

# ECAM

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**STRESS RELATED SYNDROMES :**  
*“Does the pharmacological treatment  
affect the performance ? ”*

**Performance**  
**Clinical Syndromes**  
**Antidepressant**  
**Study-Methodology-Results**  
**Discussion**  
**Conclusions**



# What's behind every human performance ???

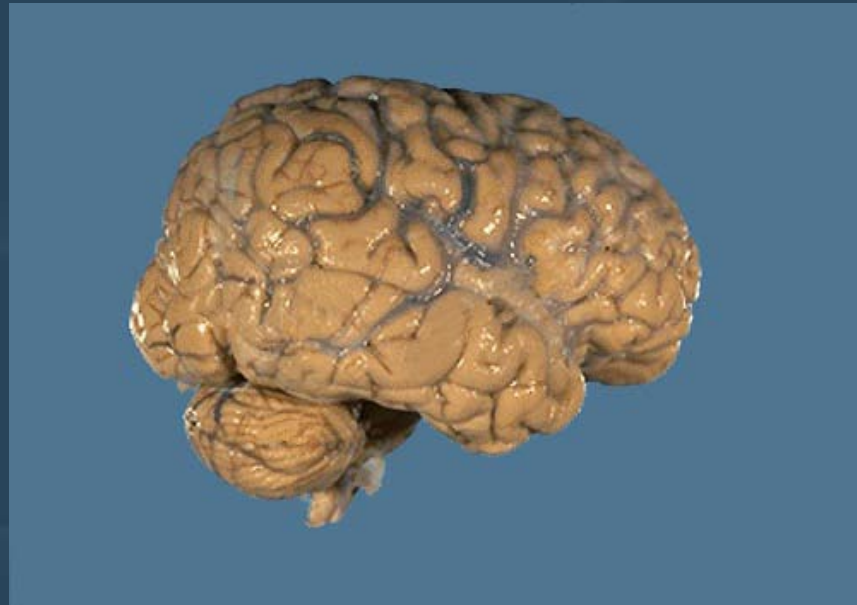


.... especially like these ....





# Always a human brain !!!



With its structural complexity  
Sophisticated biological mechanisms



- Brain activity is based on the  
**global and constant**  
communication  
between its own components  
*(through neurotransmitting systems)*
- **in “normal” or “dysfunctional”  
conditions**



# ***Functional Complexity of CNS***

- More than 50 chemical compounds acting as neurotransmitters
- Many types and subtypes of Receptor
- Billions connections/synapses
- Wide spectrum of effects  
*(inhibition, activation, facilitation, modulation, promotion, repression)*



# Neurotransmitters & Receptors

## ⇒ **SEROTONIN** (*modulation role*)

Receptors: seven types: 5HT 1-7 / several subtypes (A,B,C,D,E,F)

