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Bipolar Disorders:
a challenge in the aeromedical fitness evaluation

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DISCLOSURE

« NO CONFLICT OF INTEREST TO DECLARE»

Mental fitness evaluation by AME …..

Disqualfying Mental Diseases in aviation …

Commission Regulation (EU) No 1178/2011

ANNEX IV [PART-MED] - SUBPART B - REQUIREMENTS FOR PILOT MEDICAL CERTIFICATES

MED.B.055 Psychiatry

- (a) Applicants shall have no established medical history or clinical diagnosis of **any psychiatric disease or disability, condition or disorder, acute or chronic, congenital or acquired, which is likely to interfere with the safe exercise of the privileges of the applicable licence(s).**
- (b) Applicants with a mental or behavioural disorder due to alcohol or other use or abuse of psychotropic substances shall be assessed as unfit pending recovery and freedom from substance use and subject to satisfactory psychiatric evaluation after successful treatment. Applicants for a Class 1 medical certificate shall be referred to the licensing authority. Fitness of Class 2 applicants shall be assessed in consultation with the licensing authority.
- **(c) Applicants with a psychiatric condition such as: (*1) mood disorder; (2) neurotic disorder; (3) personality disorder; (4) mental or behavioural disorder* ; shall undergo satisfactory psychiatric evaluation before a fit assessment can be made**.
- (d) Applicants with a history of a single or repeated acts of deliberate self-harm shall be assessed as unfit. Applicants shall undergo satisfactory psychiatric evaluation before a fit assessment can be considered.
- (e) Aero-medical assessment: **(1) applicants for a Class 1** medical certificate with one of the conditions detailed in (b), (c) or (d) above **shall be referred to the licensing authority**; (2) fitness of **Class 2** applicants with one of the conditions detailed in (b), (c) or (d) above shall be assessed **in consultation with the licensing authority.**
- (f) Applicants with an established history or clinical diagnosis of schizophrenia, schizotypal or delusional disorder shall be assessed as unfit.

Mental fitness evaluation by AME …..

… not an easy job to do !!!

- **Few objective tools …**

just…

… answers on the application form …

… direct questions …

… spontaneous declarations !!!

- **Cultural differences, language barriers**

Easy detection of symptoms ***for major mental diseases****, like:*

- *Psychosis (schizophrenic spectrum)*
- *Cognitive impairment or retardation*

… some difficulties for …

Personality disorders (borderline, obsessive, …)

… a challenge for affective disorders, like…

… Bipolar Disorders !!!

Bipolar Disorder I and II (DSM5)

Type	Description
Bipolar I Disorder	Defined as manic or mixed episodes that last at least seven days, or by manic symptoms that are so severe that the person needs immediate hospital care. Usually, the person also has depressive episodes, typically lasting at least two weeks. The symptoms of mania or depression must be a major change from the person's normal behavior.
Bipolar II Disorder	Defined as a pattern of depressive episodes shifting back and forth with hypomanic episodes, but no full-blown manic or mixed episodes.
Bipolar Disorder Not Otherwise Specified (BP-NOS)	This diagnoses applies when a person has symptoms of the illness that do not meet diagnostic criteria for either bipolar I or II. Symptoms may not last long enough or the person may have too few symptoms to be diagnosed with bipolar I or II. However, the symptoms are clearly out of the person's normal range of behavior.
Cyclothymic Disorder	A mild form of bipolar disorder in which the patient has episodes of hypomania that shift back and forth with mild depression for at least two years. However, the symptoms do not meet the diagnostic requirements for any other type of bipolar disorder.

Source: National Institute of Mental Health. *Bipolar Disorder* "How does bipolar disorder affect someone over time?" Accessed 10 May 2013. Available at: www.nimh.nih.gov

Affective Temperaments:

- ***Cyclothymia and Hyperthymia***

Table 2 – Mania and hypomania diagnostic criteria

Criteria	Mania[a]	Hypomania[b]
Minimum timeframe for diagnosis	1 week	4 days
Number of symptoms for diagnosis	At least 3	At least 3
Grandiosity	Yes	Yes
Decreased need for sleep	Yes	Yes
More talkative	Yes	Yes
Flight of ideas	Yes	Yes
Distractibility	Yes	Yes
Increased goal-directed activity	Yes	Yes
Risky behavior	Yes	Yes
Marked impairment of social/occupational functioning	Yes	No
Psychotic features	Yes	No
May require hospitalization	Yes	No

[a] More severe.
[b] Less severe.
Adapted from DSM-5.

