

THE HEALING POWER OF LOVE: AN OXYTOCIN HYPOTHESIS – OVERVIEW

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Dedicated to a deeper understanding of the neurobiological basis
of love, sexuality, and wellness



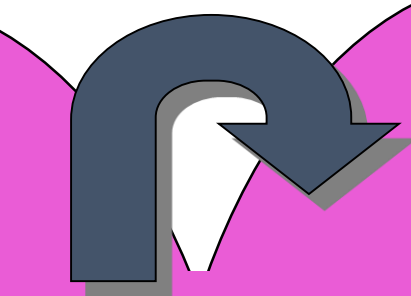
SOCIAL BEHAVIOR, SOCIAL BONDS AND LOVE EXIST IN THE CONTEXT OF EVOLUTION

**The most common
unit of analysis in
Psychology and Biology
and
especially in
Physiology
is the
INDIVIDUAL.**



**However,
Most living organisms can
NOT SURVIVE
OR REPRODUCE ALONE.**





**The mammalian nervous system
especially functions best in a
SOCIAL environment.**

**Social behavior and CONNECTION is
necessary for physiological and
behavioral
homeostasis.**

**What
Myron Hofer
called
“Hidden regulators”**



**In the ABSENCE
of appropriate
social interactions
& social bonds
(i.e. ISOLATION)**

-

**Substitutions
May occur**

**Abuse of
Drugs
Food,
Mental
Dysfunction**



**In the ABSENCE
of LOVE or other
appropriate
social interactions,
during forced or self-
induced ISOLATION -
Substitutions
May occur**

**Depression,
Illness
Shut-down
even, Death**



LOVE and FEAR are most easily understood in the context of EVOLUTION and DEVELOPMENT. BOTH LOVE and FEAR directly or indirectly support:

SURVIVAL

SOCIAL SUPPORT AND PERCEIVED SAFETY

DEFENSE AND AGGRESSION

REPRODUCTION

ACCESS TO MATES

CARE OF OFFSPRING

GENETIC SURVIVAL



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What is love?

**LOVE is usually defined by
ATTACHMENTS AND
SOCIAL BONDS AND A
NEED TO PROTECT THOSE
THAT WE LOVE.**

**Here I define LOVE as a
complex of neurobiological
processes that facilitates
health, wellness,
reproductive fitness &
biological optimality.**



FEAR AND ANXIETY
(PRIMITIVE, ADAPTIVE,
BUT POTENTIALLY
MALADAPTIVE)

There is no
fear in love;
but perfect
love casteth
out fear
1 John 4:18



**Physiological states,
regulated by ancient
hormones and the
autonomic nervous
system are elements in
the dynamic dance
between approach and
avoidance – between
LOVE and FEAR**