## ⇒ **DOPAMINE** (*motivation, reward, cognitive, motor control*)

Receptors: two types: D1, D2 / subtype D1-D5- D2,D3,D4

## ⇒ **NORADRENALINE** (*arousal, vigilance, learning, adaptive behaviours*)

Receptors: two types: Alfa 1,2- Beta 1,2,3

## ⇒ **ACETYLCHOLINE**

Receptors: Muscarinics M 1,2,3,4,5 – Nicotinics 1-7

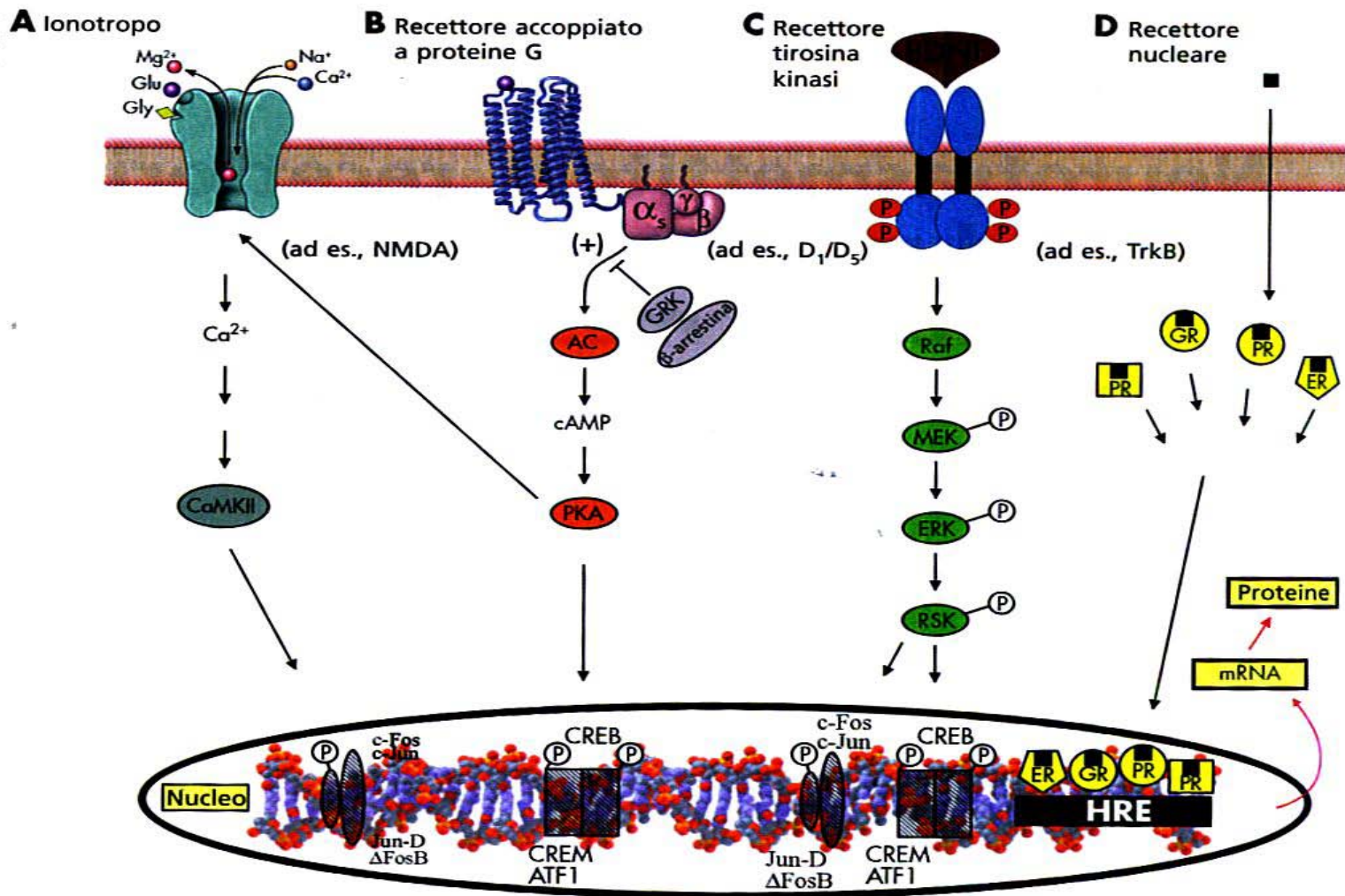
## ⇒ **GLUTAMMATE /ASPARTATE** (*excitation, synaptic plasticity, learning and memory- Toxicity*)

Receptors: ionotrophics (NMDA, AMPA, Kainate), metabotrophics (mGluR 1,2,3)

## ⇒ **GABA** (*ubiquitary inhibiting system*)

Receptors: GABA a, b









# What do we expect from the brain performance ???

## Reliability !!!

....which means:

- ⇒ *vigilance*
- ⇒ *attention*
- ⇒ *situational awareness*
- ⇒ *motivation*
- ⇒ *endurance*
- ⇒ *etc....*



**Is there something  
that could interfere ???**



## Sleeping disorders ... ?



## lack of vigilance... ?





## Impaired memory ...?





# EPIDEMIOLOGIC DATA

## INCREASING OF:

### **MOOD DISORDERS:**

*Depression, Disthymia*

### **ANXIETY DISORDERS:**

*Anxiety/Phobia*

*Panic Disorder*

*Obsessive Disorder*



# Clinical Syndromes

*most common SYMPTOMS  
related to the clinical syndromes*

Anxiety  
Sadness  
Isolation  
Tiredness  
Irritability  
Introversion  
Helplessness  
Hopelessness  
Eating disorders  
Sexual disorders  
Sleeping disorders  
**Lack of attention**  
**Memory impairment**





# Causes ???

Many factors !!!