Characteristics of the Hyperthymic Temperament :

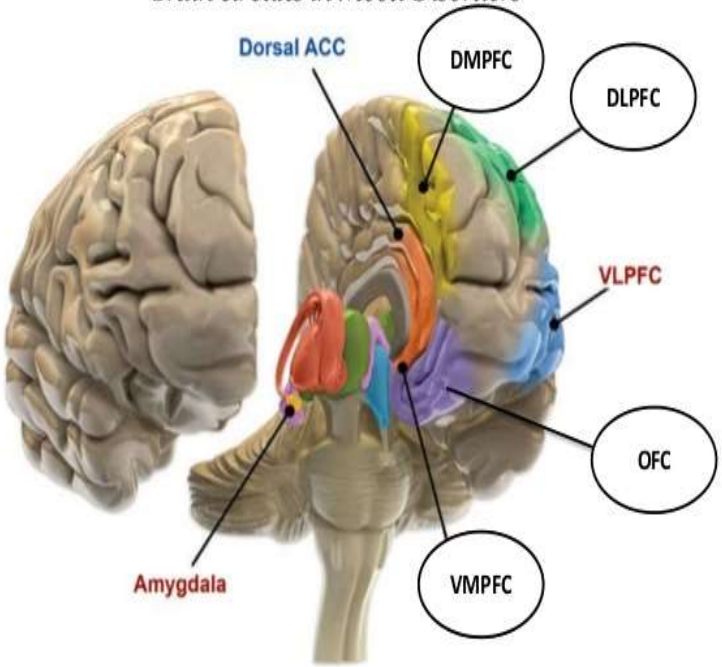
- *increased energy and productivity, tirelessness*
- *short sleep patterns*
- *extroversion, expansiveness, talkativeness*
- *generosity and tendency to overspend*
- *self-assurance, self-confidence, strong will*
- *risk-taking/sensation seeking*
- *strong libido, love of attention*
- *low threshold for boredom*
- *emotion sensitivity, unusual warmth*

The clinical understanding of hyperthymia is evolving.

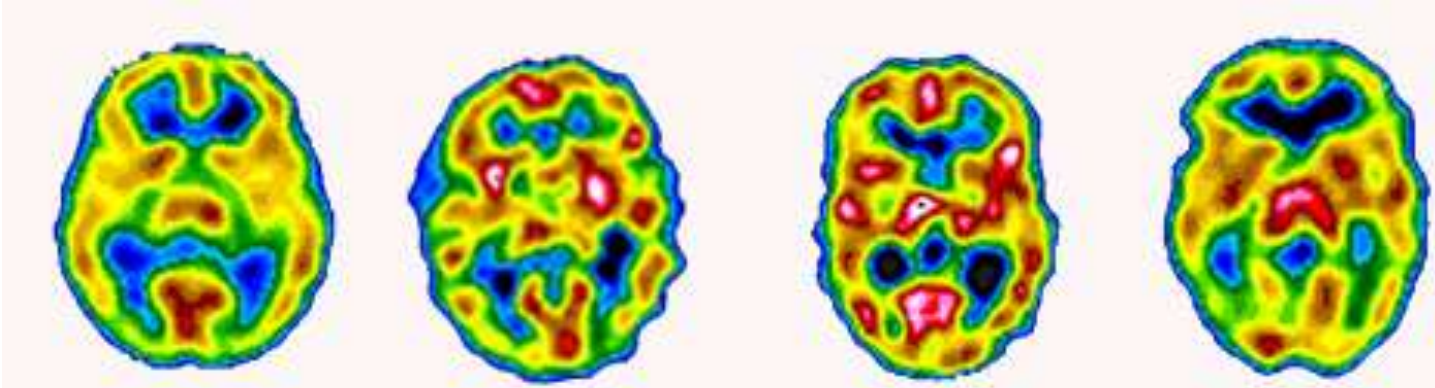
Studies have shown that:

- *hyperthymic temperament promotes efficient performance of complex tasks*
- *a familial-genetic connection to BP disorders exists*
- **intermittent hyperthymia** ***may mask hypomania*****.**
- **hyperthymia, when complicated with depressive episodes** ***may evolve in bipolar illness*****.**