**Secure attachments & bonds matter
especially in EARLY LIFE.**

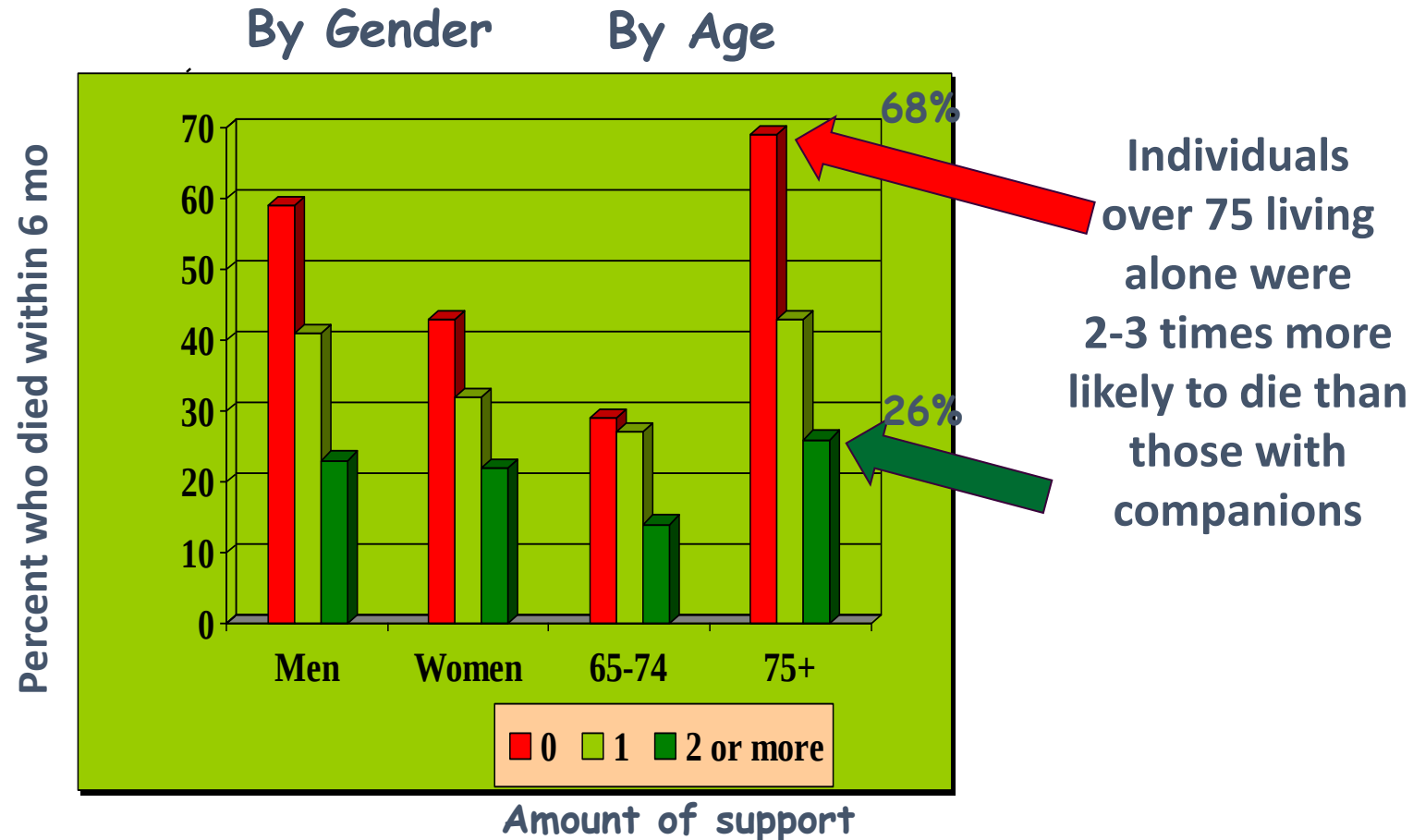


**The protective effects of positive early life
experiences and attachment depend in part
on oxytocin.**



An example of the HEALING POWER of LOVE & SOCIAL SUPPORT:

Following a heart attack, patients without support (in red) were more likely to die within 6 months.



Berkman, et al., Emotional support and survival after myocardial infarction: A prospective, population-based study of the elderly. Ann Int Med 1992



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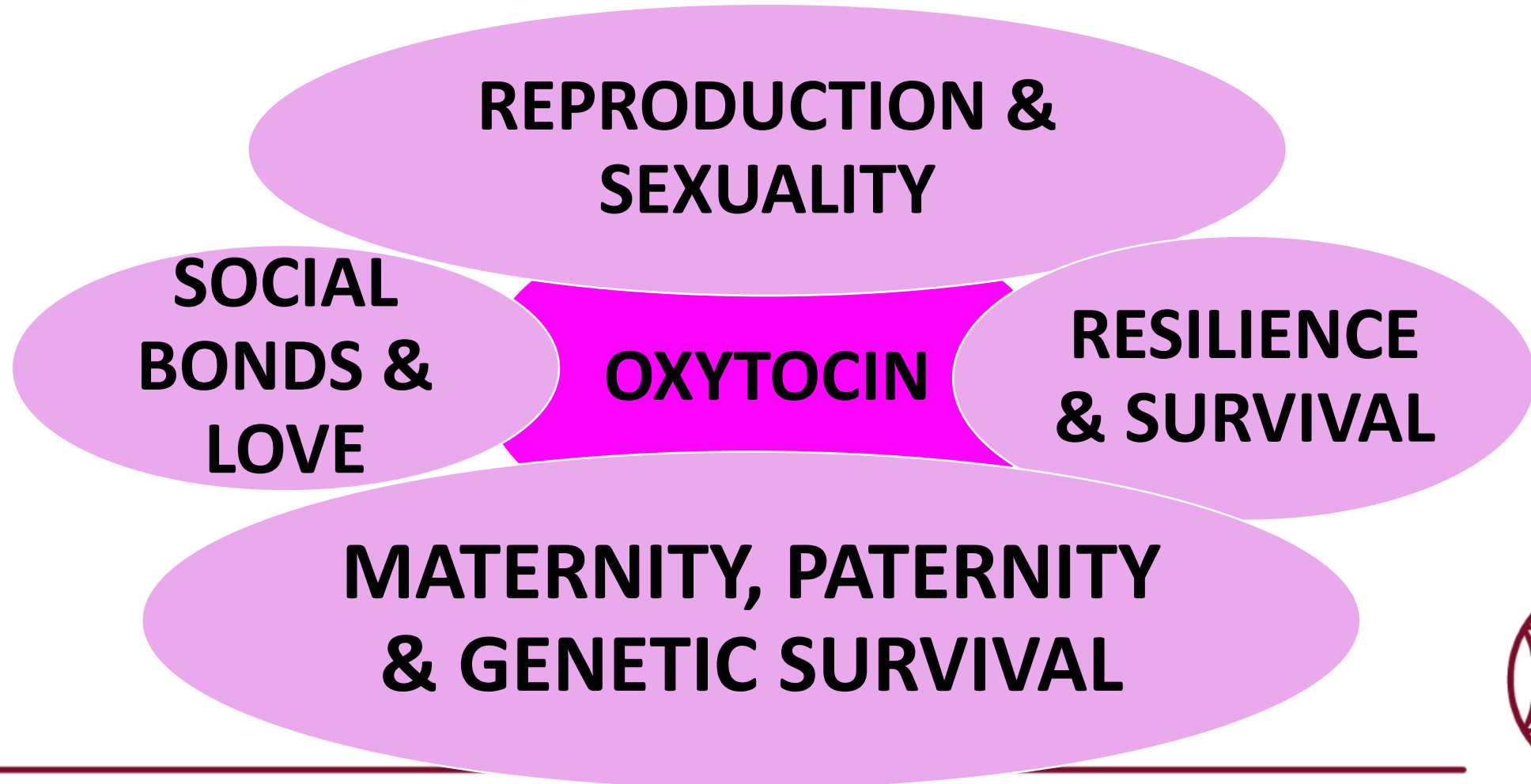
ACCESS TO MATES

