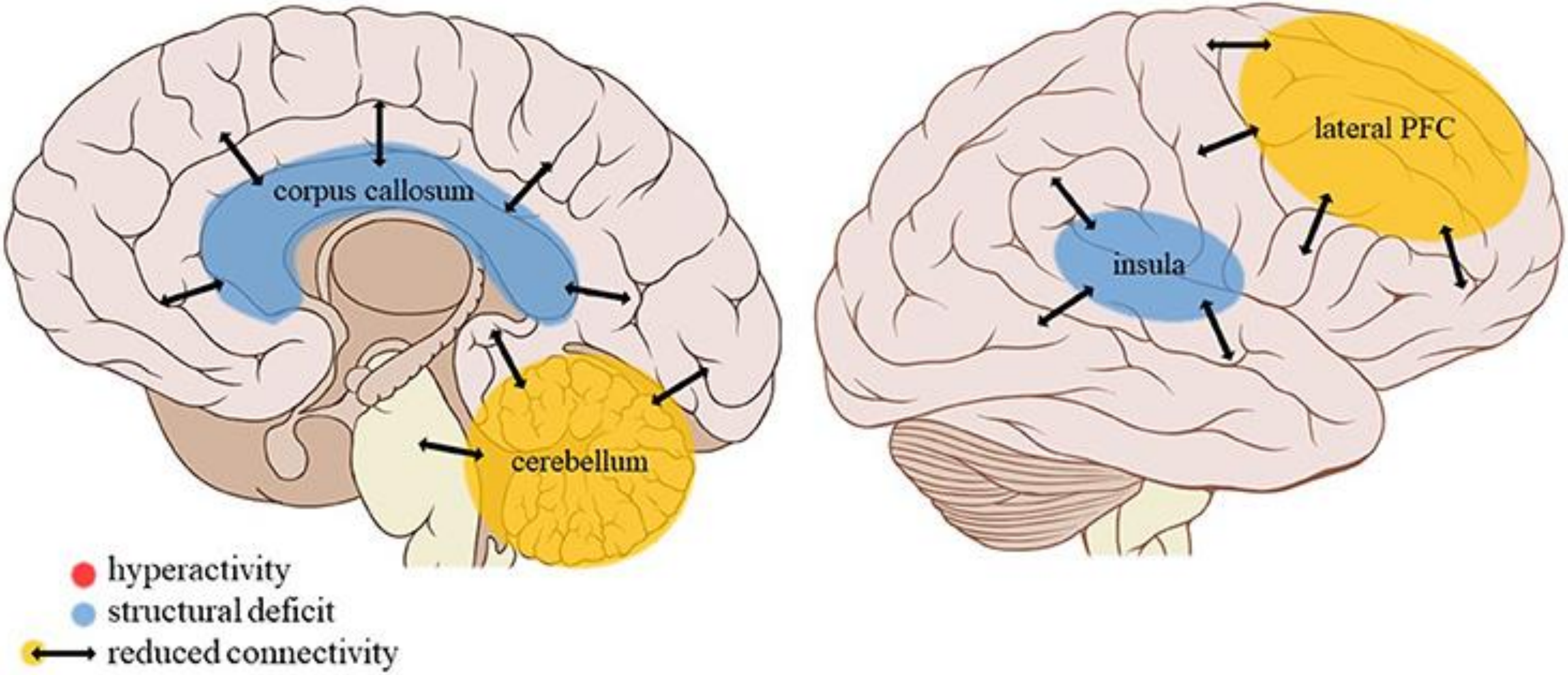
Cassiers LLM. Front Psychiatr. 2018; 9:329



Neuroimaging associated with sexual abuse. SoSens, genital somatosensory cortex; CN, caudate nucleus; A, amygdala.



Neuroimaging associated with Emotional Maltreatment. PFC, prefrontal cortex; ACC, anterior cingulate cortex; A, amygdala; amTG, anterior middle temporal gyrus



Neuroimaging findings associated with neglect. PFC, prefrontal cortex.

Le sexe biologique

cette petite différence….

