

# The Role of Neurotransmitters & Hormones in Sleep

# New Hampshire Natural Health Clinic



Bradley Bush, ND  
Rebecca Bush, ND  
Bert Mathieson, ND

[www.nhnatural.com](http://www.nhnatural.com)

# Questions to Answer

- Why should we be concerned about neurotransmitters? What are they?
- Are they critical to our health?
- What is their contribution to clinical conditions?
- What role do they play in sleep?

# What are Neurotransmitters?

- Chemicals that serve as messengers between the brain and organs.
- Analogous to the body's internal telephone system.
- Must have adequate levels to be healthy!

# Why are they important?

- Without neurotransmitters, your brain could not tell:
  - Your heart to beat
  - Your lungs to breath
  - Your stomach to digest

# Neurotransmitters Affect the *ENTIRE* Human Being

## Emotionally

- Mood
- Behavior
- Social attitude

## Physically

- Sleep
- Cardiac Function
- Metabolism/Weight

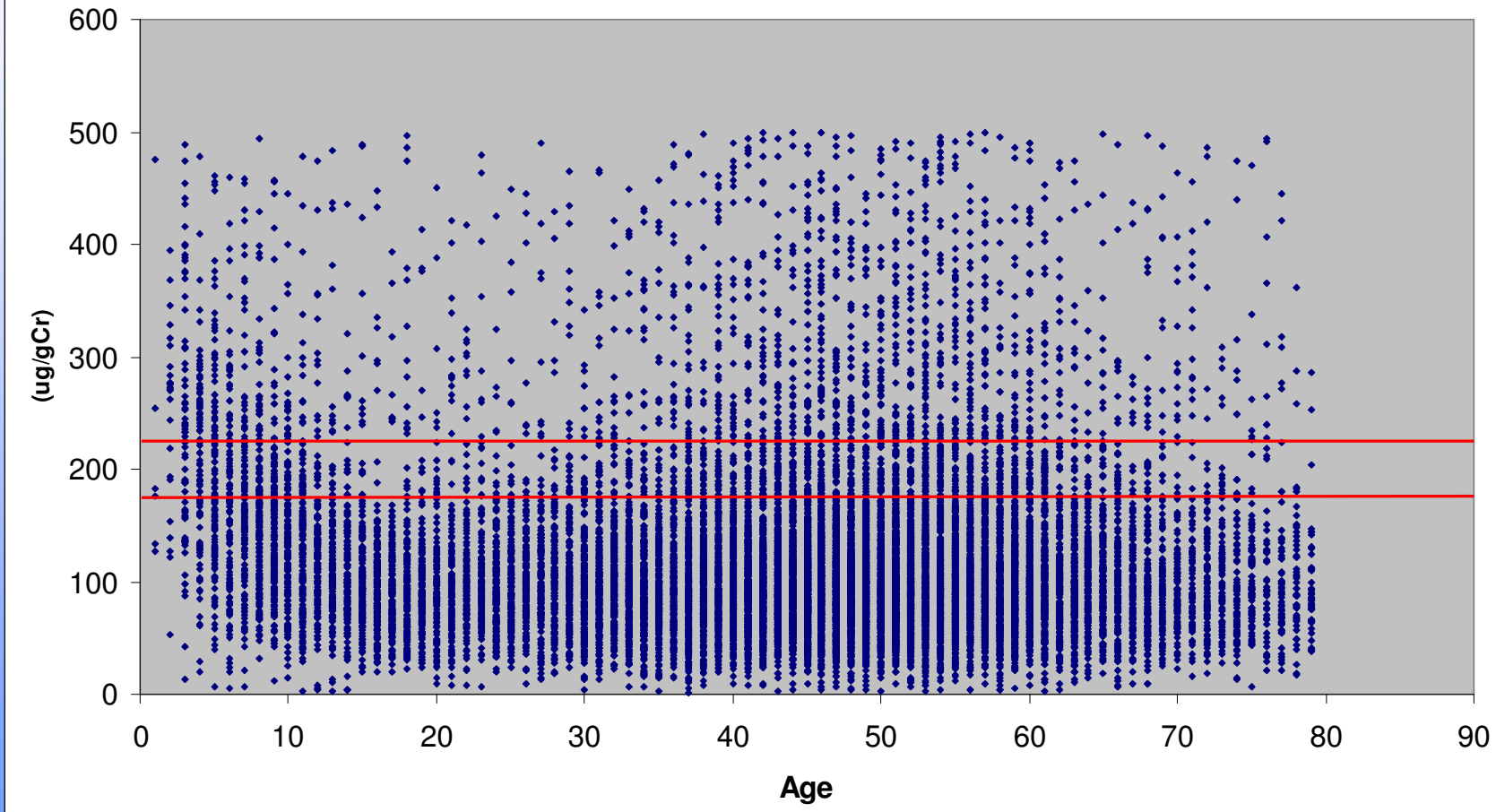
## Mentally

- Focus
- Learning ability

# Neurotransmitter Imbalances

- Scientific studies suggest the incidence of neurotransmitter imbalances in the population is very high.

### Serotonin in the Patient Population N=20000



# Where do Imbalances Come From?

- High levels of stress



- Poor dietary habits



- Environmental toxins



- Genetics



# Where do Imbalances Come From?

- Stressful lifestyles cause the body to lose neurotransmitters rapidly, which leads to very low levels over time.



# Where do Imbalances Come From?

- Poor dietary habits (fast-food, junk food, sugars, etc.) do not provide the body with the building blocks for neurotransmitters, called *amino acids*.



# Where do Imbalances Come From?

- Environmental toxins, such as industrial cleaners, air & water pollution, and solvents kill brain cells, which contain the neurotransmitters. Brain cells **CANNOT** be replaced!



# Where do Imbalances Come From?

- Some people have poor neurotransmitter levels due to their genetics.



# Neurotransmitter Imbalances Result in:

- Insomnia
- Weight Problems
- Depression
- Fatigue
- Migraines
- ADD/ADHD/Autism
- Anxiety
- OCD