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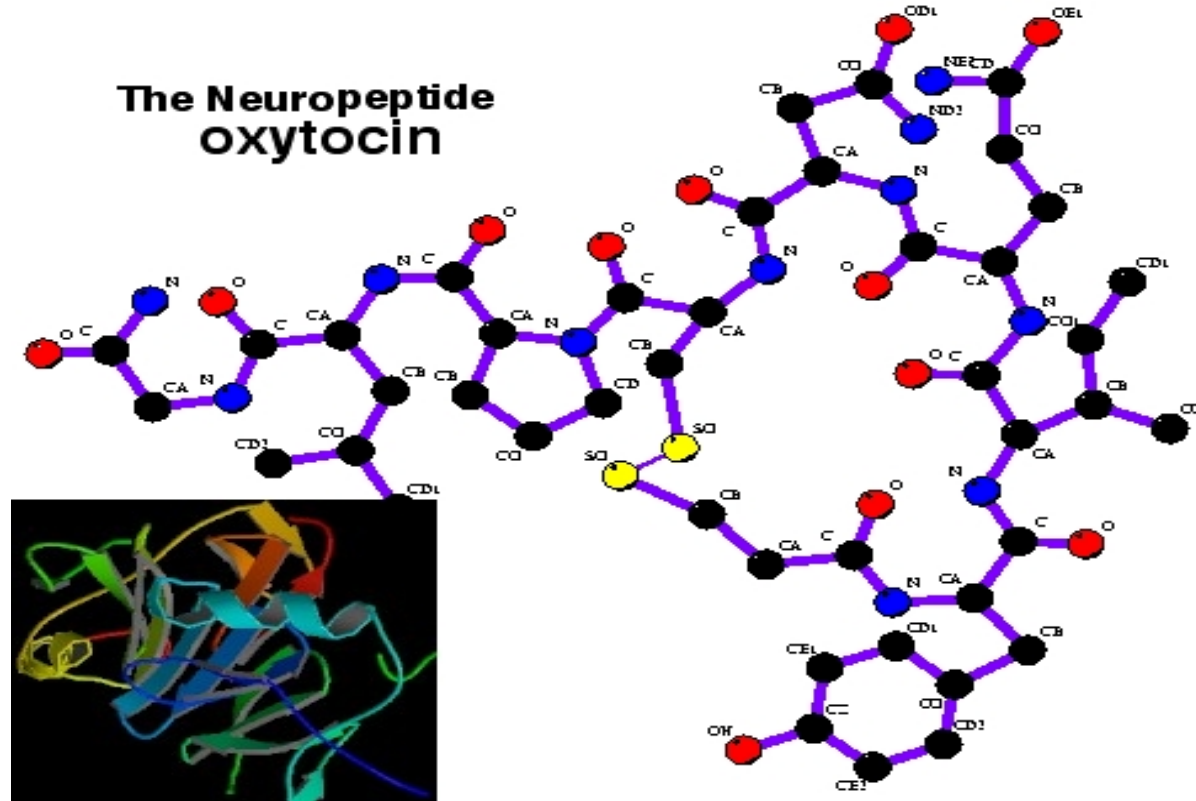
**Overview: OXYTOCIN PATHWAYS, CRITICAL TO A SENSE OF SAFETY,
UNDERLIE CENTRAL FEATURES OF SOCIAL BEHAVIOR ASSOCIATED
WITH MAMMALIAN REPRODUCTION AND SURVIVAL**



Oxytocin is a NEUROPEPTIDE MOLECULE with functions throughout the BRAIN and BODY.

OXYTOCIN is central to the biology of SAFETY & LOVE.

The Neuropeptide oxytocin



WHAT IS OXYTOCIN?

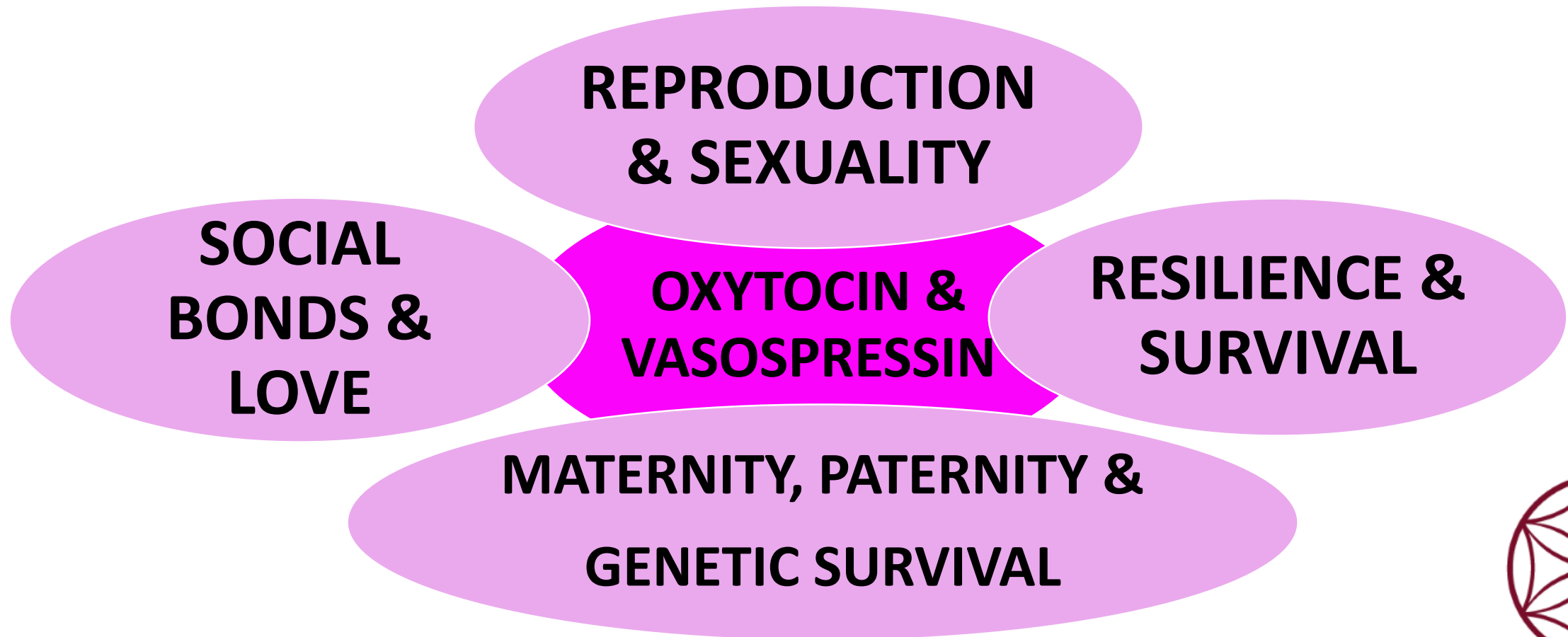


9 amino acids configured as a ring and a tail.

