IMAGING OF THE MIND
INTRODUCTION

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MENTAL HEALTH: THE URGENT NEED TO ACT

Mental health conditions are widespread, undertreated and under-resourced

WIDESPREAD

1 in 8

live with a mental health condition

UNDERTREATED

71%

people with psychosis do not receive mental health services

UNDER-RESOURCED

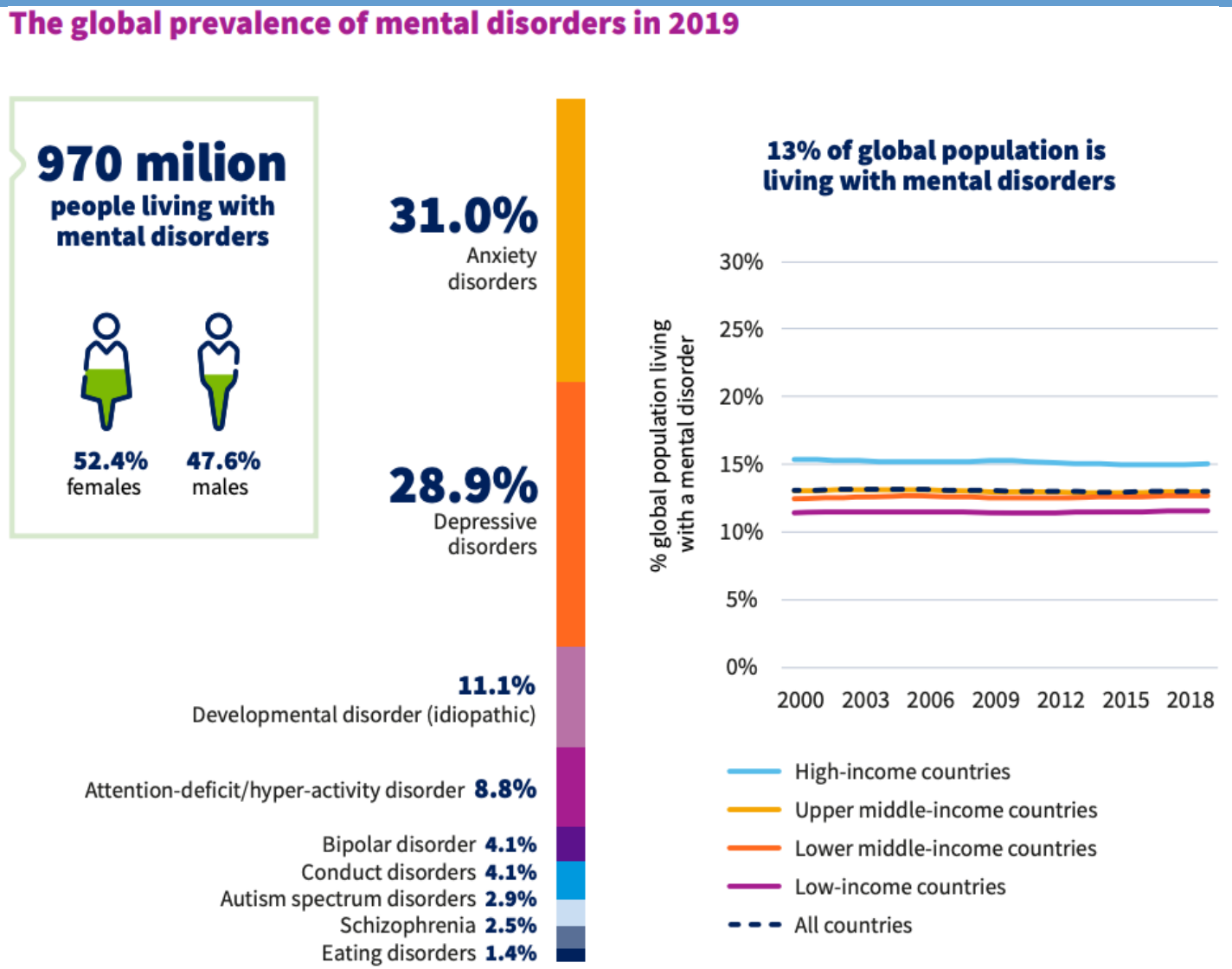