Journal of Psychiatric Research 86 (2017) 58–65

Contents lists available at ScienceDirect

Journal of Psychiatric Research

journal homepage: www.elsevier.com/locate/psychires

Childhood adversity impacts on brain subcortical structures relevant to depression

Thomas Frodl[a,b,*,1], Deborah Janowitz[c,1], Lianne Schmaal[e,ab,ac], Leonardo Tozzi[a,b], Henrik Dobrowolny[a], Dan J. Stein[n], Dick J. Veltman[e], Katharina Wittfeld[d], Theo G.M. van Erp[f], Neda Jahanshad[g], Andrea Block[c,ad], Katrin Hegenscheid[i], Henry Völzke[j], Jim Lagopoulos[k,ae], Sean N. Hatton[k], Ian B. Hickie[k], Eva Maria Frey[l], Angela Carballedo[a,m], Samantha J. Brooks[n], Daniella Vuletic[n], Anne Uhlmann[n], Ilya M. Veer[o], Henrik Walter[o], Knut Schnell[p], Dominik Grotegerd[q], Volker Arolt[q], Harald Kugel[r], Elisabeth Schramm[s,t], Carsten Konrad[u,v], Bartosz Zurowski[w], Bernhard T. Baune[x], Nic J.A. van der Wee[z], Marie-Jose van Tol[aa], Brenda W.J.H. Penninx[e], Paul M. Thompson[g], Derrek P. Hibar[g], Udo Dannlowski[q,y], Hans J. Grabe[c,d,h]