Brain circuits in Mood Disorders

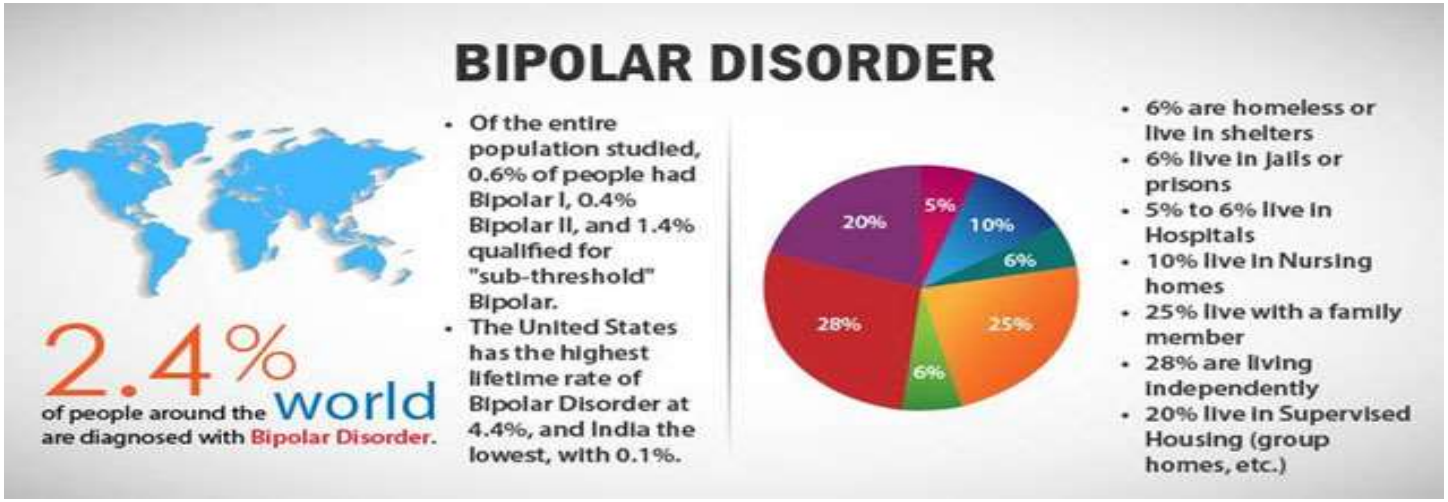


DLPFC: Dorsolateral prefrontal cortex
VLPFC: Ventrolateral prefrontal cortex
DMPFC: Dorsomedial prefrontal cortex
ACC: Anterior cingulate cortex

