

Depression,  
serotonin  
and dark chocolate



# Major depression (Unipolar disorder) Quizz 1

1. What are emotional/mood symptoms of depression?
2. Who's theory of depression is based on the "Cognitive triad"?
3. What is the most common course of depression?
  - a) recovery without recurrence
  - b) recovery with recurrence
  - c) chronic depression
4. What attributional style does a depressed individual use for bad events?
  - a) internal – unstable – specific
  - b) external – stable – global
  - c) internal – stable - global

## Major symptoms:

- Low mood
- Inability to experience pleasure and drive
- Cognitive impairment (memory, concentration etc)
- Low self-esteem, hopelessness
- Insomnia or hypersomnia
- In most severe cases, psychosis

To experience smth. –  
переживать что-то

Drive (психол.) – энергия,  
внутренний импульс

Impairment – ухудшение,  
нарушение функции

Self-esteem – самооценка

Insomnia – бессонница

Severe case – тяжелый  
случай

## Major causes:

- Psychological (stressful life events, death, relationships break, financial losses, etc.)
- Biological (brain damage, toxic agents, genetic mutations, drug abuse)

Life events – жизненные события

Sedative drugs – успокоительные лекарства

Drug abuse –  
злоупотребление  
наркотиками (или  
мед. препаратами)

## Biological mechanism

Monoamine theory – low level of three neurotransmitters:

- Serotonin
- Norepinephrine (noradrenaline)
- Dopamine

Most modern antidepressant drugs are targeting these three compounds (to increase).