Changes in

⇒ Job profile

*(uncertainty, risk, higher workload)*

⇒ Rules

⇒ Commercial policy

⇒ Economics

⇒ Family

⇒ etc



# Clinical target ?

Recovery

Stability

Reliability

*... for a safe performance !*



# CLINICAL GUIDELINES

## ANTI DEPRESSANTS

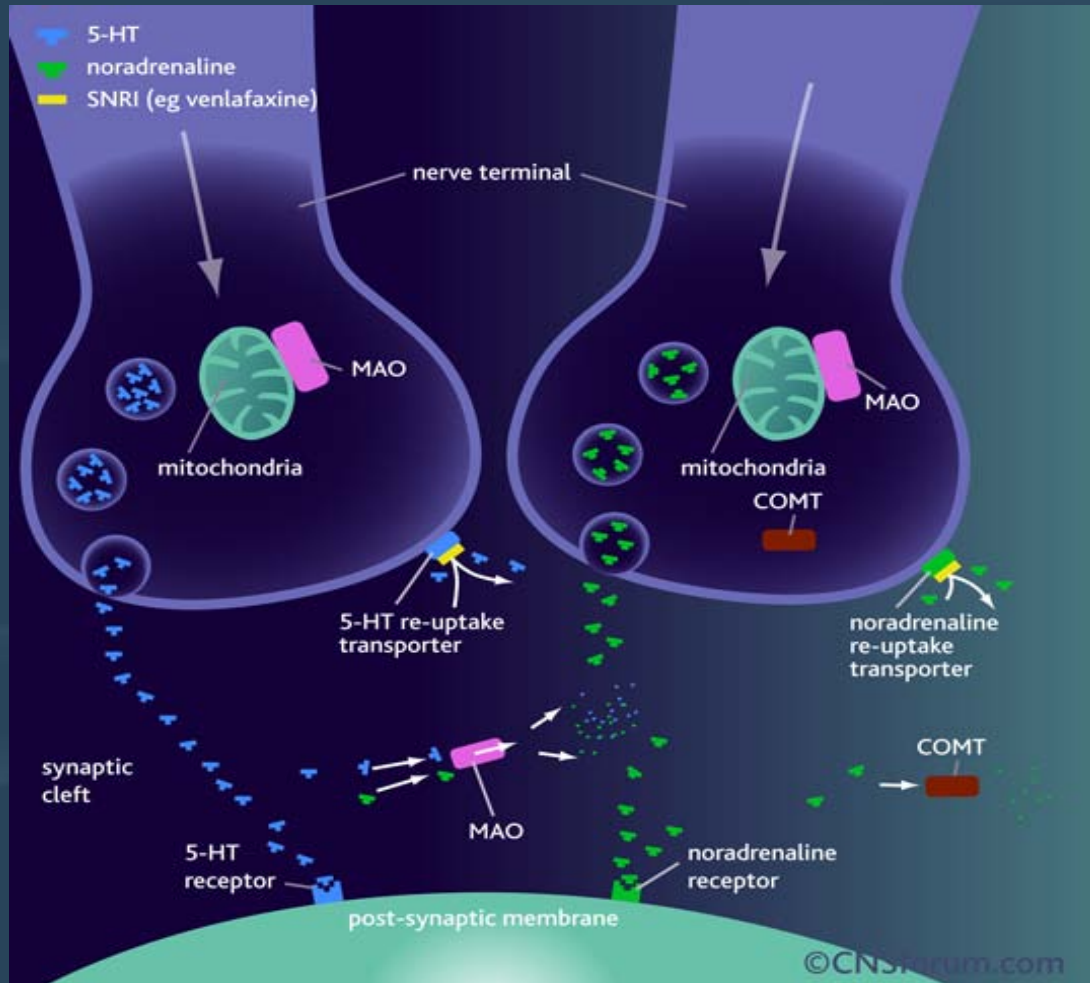
use:

*Selective Serotonine Reuptake Inhibitors  
(S.S.R.I.s.)*

*Serotonine-Noradrenaline Reuptake Inhibitors  
(S.N.R.I.s.)*

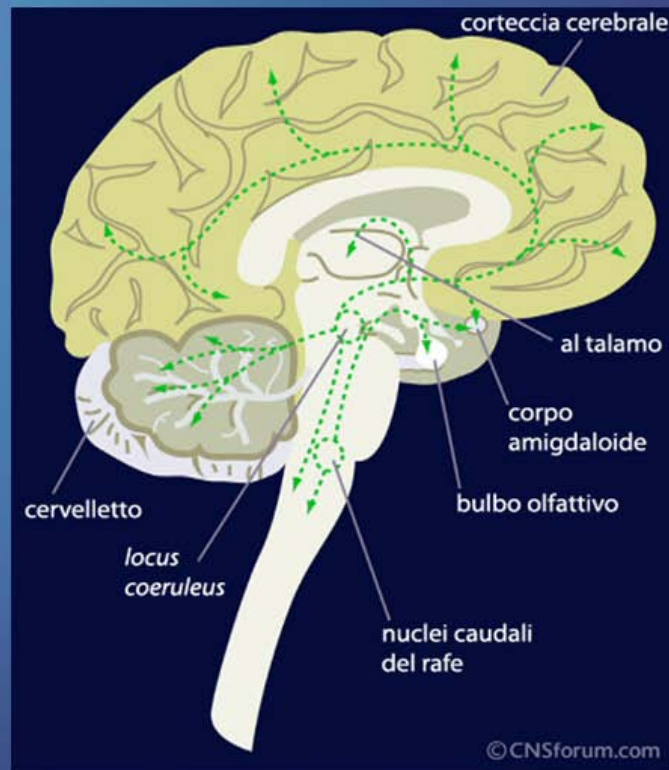


# Transporters mechanism





## Vie monoaminergiche cerebrali: NA





## **Aim of the study**

*verify the impact  
of  
medium/long term  
treatment with antidepressant  
on mental performance*





## TWO GROUPS:

### ⇒ CONTROL (CTRL):

**50 healthy subjects.**

- **Male and Female**  
Mean age 41
- **Applicants suitable for the pilot licence medical certificate (1st and 2nd class)**

### ⇒ CLINICAL (SS-N-RI) :

**50 subjects taking SSRIs or SNRIs for at least 6 months.**

- **Male and Female**  
Mean age 42
- **Pilots**
- **Flight Attendants**
- **Flight Engineers**
- **Air traffic controllers**



# *neurocognitive testing battery*

**TACHISTOSCOPE:**

*perceptual speed, attention, vigilance*

<b>P</b>	<b>M</b>	<b>L</b>
<b>7</b>	<b>H</b>	<b>F</b>
<b>4</b>	<b>A</b>	<b>2</b>



# *neurocognitive testing battery*

## **TREMOR TEST:** *shaking intensity of the hand*





# neurocognitive testing battery

## MENTAL EFFICIENCY: short term/working memory, concentration

**E.M. 1-2**  
di C. V. Remondino

cognome \_\_\_\_\_ nome \_\_\_\_\_  
data nascita \_\_\_\_\_ luogo \_\_\_\_\_  
studi \_\_\_\_\_

- CERCHIO
- ✦ FRECCIA
- QUADRATO
- ★ STELLA
- ▲ TRIANGOLO

*(The test consists of a grid of 10 columns and 20 rows of symbols: circles, arrows, squares, stars, and triangles. The symbols are arranged in a pattern that requires concentration and short-term memory to track.)*

07/02/2005





# *neurocognitive testing battery*

**VISUAL RESPONSE TIME:  
*vigilance, reaction time***





## STRUCTURE of ANALYSIS:

**Multivariate *AN*alysis *Of* *VA*riance for:**

- *comparable groups*
- *repeted measures*



# RESULTS

## -MANOVA- for groups

	⇒ CONTROL (CTRL):	⇒ CLINICAL (S.S/N R.I.)
<b>TACHISTOSCOPE</b> <i>N° correct answers</i>	<b>34.80</b>	<b>33.50</b>
<b>TREMOR</b> <i>N° of significant shakes</i>	<b>6.52</b>	<b>7.24</b>
<b>MENTAL EFFICIENCY</b> <i>N° correct answers</i>	<b>42.08</b>	<b>45.68</b>
<b>VISUAL RESPONSE TIME</b> <i>- speed average (mmsec)</i>	<b>201.08</b>	<b>214.90*</b>
<i>- medium variation (mmsec)</i>	<b>21.28</b>	<b>24.30</b>