2%

of health budgets, on average, go to mental health

Source: World mental health report, 2022

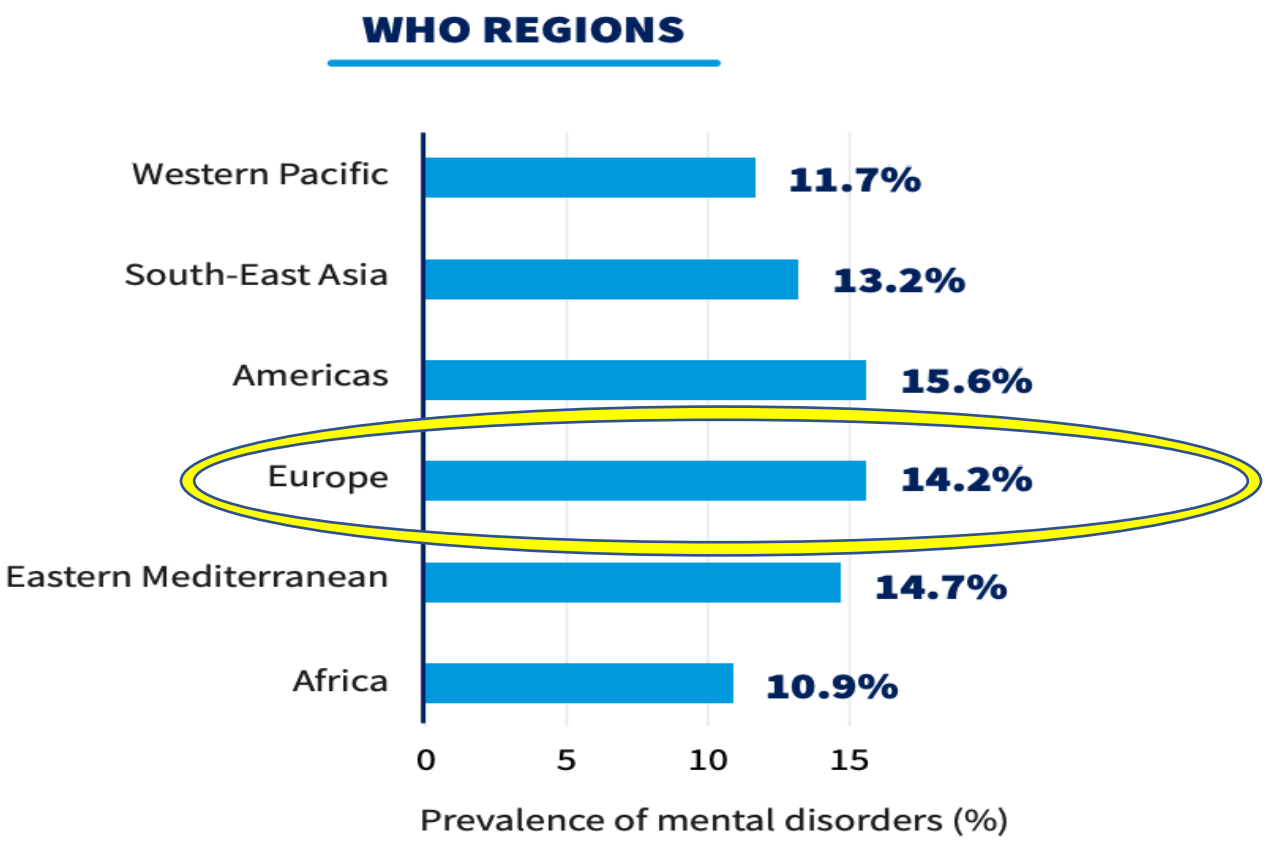
MENTAL HEALTH: THE URGENT NEED TO ACT

Dr Nuno Susa: Stress and brain



MENTAL HEALTH: THE URGENT NEED TO ACT

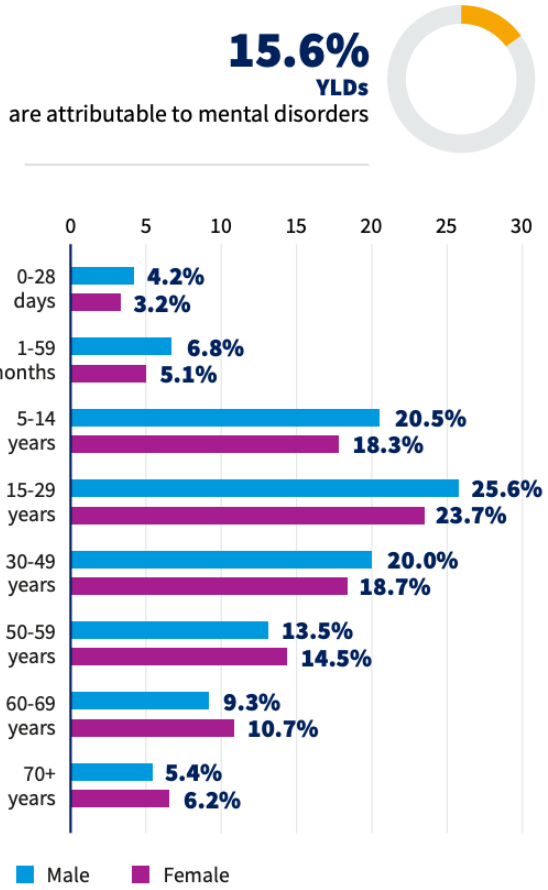
Prevalence of mental disorders across WHO regions, 2019



Source: IHME, 2019 *(112)*.