The ring in oxytocin is held together by sulfur bonds. These bonds allow oxytocin to have a high degree of biological activity and support positive social behaviors, stress buffering and good health.



OXYTOCIN PLUS VASOPRESSIN BOTH UNDERLIE CENTRAL FEATURES OF SOCIAL BEHAVIOR ASSOCIATED WITH MAMMALIAN REPRODUCTION AND SURVIVAL



Oxytocin does NOT act alone.
OXYTOCIN (OT) has a sibling hormone –
Arginine VASOPRESSIN (AVP) –
from which it differs by 2 (of 9) amino acids

OXYTOCIN (OT)

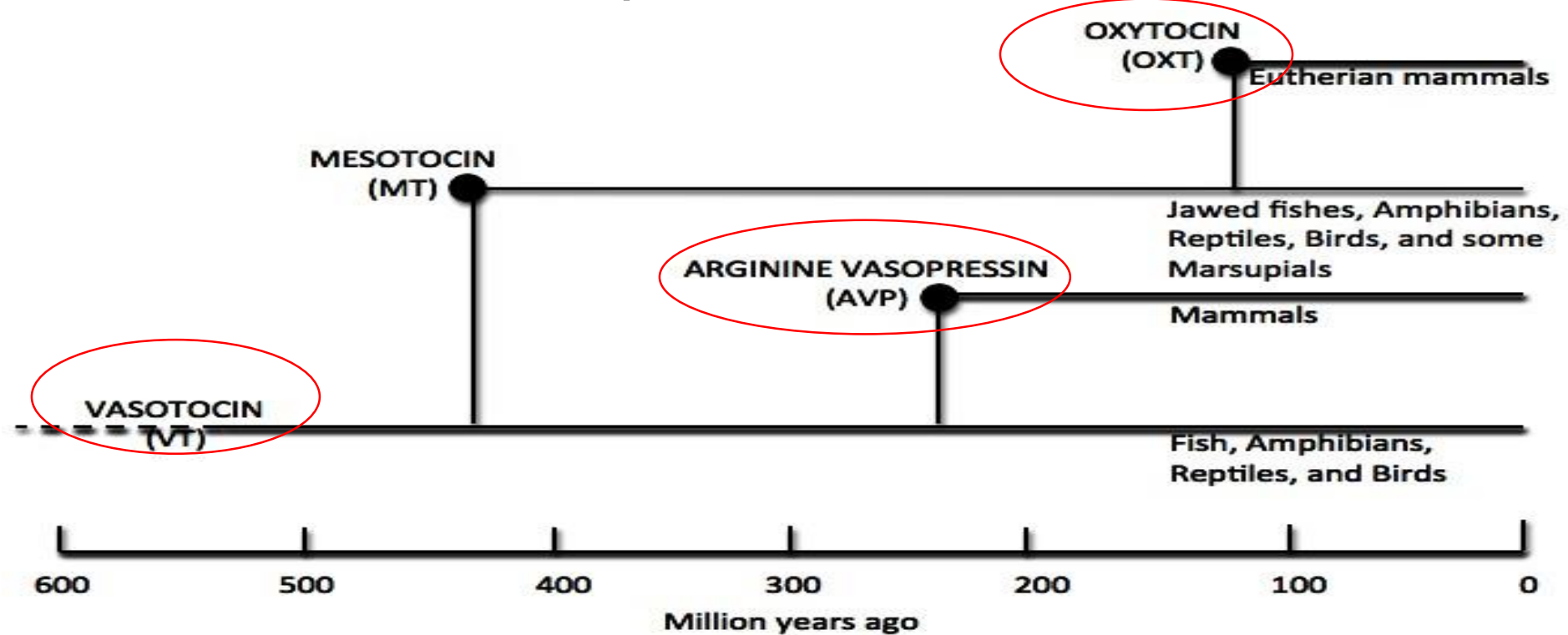
Cys-Tyr-Ile-Gln-Asn-Cys-Pro-Leu-Gly-NH₂

Arginine VASOPRESSIN (AVP)

Cys-Tyr-Phe-Gln-Asn-Cys-Pro-Arg-Gly-NH₂



Oxytocin and Vasopressin evolved from an ancestral molecule, VASOTOCIN, that preceded the evolution of Vertebrates



Arginine Vasopressin (AVP) evolved about 200 million years ago – from VASOTOCIN (a more ANCIENT peptide).

Oxytocin (OT) is more MODERN... appearing about 100 million years ago, associated with the evolution of mammals (SOCIAL BONDS, BIRTH, LACTATION AND SOCIAL COGNITION).



WHAT IS OXYTOCIN?