Neurotransmitter –  
нейромедиатор, активное  
действующее вещество в  
синапсе

Chemical compound –  
химическое соединение

Fatigue – истощение,  
утомление

Anxiety – тревога,  
тревожность

## Biological mechanism

Serotonin – energy, calmness,  
concentration

Lack of serotonin – fatigue,  
anxiety

Neurotransmitter –  
нейромедиатор, активное  
действующее вещество в  
синапсе

Chemical compound –  
химическое соединение

Fatigue – истощение,  
утомление

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тревожность

## Biological mechanism

Dopamine – happiness, pleasure,  
motivation

Lack of dopamine – anhedonia,  
apathy

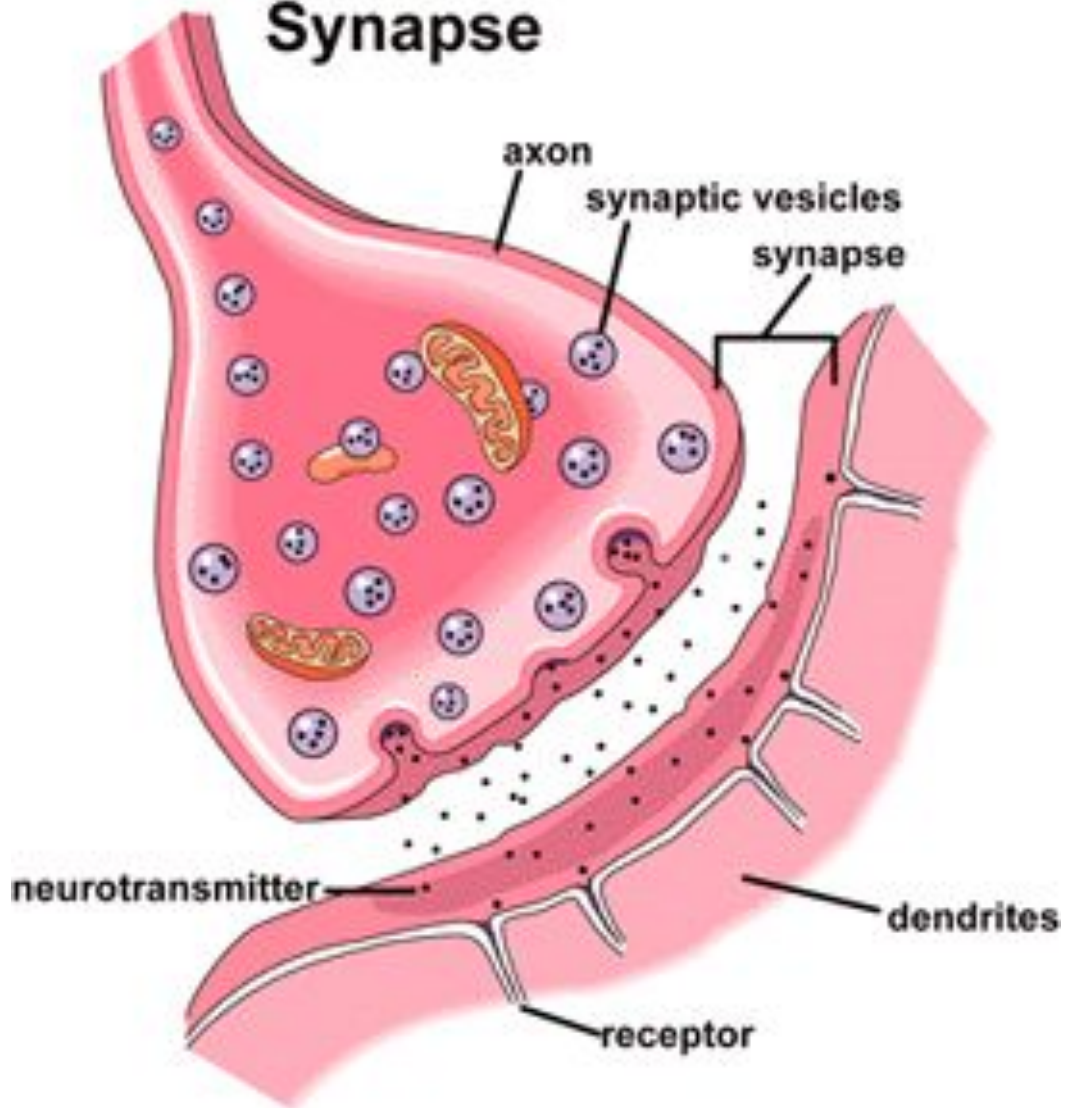
Neurotransmitter –  
нейромедиатор, активное  
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синапсе

Chemical compound –  
химическое соединение

Fatigue – истощение,  
устомление

Anxiety – тревога,  
тревожность

# Synapse



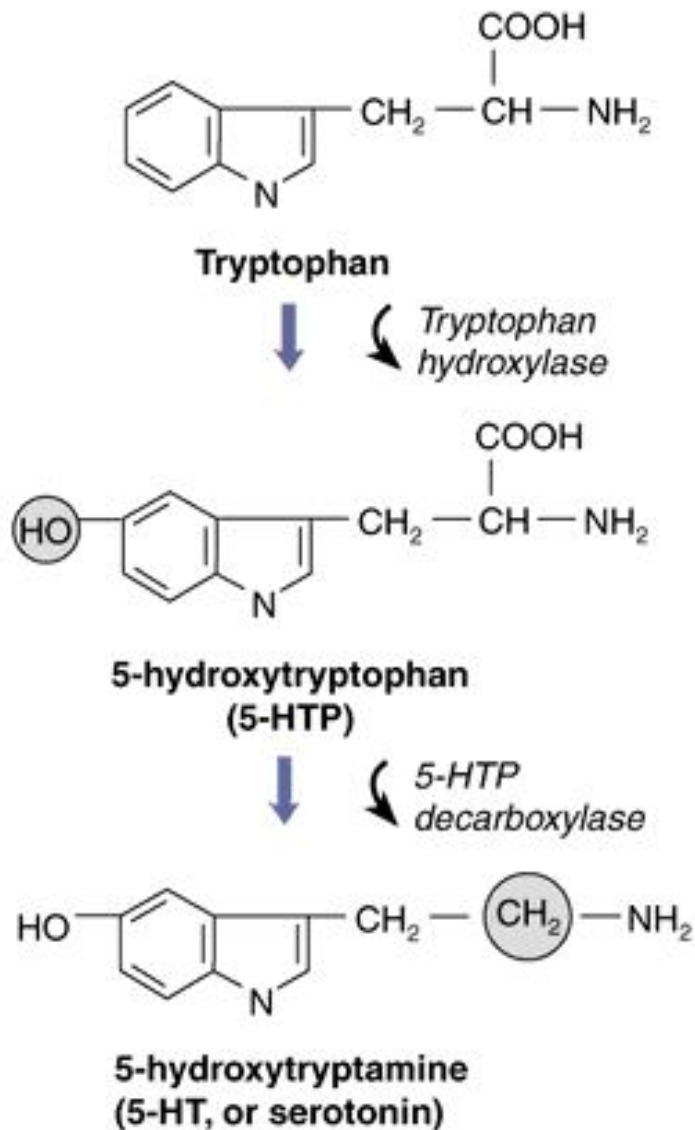
Neurotransmitter –  
нейромедиатор, активное  
действующее вещество в  
синапсе