# RESULTS

**-MANOVA- for repeted measures**

**Time 1 – Time 2**

	CLINICAL (S.S/N R.I.)	
<b>TACHISTOSCOPE</b> <i>N° correct answers</i>	T1	T2

<b>TREMOR</b> <i>N° of significant shakes</i>	T1	T2
--	----	----

<b>MENTAL EFFICIENCY</b> <i>N° correct answers</i>	T1	T2
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<b>VISUAL RESPONSE TIME</b> <i>- speed average (mmsec)</i> <i>- medium variation (mmsec)</i>	T1	T2
--	----	----

**(F "6,14" =1.734    p=0.185)**

**any significant difference**

**=**

**stability of performance**



# Comments

The only statistically significant difference is the higher visual response time in the "clinical" group:

- speed average: **201.08** vs **214.90** (mmsec)

*No differences have been found for the other parameters evaluated*

*The performance is stable in the follow up*



# Common SIDE EFFECTS described for S-N RIs

Headache

Drowsiness

Dizziness

Sleeplessness

Tiredness

Nervousness

Tremors

Difficulty concentrating

Appetite loss or increase

Weight loss or gain

Sexual dysfunctions



# Comparison:

## Side Effects

vs

## Clinical Symptoms

- ➔ Headache
- ➔ Drowsiness
- ➔ Dizziness
- ➔ Sleeplessness
- ➔ Tiredness
- ➔ Nervousness
- ➔ Tremors
- ➔ Difficulty concentrating
- ➔ Appetite loss or increase
- ➔ Weight loss or gain
- ➔ Sexual dysfunctions

- ➔ *Anxiety*
- ➔ *Sadness*
- ➔ *Isolation*
- ➔ *Irritability*
- ➔ *Tiredness*
- ➔ *Introversion*
- ➔ *Helplessness*
- ➔ *Hopelessness*
- ➔ *Eating disorders*
- ➔ *Sleeping disorders*
- ➔ *Sexual dysfunctions*
- ➔ ***Lack of attention***
- ➔ ***Memory impairment***



# What about other drugs/medications ?

*common side effects reported*

- ⇒ ACE inhibitors
- ⇒ Histamine- H2 Antagonists
- ⇒ Proton Pump Inhibitors
- ⇒ Calcium Channel Blockers
- ⇒ Pain relievers-NSAIDs
- ⇒ Bronchodilators
- ⇒ Cough suppressants
- ⇒ Decongestants
- ⇒ Some "On-the-counter drugs"
- ⇒ Dizziness
- ⇒ Headache
- ⇒ Fainting
- ⇒ Tremors
- ⇒ Drowsiness
- ⇒ Impaired vision