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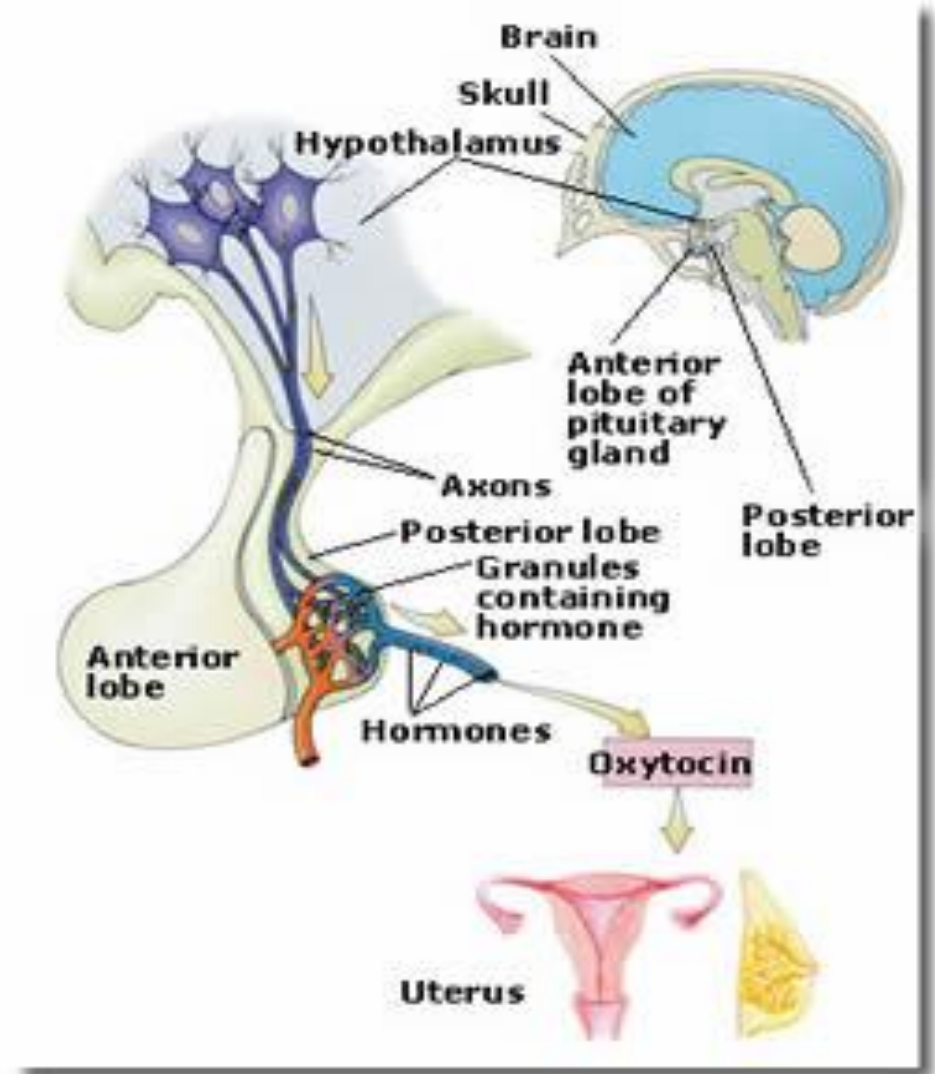


What is oxytocin

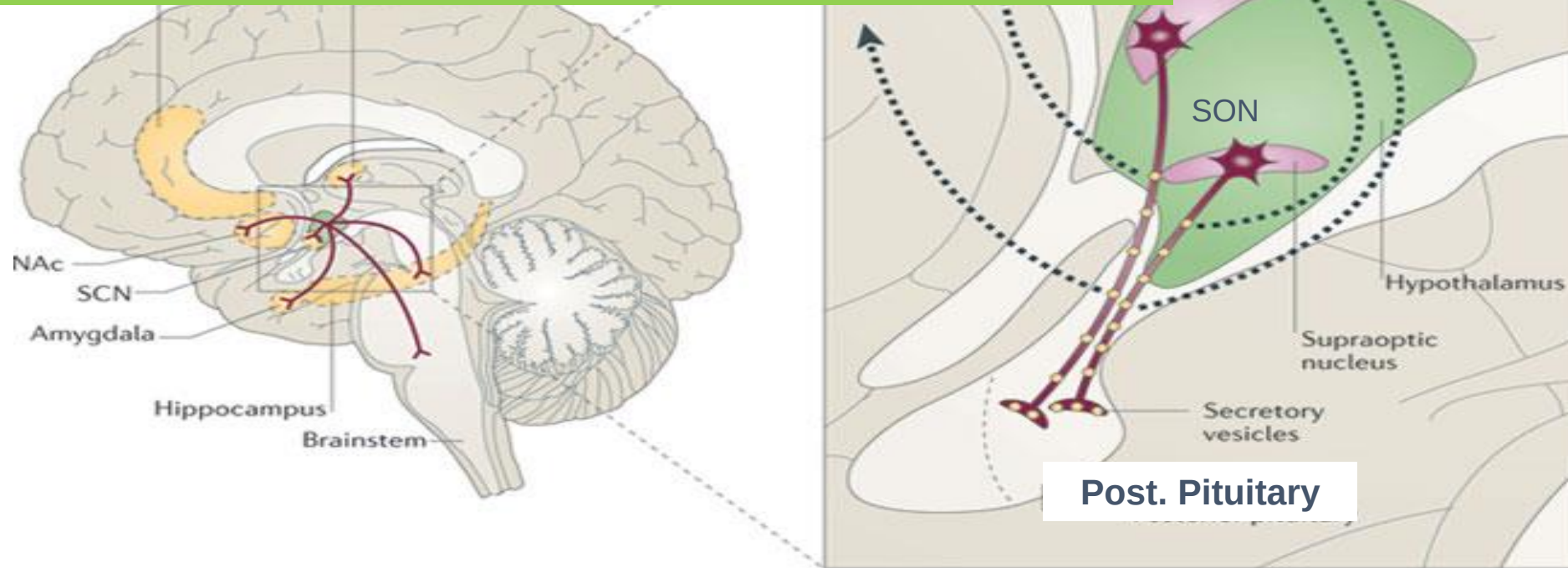
Oxytocin was classically viewed as a “FEMALE REPRODUCTIVE HORMONE,” acting primarily on the UTERUS and MAMMARY GLAND.

Of course, we now know that this is only part of the story!