- Behavioral Issues
- Others

# Neurotransmitters & Sleep

- Neurotransmitters control many aspects of sleep.
  - Falling asleep
  - Staying asleep
  - Getting deep sleep (REM)
  - The waking process

# Neurotransmitters & Sleep

- Neurotransmitters are divided into two categories:

- **Excitatory**

- Energizing
- Motivating
- Provide focus
- Rev up the system

- **Inhibitory**

- Calming
- Relaxing
- Sleep inducing
- Slow down the system

# Neurotransmitters & Sleep

- Elevated levels of excitatory neurotransmitters can lead to sleep disturbances.
- Excitatory neurotransmitters related to sleep:
  - Epinephrine (adrenalin)
  - Norepinephrine (noradrenalin)
  - Phenylethylamine (PEA)
  - Glutamate
  - Histamine

# Neurotransmitters & Sleep

- Low levels of inhibitory neurotransmitters can lead to sleep disturbances.
- Inhibitory neurotransmitters related to sleep:
  - Serotonin
  - GABA
  - Taurine
  - Glycine

# Neurotransmitters & Sleep

- During the day, excitatory neurotransmitter levels are high, providing the energy and motivation necessary to carry out normal functions.
- During the evening, excitatory levels drop and inhibitory transmitter levels rise, preparing the body for rest.

# Neurotransmitters & Sleep

- Around bed time, the drop in excitatory neurotransmitter levels and rise in inhibitory levels signal the production of melatonin.
- During the night, low levels of excitatory transmitters and increased levels of inhibitory transmitters and melatonin are what the body needs for deep, restful sleep.

# Hormones & Sleep

- Melatonin is known as the “sleep hormone” and is responsible for inducing sleep in humans.
- Melatonin is made from serotonin in the body.
- Low levels of serotonin could lead to low levels of melatonin.

# Hormones & Sleep

- Cortisol is known as the “stress hormone” and is produced by the adrenal gland.
- People experiencing high amounts of stress may have elevated cortisol levels.
- High night time cortisol levels can cause sleep disturbances.

# Neurotransmitters & Sleep

Sleep disturbances can be due to a number of different neurotransmitter & hormone imbalances.