Frodl T. J Psychiatr Res 2017; 86:58-65

Résultats

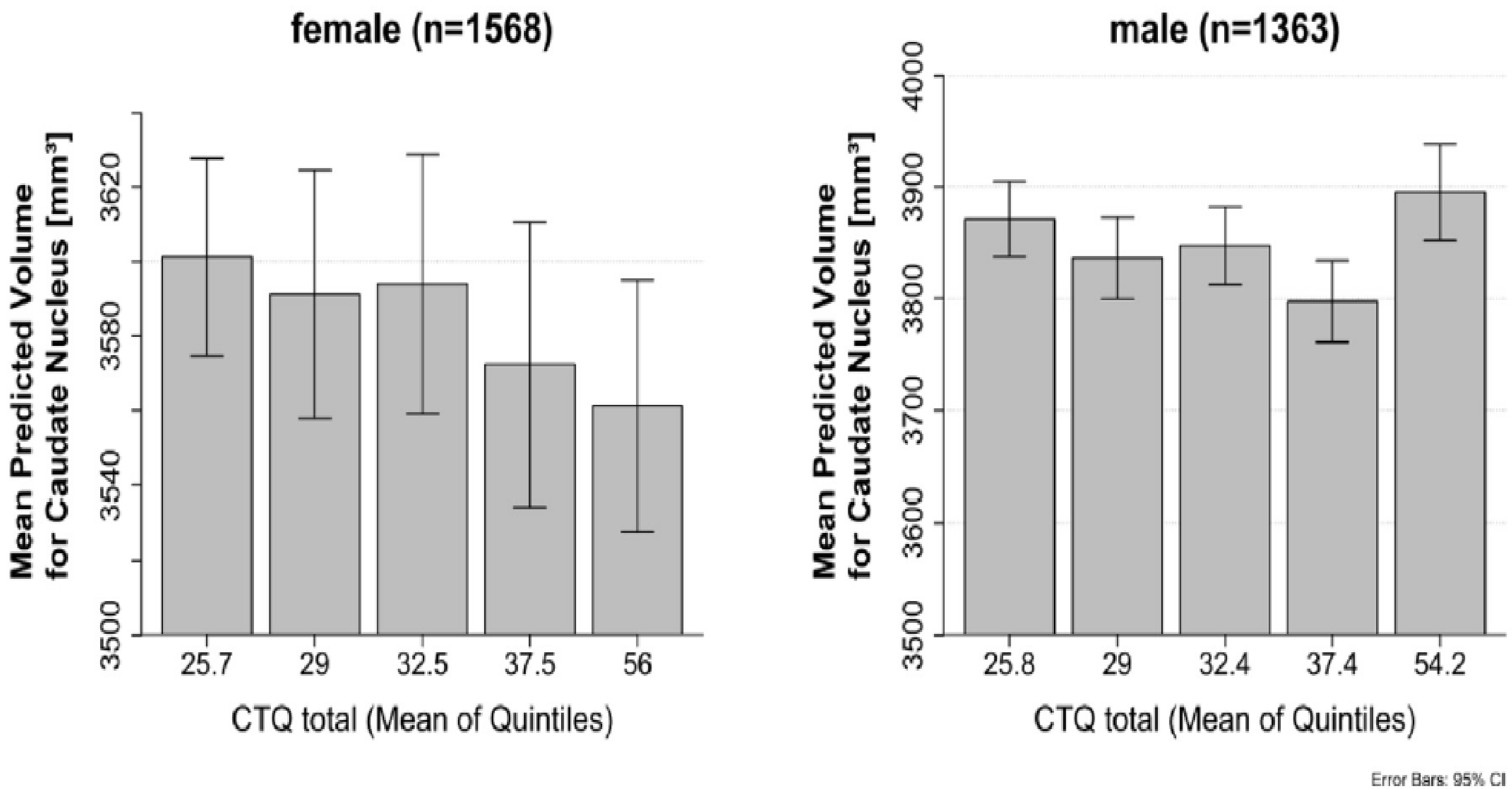


Fig. 1. Association between childhood adversity and caudate volumes (mean of left and right) in females and males. Shown are quintiles (quintiles of the population, with mean of quintiles labeled) for the different severities of childhood adversity and predicted values after correction for covariates, age, ICV, imaging site as well as the standard error.

Neuropsychopharmacology (2016) 41, 1716–1723

www.neuropsychopharmacology.org

Childhood abuse and deprivation are associated with distinct sex-dependent differences in brain morphology

Daphne Everaerd*[,1,2], Floris Klumpers[1,3], Marcel Zwiers[1], Tulio Guadalupe[4], Barbara Franke[1,2,5], Iris van Oostrom[1,2], Aart Schene[1,2], Guillén Fernández[1,3] and Indira Tendolkar[1,2,6]

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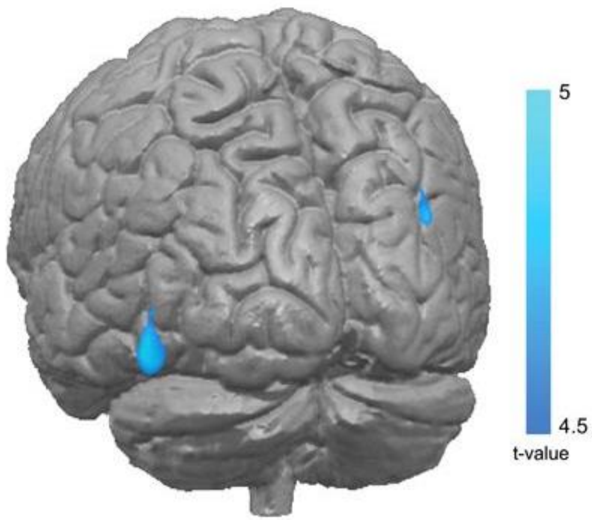
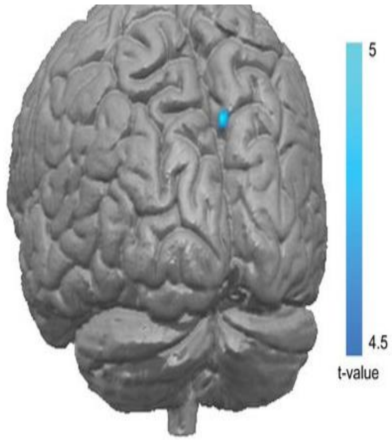
Childhood adversity (CA) has been associated with long-term structural brain alterations and an increased risk for psychiatric disorders. Evidence is emerging that subtypes of CA, varying in the dimensions of threat and deprivation, lead to distinct neural and behavioral outcomes. However, these specific associations have yet to be established without potential confounders such as psychopathology. Moreover, differences in neural development and psychopathology necessitate the exploration of sexual dimorphism. Young healthy adult

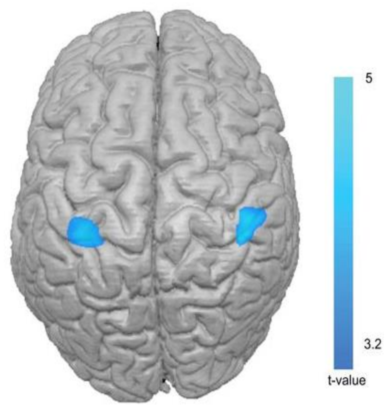
Everaerd D. Neuropsychopharmac 2016;41:1716



Significant decrease in gray matter volume in subjects with a history of deprivation (n=126) *vs* those with a history of abuse (n=127) in childhood in the fusiform gyrus and middle occipital gyrus. A 3D rendering is shown with color-coded differences in blue, thresholded at p_{FWE}<0.05 for the t-contrast deprivation group<abuse group. A full color version of this figure is available at the *Neuropsychopharmacology* journal online.