Cell – клетка

Neuron – нейрон



► Biosynthesis of Serotonin

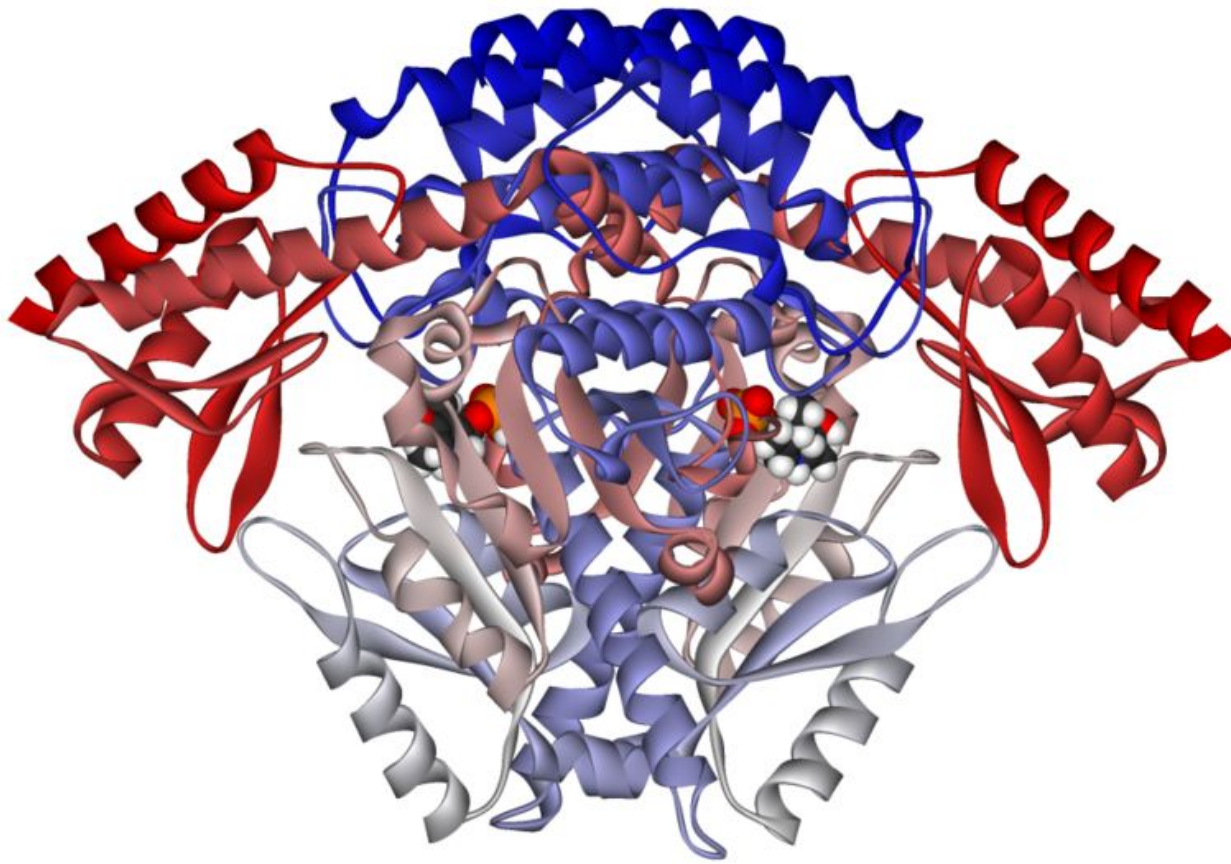


To synthesize –  
синтезировать

Precursor –  
предшественник

Amino acid –  
аминокислота

Enzyme – энзим,  
фермент



Precursor –  
предшественник

Amino acid –  
аминокислота

Enzyme – энзим,  
Фермент

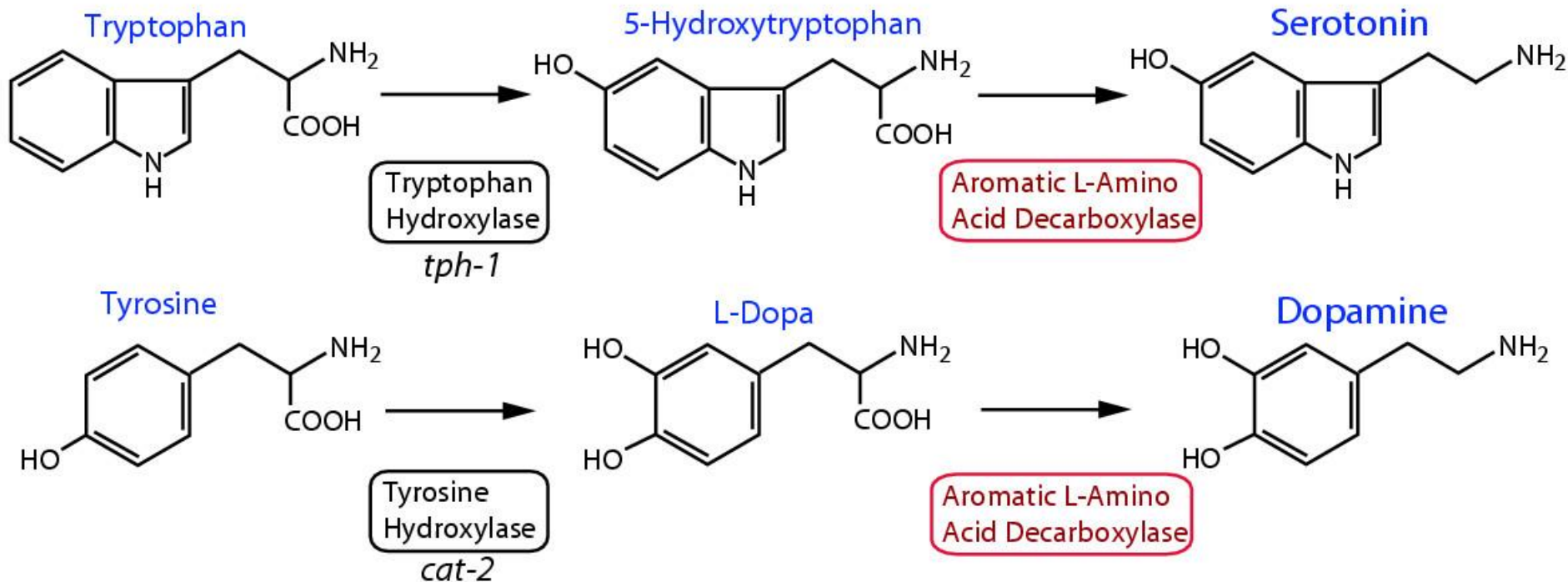
To convert –  
превращать,  
преобразовывать

**AADC (enzyme)**

(Aromatic L-amino acid decarboxylase)