OXYTOCIN HAS EFFECTS IN BOTH MALES & FEMALES THROUGHOUT THE BODY & BRAIN



OXYTOCIN IS A STRESS COPING HORMONE AND A BIOLOGICAL METAPHOR FOR SAFETY

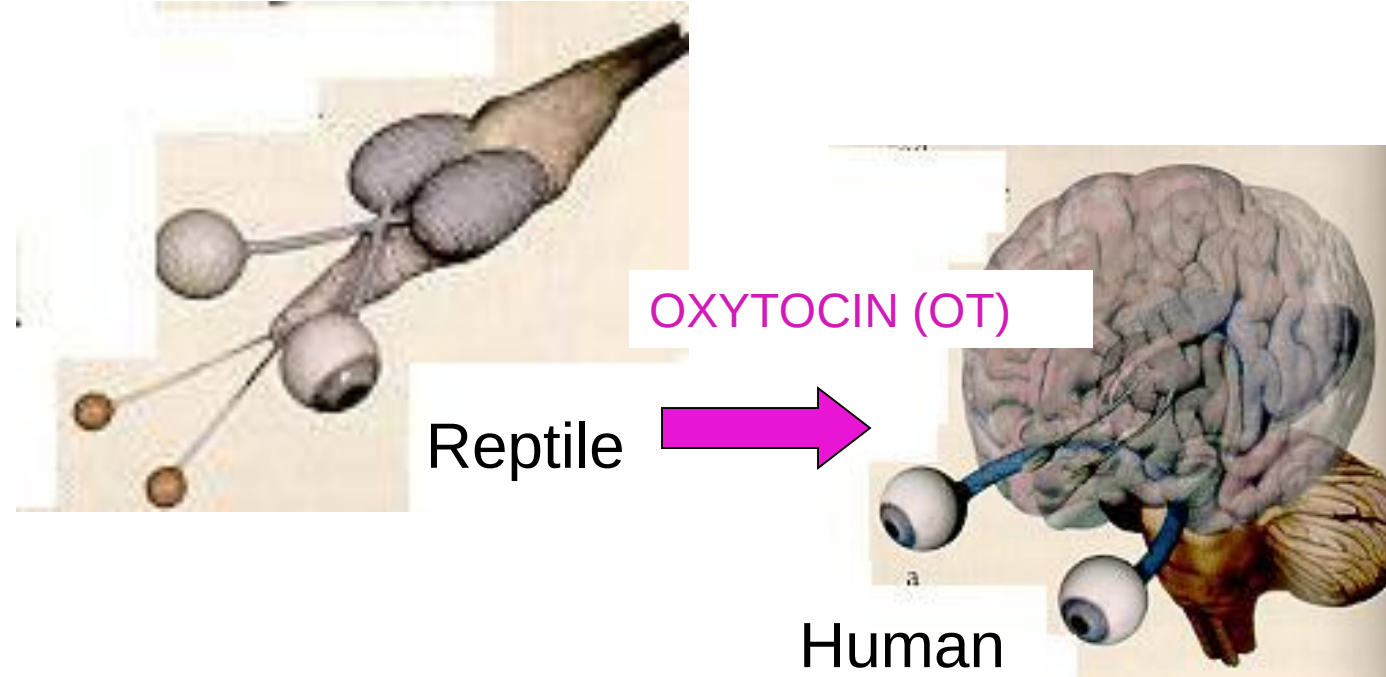


Oxytocin is made primarily in the **BRAIN (HYPOTHALAMUS)**, and released into the blood stream at the Posterior Pituitary, but is also released within the nervous system.

Oxytocin can affect social behavior, the autonomic nervous system, and the immune system, allowing the body to **ADAPT, PROTECT and HEAL** especially in the face of challenge and **STRESS**.



**The human nervous system is a consequence of evolution.
Compared to reptiles humans have a massive increase in
the size of the cerebral cortex**



OXYTOCIN (OT) allowed the transition from reptile to mammal.

OT permits birth (helps expel the large-brained baby from the uterus)

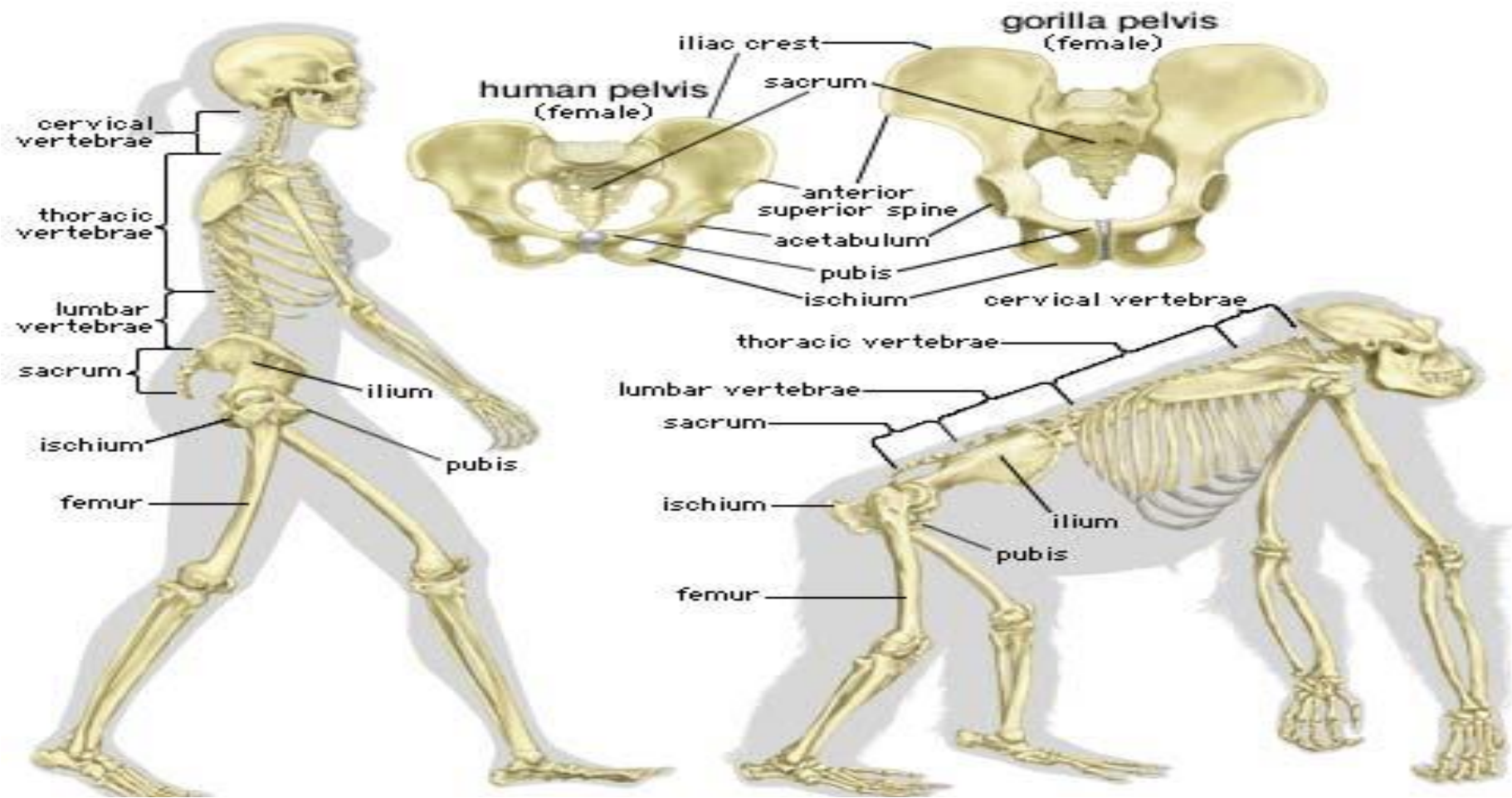
**OT facilitates post-birth nutrition & supports the baby
(lactation/maternal behavior/, alloparenting)**