Significant decrease in gray matter volume in women with a history of childhood deprivation or abuse (n=143) *vs* controls (n=72) in the right inferior visual posterior precuneal region. A 3D rendering is shown with color-coded differences in blue, thresholded at p_{FWE}<0.05 for the t-contrast CA groups<control group. A full color version of this



Significant decrease in gray matter volume in men with a history of childhood deprivation (n=52) *vs* men with a history of abuse (n=58) in the postcentral gyrus. A 3D rendering is shown with color-coded differences in blue, for the t-contrast deprivation group<abuse group thresholded at $p_{uncorrected}$<0.001 and masked with an anatomical mask for the bilateral postcentral gyrus. A full color version of this figure is available at the *Neuropsychopharmacology* journal online.

Violence et négligence

Différences de volumes de MG

Génétiquement modifiées

Potentiellement entraîner: modifications spécifiques du bien-être mental ou des symptômes de psychopathologie

Social Cognitive and Affective Neuroscience, 2016, 1841–1852

doi: 10.1093/scan/nsw086
Advance Access Publication Date: 12 July 2016
Original article

Effect of childhood maltreatment and brain-derived neurotrophic factor on brain morphology

Laura S. van Velzen,[1] Lianne Schmaal,[1] Rick Jansen,[1] Yuri Milaneschi,[1] Esther M. Opmeer,[2] Bernet M. Elzinga,[3] Nic J.A. van der Wee,[4] Dick J. Veltman,[1] and Brenda W.J.H. Penninx[1,5]

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Van Velzen LS. Soc Cogn Affect Neurosci 2016; 11:1841

Génétique

Effets différents sur la morphologie chez les mét-porteurs et les val-val homozygotes (BDNF)

Van Velzen LS. Soc Cogn Affect Neurosci 2016; 11:1841-1852

Effect of the Interaction Between Childhood Abuse and rs1360780 of the *FKBP5* Gene on Gray Matter Volume in a General Population Sample

Hans Jörgen Grabe,[1,2]* Katharina Wittfeld,[2] Sandra Van der Auwera,[1,2] Deborah Janowitz,[1] Katrin Hegenscheid,[3] Mohamad Habes,[4,5] Georg Homuth,[6] Sven Barnow,[7] Ulrich John,[8] Matthias Nauck,[9] Henry Völzke,[4] Henriette Meyer zu Schwabedissen,[10] Harald Jürgen Freyberger,[11] and Norbert Hosten[3]

[1]*Department of Psychiatry and Psychotherapy, University Medicine Greifswald, Greifswald, Germany*

[2]*German Center for Neurodegenerative Diseases (DZNE), Site Rostock/Greifswald, Germany*