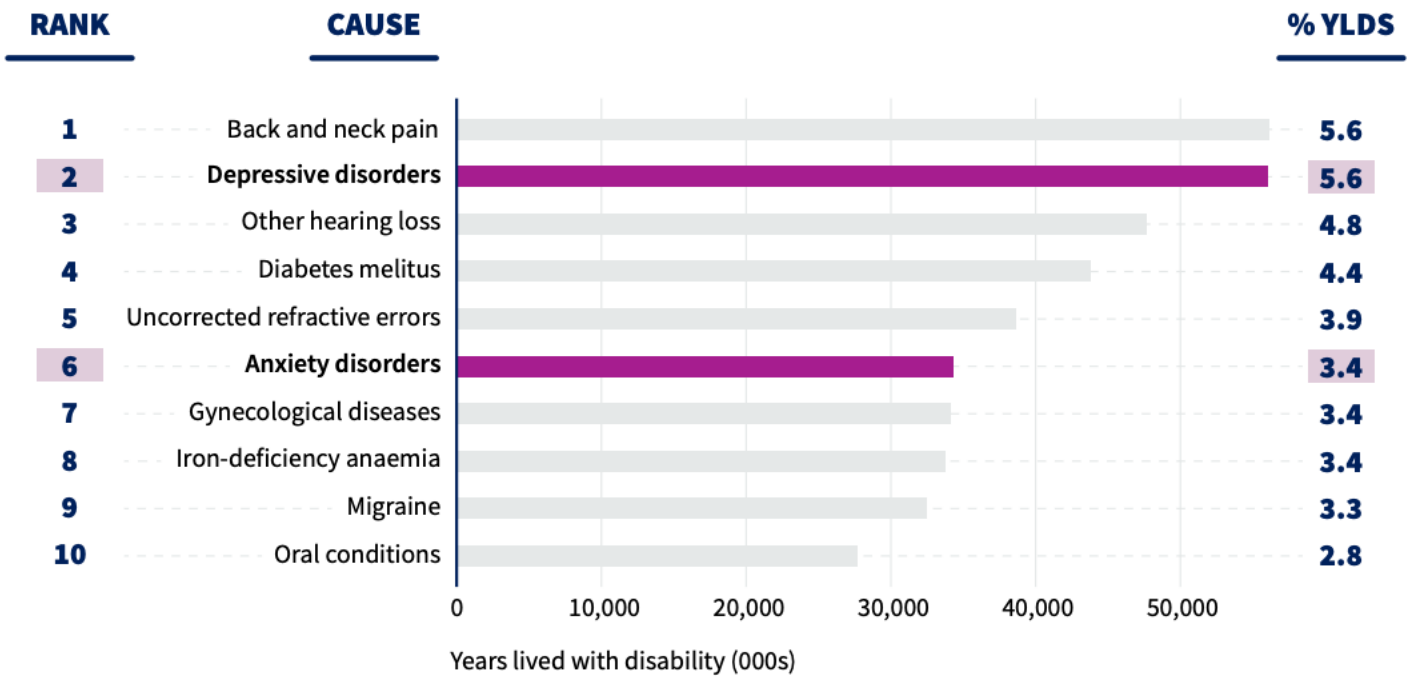
MENTAL HEALTH: THE URGENT NEED TO ACT

Proportion of all-cause years lived with disability (YLDs) attributable to mental disorders, across the life-course, 2019



Source: WHO, 2019 *(129)*.

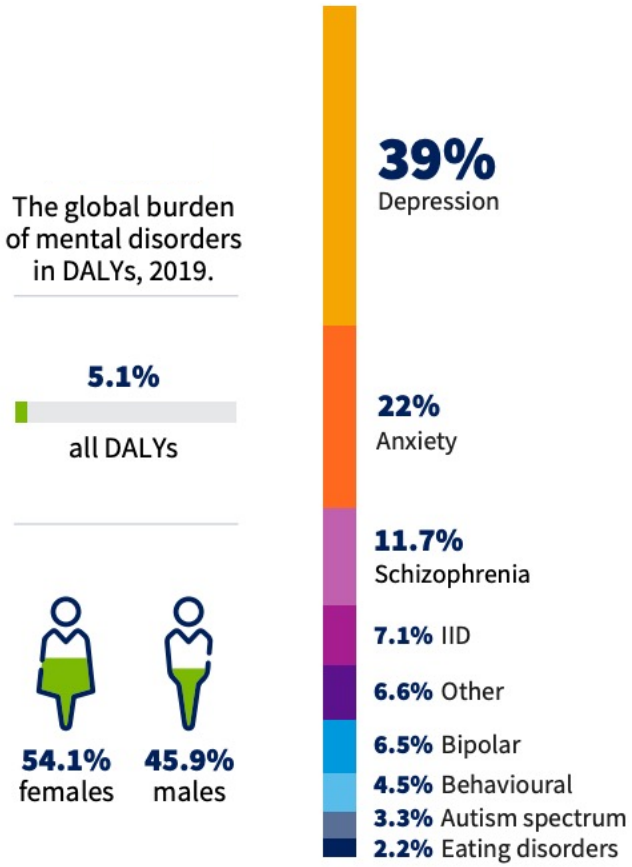
Top ten leading causes of global years lived with disability (YLDs), 2019



Source: WHO, 2019 *(129)*.

MENTAL HEALTH: THE URGENT NEED TO ACT

The global burden of mental disorders in disability-adjusted life years (DALYs), 2019



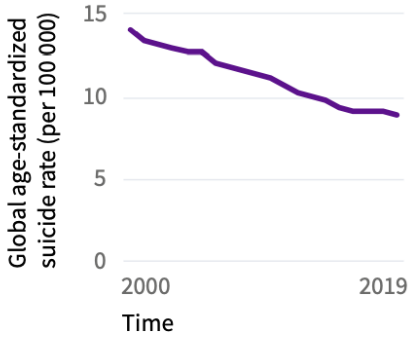
Source: WHO, 2019 *(128)*.