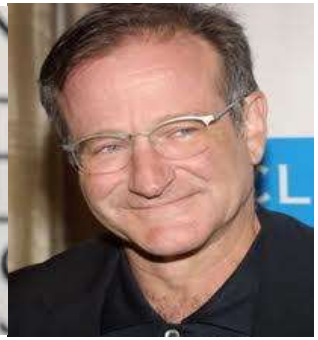


Normal	Obsessive Compulsive Disorder	Bipolar Disorder	Depression

Epidemiologic features

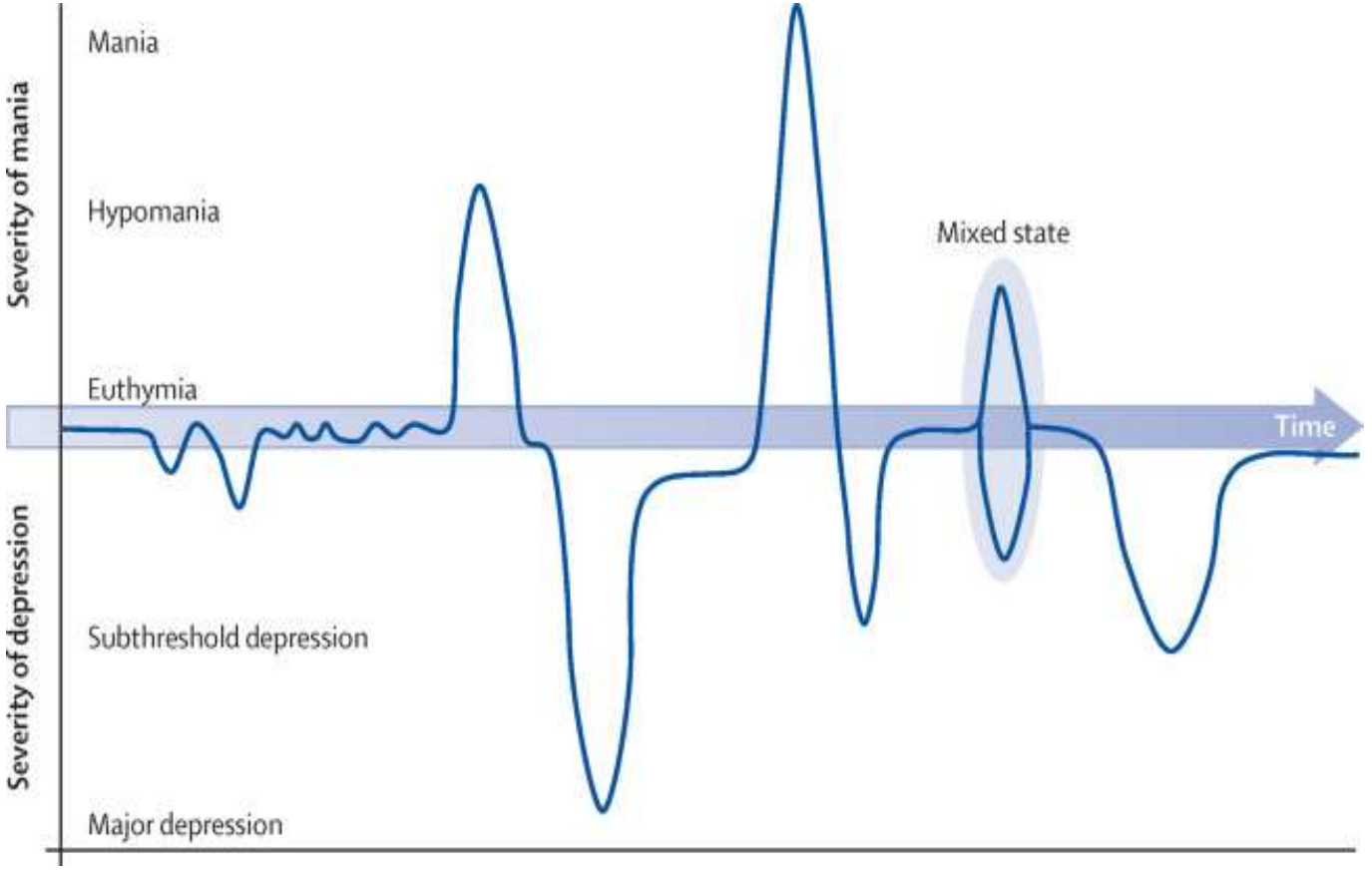


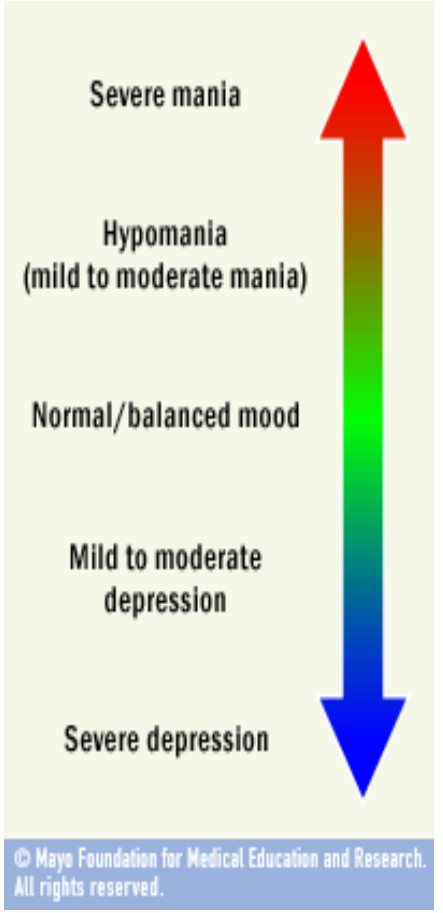
- ***Age : 18 to 45***
- ***Gender****: no significant differences*
- ***Familiarity/Genetic****: significant*



Why is it a challenge ?

- ***Recurrence*** *of manic/hypomanic or depressive episodes*
- ***Free intervals****, with few or undetectable "symptoms", or …*
- ***Residual hyperthymia*** *(appealing behaviours, energy, optimism, successful, etc ….)*





Manic/Hypomanic/Depressive episodes …

… frequently, but not always, triggered by stressful events …

Suicidality … ***in bipolar disorders*** …

lifetime risk is at least **15 times** that of the general population.