Grabe HJ. Hum Brain Mapp. 2016;37:1602-1613

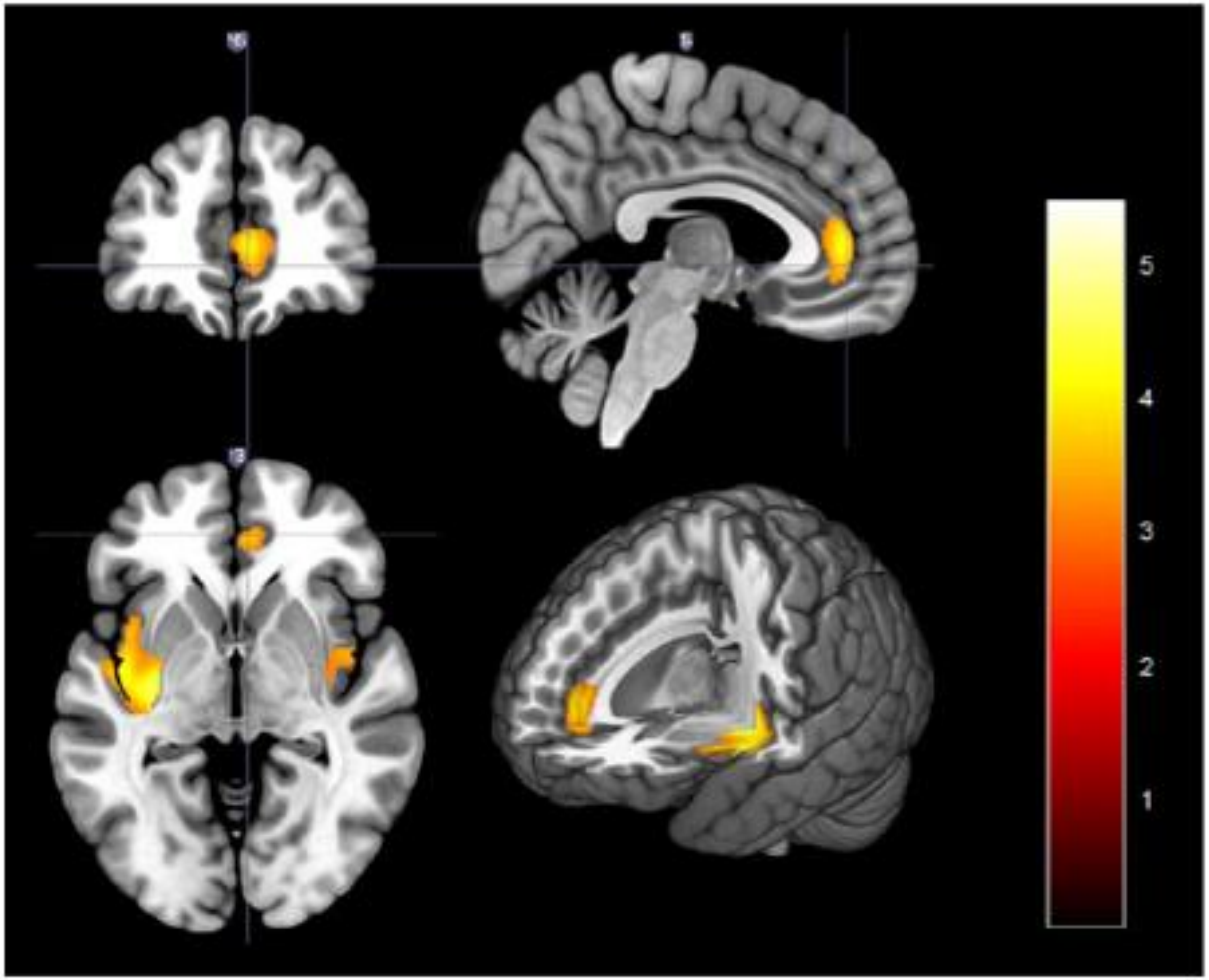

Figure 1.
Inverse interaction effect of *FKBP5* (CC/CT vs. TT) and childhood abuse (none vs. mild/moderate/severe) on gray matter. Voxel based morphometry (VBM) interaction analysis in $N = 1{,}826$ subjects revealed three clusters after the adjustment for age, gender, and lifetime diagnosis of MDD.

Traboules du Vieux Lyon

Limitations dans le méthode

La présence de psychopathologie peut être un facteur déroutant

Des altération similaires ont été observées dans certaines maladies:
dépression et hippocampe
schizophrénie et la matière grise
développement et connexions

Limitations dans le méthode

Résultats sont encore très limitées

Rares études analysant des images comparables

Différents types d'abus

Violence physique et psychologique est la plus étudiée

Limitations dans le méthode

Résultats limités aux régions d'intérêt: amygdala et le cortex préfrontal (volume et fMR)

La connectivité n’a pas été comparée en fonction des types de traumatisme et a été pratiquement limitée à l’amygdala

Limitations dans le méthode

N'existe pratiquement aucune étude longitudinale

Relation causant l'effet entre maltraitance et altérations du développement du système nerveux

Limitations dans le méthode

- Maltraitances détectés différentes: questionnaires auto-interrogés (CTQ), entretiens structurés ou dossiers médicaux
- Différentes maltraitance ou abus
- Âge auquel l’enfant à souffert la maltraitance
- Durée et intensité

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