Suicides in 2019

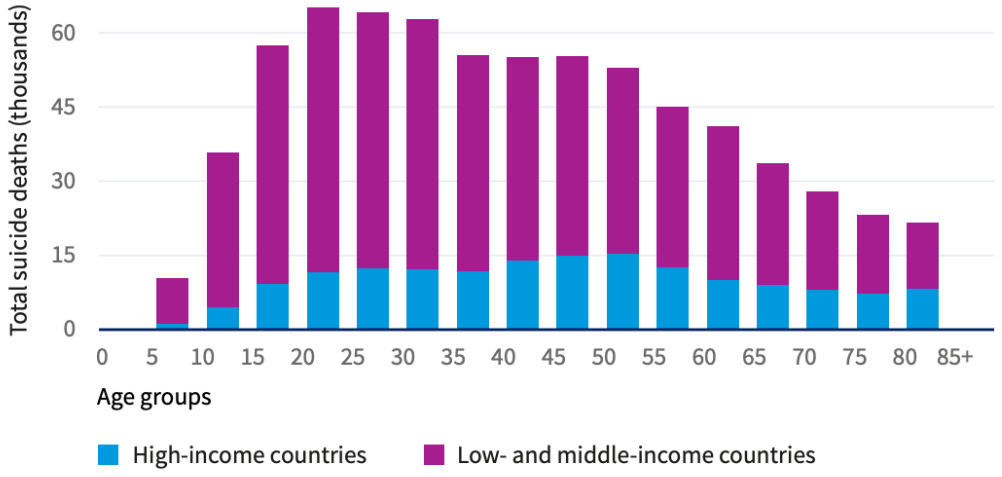
703k
people died by suicide in 2019

Global suicide rate: 9 per 100 000

36%
drop in suicide rates since 2000



58%
suicides happen before the age of 50

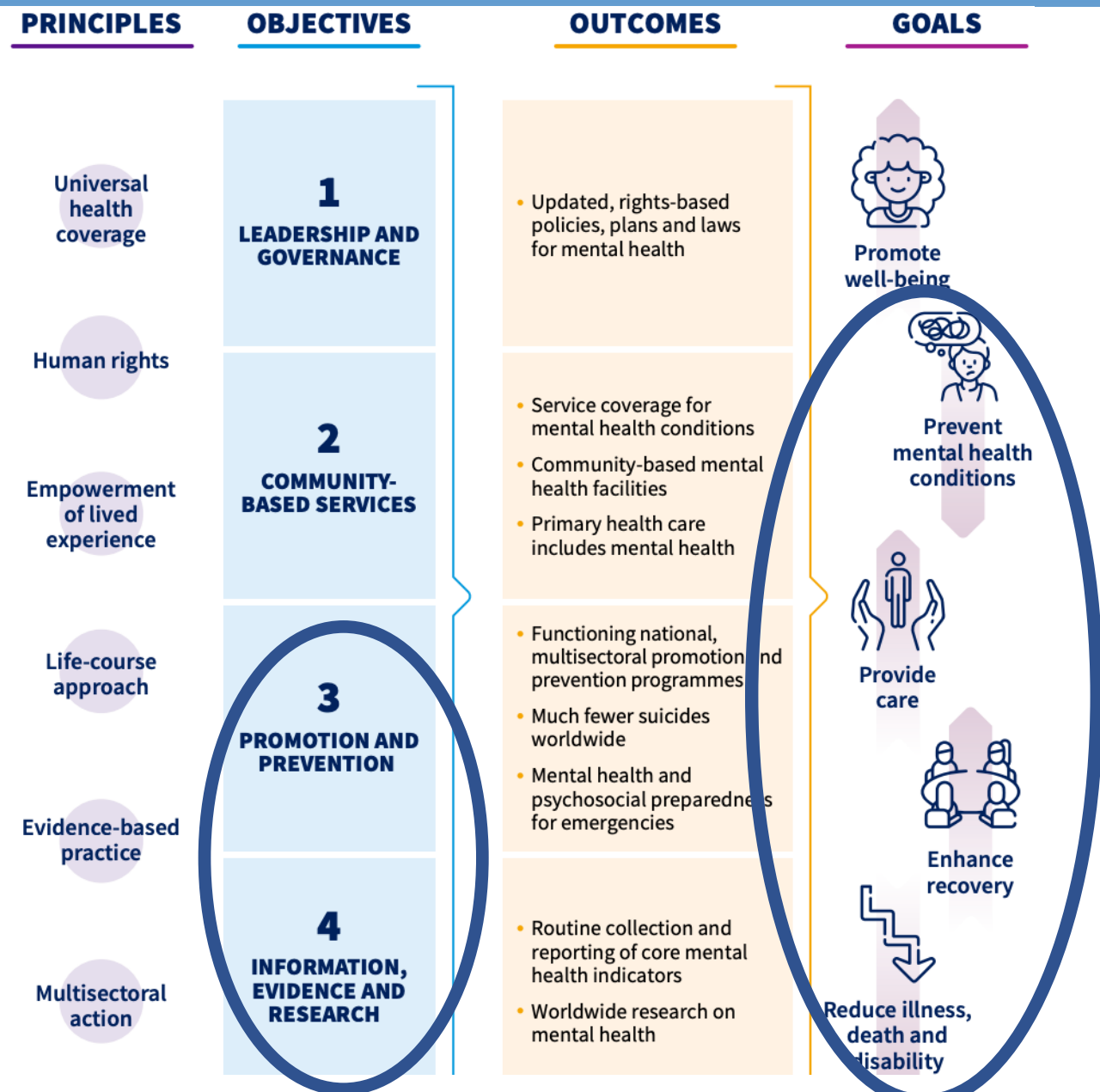


Source: WHO, 2021 *(125)*.

MENTAL HEALTH: HOW TO ACT

A visual summary of the *Comprehensive mental health action plan 2013–2030*

- OBJECTIVES: « promotion and prevention, evidence-based practice and research »
- GOALS TO ACHIEVE: « prevent mental health conditions, provide care, enhance recovery, reduce illness, death and disability »
- Tools that allow those objectives and goals?



MENTAL HEALTH: IMAGING AT THE HEART OF THE ACTION

Clinical meta-variable
(clinical history, neuropsychological tests, actimetry, etc.)

Imaging Meta-variable
Functional & Structural MRI

Biological Meta-variable
(inflammatory markers, genomics)