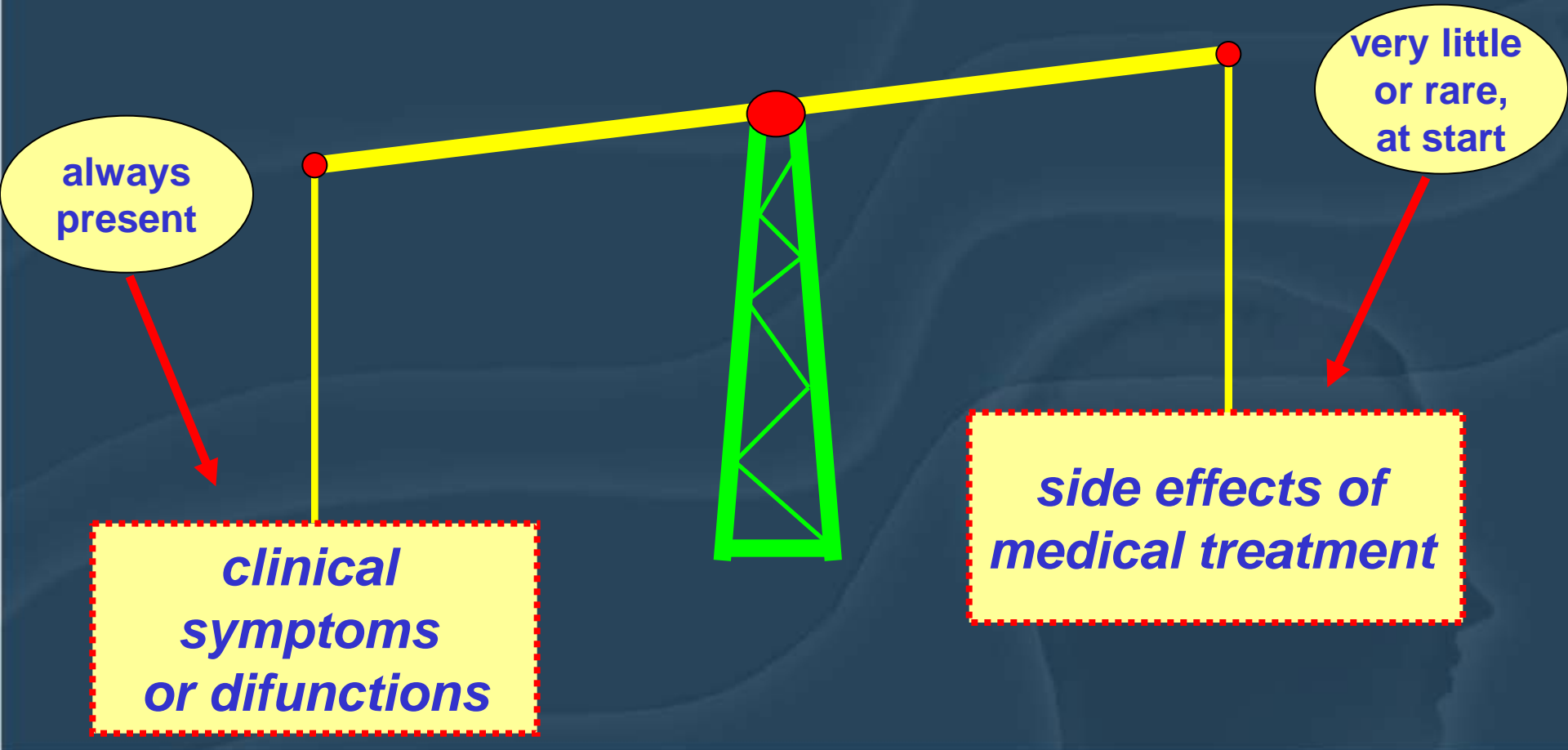
## IMPAIRMENT in PERFORMANCE BALANCE

always  
present

very little  
or rare,  
at start

*clinical  
symptoms  
or difunctions*

*side effects of  
medical treatment*





# Discussion

THESE RESULTS SEEM TO CONFIRM OTHER FINDINGS AND ARE CONSISTENT WITH THE HYPOTHESIS THAT THE **ANTIDEPRESSANT TREATMENT WITH SSRI<sub>s</sub> OR SNRI<sub>s</sub> IS:**

- *useful for the remission of the clinical syndromes*
- *useful for the prevention of somatic dysfunctions*
- *active on neurotrophic and neuroplastic brain process*
- *tolerated and safe, at "least but not less" than the syndromes themselves*





**F.A.A. (USA)**  
has recently authorized  
use of SSRI  
in pilots :

- *Paroxetine*
- *S-Citalopram*
- *Sertraline*
- *Fluoxetine*

*... with some prescriptions !!!*



# Conclusions

***INCIDENCE OF PSYCHOLOGICAL DYSFUNCTIONS  
(mainly those related to stress)  
IS INCREASING, EVEN IN THE AIRCREW COMMUNITY***

***AN APPROPRIATE, STANDARDIZED AND ALLOWED  
PHARMACOLOGICAL TREATMENT PROTOCOL***

***is***

***ready to be introduced in the aviation medical rules  
(like other treatments)***



Thank you !

QUESTIONS ???