3 AM Sample Insomnia Pt's.	Optimal Range (nighttime)	Pt. 1	Pt. 2	Pt. 3	Pt. 4	Pt. 5	Pt. 6
Epinephrine	<5	15.6	3.2	1.5	2.7	3.0	1.1
Norepinephrine	30-55	36.8	77.5	21.0	25.4	27.4	31.2
Dopamine	125-175	159	123	178	158	174	126
Serotonin	175-225	145	96.3	87.5	74.2	100	65.2
GABA	2.0-4.0	4.3	5.2	4.1	6.7	5.9	2.1
PEA	175-350	199	289	895	333	208	177
Histamine	10-25	13.1	22.8	11.4	47.2	19.5	15.2
Cortisol	0.3-1.5	0.9	1.1	1.5	0.5	6.4	1.8
Melatonin	25-60	46	26	34	36	21	6.4

# Neurotransmitters & Sleep

- Trends associated with sleep disturbances:
  - Low serotonin levels
  - Elevated levels of one or more excitatory neurotransmitters
  - Hormonal imbalances:
    - Low melatonin
    - High cortisol

# What can be done?

- Identifying which chemical is out of balance is the first step.
- A non-invasive hormone & neurotransmitter test can identify if there is an imbalance in the system.
- Once the imbalance has been identified, a targeted therapeutic regimen can be developed.

# What can be done?

- Healthy lifestyle choices can improve neurotransmitter & hormone levels, leading to better sleep patterns.
  - Eat a healthy diet, avoiding foods high in sugars
  - Exercise
  - Avoid environmental toxins
  - Develop a consistent sleep schedule

# Benefits of a Healthy Diet

- Neurotransmitters are made from protein-containing foods in our diet.
- Sugar can lead to depletion of certain neurotransmitters.
- Avoiding large amounts of sugar helps prevent the rapid loss of neurotransmitters that eventually leads to low levels.

# Benefits of Exercise

- Exercise raises the levels of many neurotransmitters, including serotonin.
- Exercise during the day has been scientifically shown to help people sleep more soundly.

# Case Study

- Chronic insomnia patient, unable to fall asleep on a nightly basis.
- Elevated PEA & epinephrine, and low serotonin are likely causes.

Female, 46 Y.O. 10 PM Sample	Optimal Range (nighttime)	1 <sup>st</sup> Test	2 <sup>nd</sup> Test
Epinephrine	<5	9.6	
Norepinephrine	30-55	46.3	
Dopamine	125-175	159	
Serotonin	175-225	63	
GABA	2.0-4.0	5.0	
PEA	175-350	637	
Histamine	10-25	24.7	
Cortisol	0.3-1.5	1.3	
Melatonin	25-60	36	

# Case Study

- Patient began Targeted Amino Acid Therapy program designed to raise serotonin and lower PEA & epinephrine.

Female, 46 Y.O. 10 PM Sample	Optimal Range (nighttime)	1 <sup>st</sup> Test	2 <sup>nd</sup> Test
Epinephrine	<5	9.6	
Norepinephrine	30-55	46.3	
Dopamine	125-175	159	
Serotonin	175-225	63	
GABA	2.0-4.0	5.0	
PEA	175-350	637	
Histamine	10-25	24.7	
Cortisol	0.3-1.5	1.3	
Melatonin	25-60	36	

# Case Study

- After 3 months of therapy, the neurotransmitter values have normalized and the patient was able to fall asleep regularly.

Female, 46 Y.O. 10 PM Sample	Optimal Range (nighttime)	1 <sup>st</sup> Test	2 <sup>nd</sup> Test
Epinephrine	<5	9.6	4.8
Norepinephrine	30-55	46.3	39.8
Dopamine	125-175	159	141
Serotonin	175-225	63	305
GABA	2.0-4.0	5.0	4.6
PEA	175-350	637	369
Histamine	10-25	24.7	23.7
Cortisol	0.3-1.5	1.3	0.9
Melatonin	25-60	36	44

# Summary

- Sleep is a complex biological process that is influenced by many neuroendocrine parameters.
- A disruption in one or more of these parameters can lead to sleep disturbances.
- Identifying which chemical is out of balance is the first step in addressing sleep problems.

# Summary

- Supplying the body with the building blocks (amino acids) for making neurotransmitters is a natural, effective alternative to addressing sleep related problems.

# New Hampshire Natural Health Clinic



Call for an appointment  
(603)623-6800

[www.nhnatural.com](http://www.nhnatural.com)