MENTAL HEALTH: IMAGING AT THE HEART OF THE ACTION

MRI for the first-episode psychosis:

- Differential diagnosis:

  Many neurological diseases can mimic psychiatric disorders

- Positive diagnosis:

  New biomarkers / advanced imaging

Falkenberg I. et al., « *Clinical utility of magnetic resonance imaging in first-episode psychosis* ».
BJ Psych, Octobre 2017, vol. 211, n°4, p. 231-237.

MENTAL HEALTH: IMAGING AT THE HEART OF THE ACTION

Objective: **Decrease the DUP** = delay of untreated psychosis

- ✓ Rule out any serious neurological disorder
- ✓ Better understand mechanisms: advanced imaging

Dr Riyad Hanafi: Current applications of MRI in psychotic events

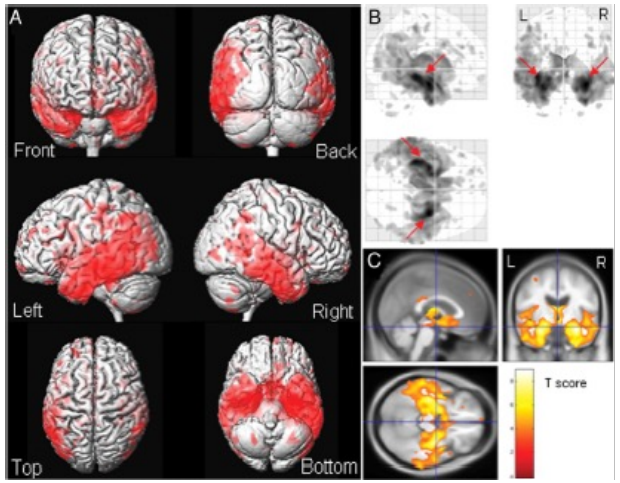
Marshall : « association between DUP and outcome in cohort of PEP
Perkins : « Relationship between DUP and outcome : a critical review
Pentil : « DUP is predictor of long term outcome in schizophrenia : a systematic review.