Converts both **5-HTP** to **serotonin** and **L-Dopa** to **dopamine**

# Serotonin & Dopamine Biosynthesis



## Association study between two variants in the DOPA decarboxylase gene in bipolar and unipolar affective disorder†

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Issue



## Possible parent-of-origin effect of Dopa decarboxylase in susceptibility to bipolar affective disorder

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Issue



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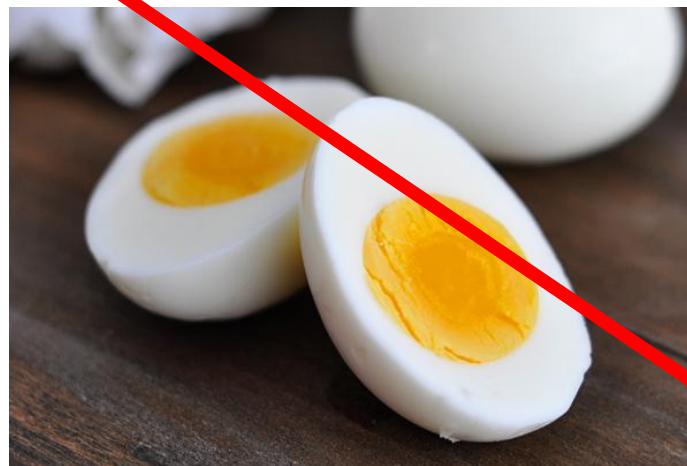
# Tyrasine (to raise dopamine)



# Tryptophan (to raise serotonin)



# Tryptophan (to raise serotonin)



# Diet

Diet rich in carbohydrates (sugars) increases level of **insulin**, and then increase **serotonin production**.

Carbohydrates –  
углеводы

Diabetes –  
сахарный диабет





Carbohydrates –  
углеводы

Diabetes –  
сахарный диабет



# Diet

Rich in carbohydrates (sugars) increases level of **insulin**, and then increase **serotonin production**.

BUT! Constant high level of insulin may cause diabetes (II type)

Carbohydrates –  
УГЛЕВОДЫ

Diabetes –  
сахарный диабет



Low sugar. Not a good source of tryptophan.

Then why does dark chocolate help?





**Anandamide** – endogenous cannabinoid

**Phenethylamine** – «chocolate amphetamine», stimulant that promote feelings of attraction, excitement by stimulating the brain's pleasure centres

**Flavonoids** - anti-inflammatory, anti-allergic, good for blood flow

Endogenous –  
эндогенный,  
внутренний

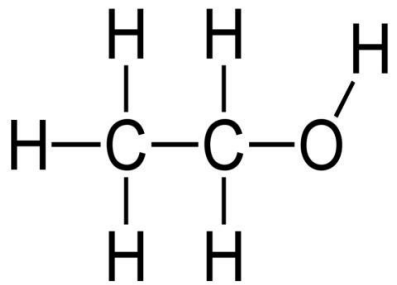
Excitement –  
возбуждение

Pleasure centres –  
центры удовольствия

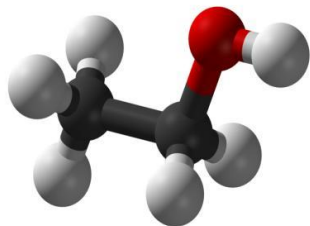
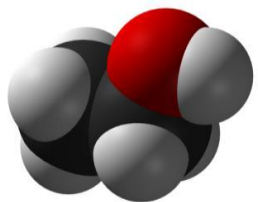
Inflammatory –  
воспалительный







**Ethanol**



Ethanol –  
этиловый спирт,  
алкоголь





**Anandamide** – endogenous cannabinoid

**Phenethylamine** – «chocolate amphetamine», stimulant that promote feelings of attraction, excitement by stimulating the brain's pleasure centres

**Flavonoids** - anti-inflammatory, anti-allergic, blood flow

Endogenous –  
эндогенный,  
внутренний

Excitement –  
возбуждение

Pleasure centres –  
центры удовольствия

Inflammatory –  
воспалительный

## Remember!

No matter how complicated the psychological phenomenon is, there is always physiological mechanism, underlying it.



Complicated –  
СЛОЖНЫЙ,  
КОМПЛЕКСНЫЙ

Underlying –  
ЛЕЖАЩИЙ В ОСНОВЕ