OT facilitates oxygenation of the brain (myelinated vagus).

OT PERMITS HUMAN COGNITION AND SOCIAL BEHAVIOR.

WE ARE HERE TODAY BECAUSE OF OXYTOCIN!





HUMAN BIRTH presents special problems because of our

- **BIG CORTEX** and **SKULL**,
- **BIPEDAL LOCOMOTION** and
- **SMALL, RIGID PELVIC GIRDLE**

OXYTOCIN FACITATES BIRTH by **STRONG UTERINE CONTRACTIONS**



**OXYTOCIN and VASOPRESSIN are similar in structure
but have different functions**

Vasopressin

**Fear/Defense
Territoriality**

**Vigilance, Arousal
Mobilization**

Sympathetic nervous system

**PROTECTIVE
(active strategies)
More "primitive"
Dominant during
Extreme stress/ Trauma**

Oxytocin

**Prosociality/Approach
Sharing**

**Relaxation, Resilience
Immobilization without fear**

**Parasympathetic nervous
system (the vagus nerve)**

**HEALING & RESTORATION
(The healing power
of "love") More modern.
Dominant when there
Is a sense of SAFETY.**



CONTEXT of PERCEIVED -

↑ OXYTOCIN

LOVE and SAFETY



**SOCIAL BONDS & LOVE
SAFETY OR CALM**

↑ VASOPRESSIN

ANXIETY or FEAR

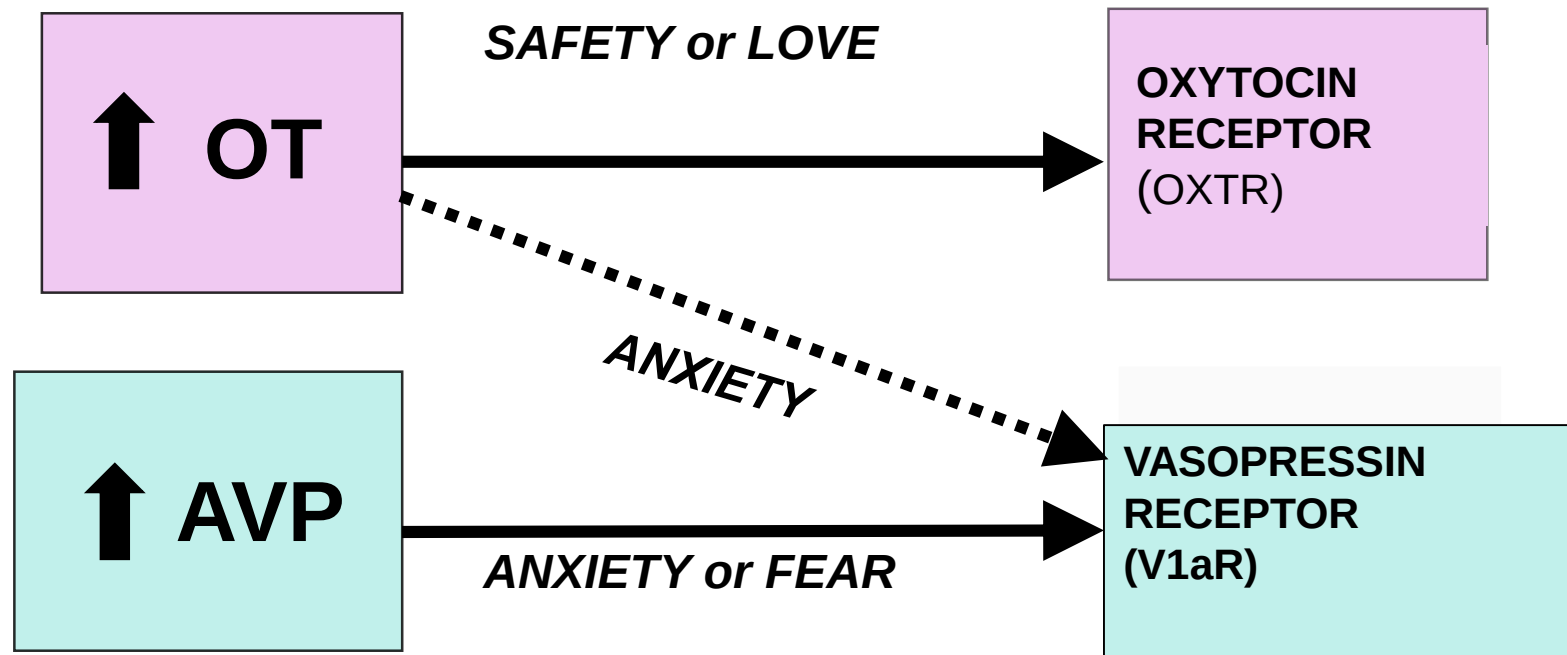


**AVOIDANCE & ANXIETY
DEFENSIVENESS & FEAR
AGGRESSION**



Oxytocin can act through the
VASOPRESSIN RECEPTOR with effects that depend on **CONTEXT**.
High levels of OT may act like AVP.
It is often the **RECEPTOR** that determines the effect –**NOT** the **PEPTIDE** itself.