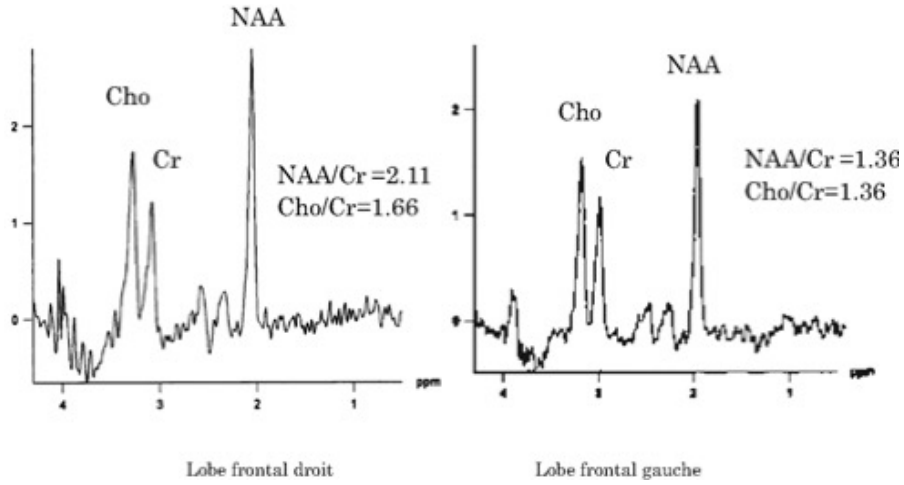
BIOMARKERS: ADVANCED IMAGING PRECISION AND PREDICTION

- Functional MRI : resting state (rs f-MRI)
- MR Spectroscopy
- AI / Machine and Deep learning
- Ultra-high field 7T MRI

Dr Sidney Krystal: Functional connectivity in bipolar disorders

Dr Renaud Lopes: Application of artificial intelligence in normal brain aging





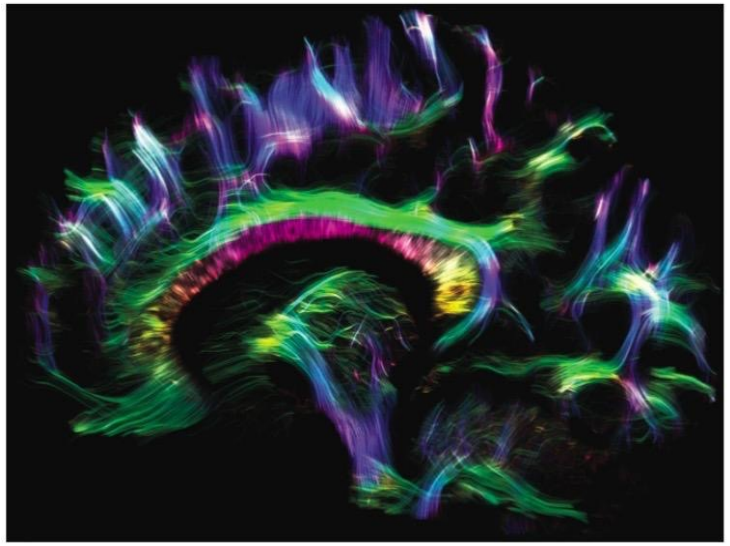


FIG 5. Tractography performed by using diffusion imaging at 7T with readout-segmented EPI and parallel imaging. Image courtesy of Dr Robin Heidemann, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany. Scanner: whole-body 7T MR imaging (Magnetom; Siemens). RF coil: Nova 24-channel head coil. Scan parameters: b-value of 1000 s/mm^2, resolution = 1 × 1 × 1 mm^3, 30 diffusion directions, generalized autocalibrating partially parallel acquisition acceleration factor = 3, TE/TR = 60/11,000 ms, scanning time = 75 minutes.

1. Radua et al., meta-analysis : functional and structural cartographies : significant cortical thickness decrease in insular, superior temporal gyrus and anterior cingulum cortex and functional anomalies
2. Brugger et al., NAA decrease in medial temporal lobes and thalamus in schizophrenia.

THANK YOU !

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