"Airplane pilot mental health and suicidal thoughts: a cross-sectional descriptive study via anonymous web-based survey." (*)

This study found that out of the 1848 pilots that completed the interviews :

- ***233 (12.6%)*** *met depression threshold*
- ***75 (4.1%)*** *reported to have had suicidal thoughts.*

(*)Wu AC, Donnelly-McLay D, Weisskopf MG, McNeely E, Betancourt TS, Allen JG. - ***Environ Health. 2016 Dec 15;15(1):121.***

from 1976 to 2018

21 accidents

confirmed / believed suicide

of the pilot in control of the flight

"Could the BP disorder be considered as a determinant factor in some accidents where it is known or hypothesized an aircraft-assisted pilot suicide ?"

By looking into the history of the cases ….

… problems can always arise….

The way of coping with stressful conditions varies …

… in BP disorder….

… poor or no self-perception of disease/dysfunction …

… no seek for treatments!

Suicide pattern of BP : disruptive, striking gestures !?

Considerations …..

No significant concerns or aspects to worry about …..

… the statistical data confirms that the air transport, among the others,

is the safest !!!

The all accident rate (measured in accidents per 1 million flights) was 1.08, an improvement over the all accident rate of 1.68 in 2016 and the rate of 2.01 for the previous 5-year period (2012-2016).

ADDRESSING THE PRIMARY CAUSES OF ACCIDENTS

- Human Factor involvement-

From 2013 to 2017:

Loss of Control In Flight ***(accounted for 9%)***

Controlled Flight into Terrain ***(represent 4% of the total accidents)***

… the key of success in the aviation industry…

The principle of prevention ! …

… "every effort or initiative must be put in place to eliminate all the potential risks for the safety !"…

Did the same happen for the aeromedical issues ?
… in terms of *surveillance and effectiveness ?…*

… arising questions
for the mental issues…

Flying … is an attractive and stimulating activity !!!

Depressed mood	*Euphoric*	*Excited*
Weak	*Strong*	*Never tired*
Any project	*Engaged*	*Multiple engagements*
Poor self care	*Well dressed*	*Eccentric*
Anxiety	*Trustful*	*Irritable*

<u>... fit to fly …</u>

*….unless that **hyperthymic-like state** is not a **subthreshold/residual phase** of a **BP disorder** or one of a **cyclothymic temperament** !!*

Initial screening :

- Comprehensive Psychiatric Evaluation …for all classes of certificate !?

Biographical / Family / Anamnestic data …

Search for *:*

- **Cognitive endophenotypes** ***…***

  (***genetic susceptibility*** *and* ***deficit in:*** *executive functions, verbal memory, sustained attention, response inhibition ….* ***Neuro-Psychological testing*** *)*

- **Affective temperaments** ***…***

  TEMPS-A: *Temperament Evaluation Memphis* (*Akiskal HS*)

  TCI-R: *Temperament and Character Inventory* (*Cloninger CR*)

Risks*:*

- *misdiagnosis !?*
- *false positive/false negative ratio !?*

Routine/Periodic assessment :

Occupational medicine / AME certification ...

Screening for:

- ***Exposure to stressful events/conditions***

- ***Allostatic load …***

overview of specific metabolic parameters

(cortisol, citokines, HDL/LDL, Blood Pressure, etc…)

Tough decision to make … !?

The term **Allostatic load** was coined by Bruce McEwen (2000) and refers to the physiological costs of chronic exposure to the neuroendocrine stress response.

It is used to explain how frequent activation of the body's stress response can damage the body in the long run.

The hormones and other physiological agents that mediate the effects of stress on the body have protective and adaptive effects in the short run and yet can accelerate pathophysiology when they are over-produced or mismanaged.

Allostatic load can be measured, through a composite index of indicators of the cumulative strain on several organs and tissues, **as chemical imbalances in the:**

- *autonomic and central nervous system*
- *neuroendocrine and immune system activity*
- *cardiovascular system*

or

- perturbations in the diurnal rhythms
- plasticity changes of brain structures

.

Initial screening … *PREVENTION !!!*

Routine/Periodic assessment … *INTERCEPTION* …. and TREATMENT !?

… new perspective:

Occupational medicine
(prevention, care)

Legal medicine
(certification)

… both focused on the same object !

Improving a Just Culture Policy !!!

Thank you

Questions ?