(Detailed in Carter, 2017 *Frontiers in Endocrinology*)

CONTEXT of PERCEIVED -



Prairie voles share with humans the following traits (rare in other rodents):

A socially monogamous mating system with:

Capacity to form social bonds and selective secure attachments

Alloparental behavior and biparental behavior

High levels of OXYTOCIN and OXYTOCIN RECEPTORS

High levels of parasympathetic function (vagal activity in the human range)

Unique OXYTOCIN Receptor GENES allowing EARLY EXPERIENCES and OXYTOCIN ITSELF to TUNE EXPRESSION of the OXYTOCIN Receptor especially around the time of birth.

Vasopressin is particularly important to

DEFENSE of SELF AND FAMILY

Including

Increased Arousal and

Protective Aggression,

through actions on VASOPRESSIN RECEPTORS



THE OXYTOCIN PARADOX?

Oxytocin **ALSO** may be released under conditions that are negative or acutely “stressful,” –

Inflammation
Disease

Oxytocin serves as a component of an adaptive, **COPING** strategy, **BUFFERING** against stressors.

At high level **OXYTOCIN** also may act by binding to **VASOPRESSIN RECEPTORS**.
(reviewed in Carter, 2017 Frontiers in Endocrinology)



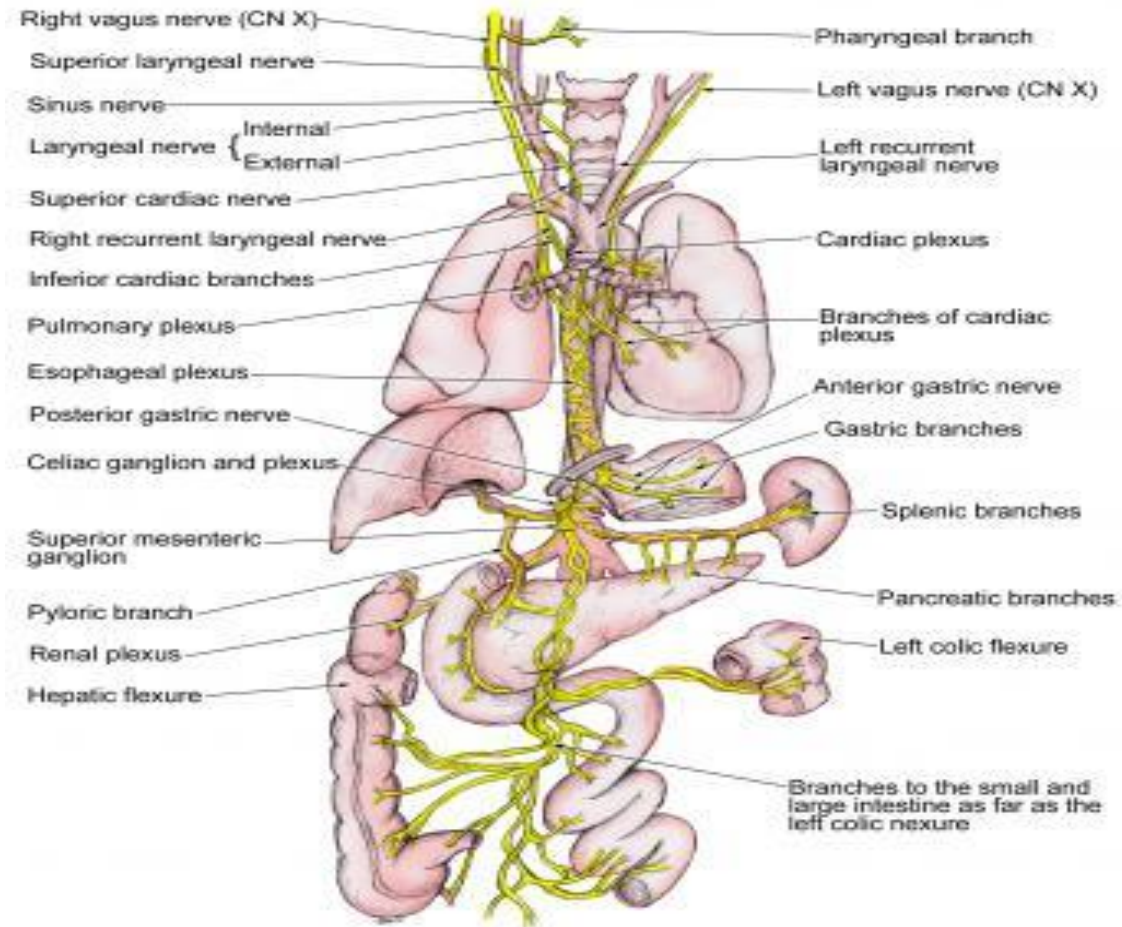
**OXYTOCIN IS A STRESS-COPING
HORMONE**



Of particular importance to understanding Oxytocin & Vasopressin - as well as the HEALING POWER OF LOVE - is the fact that these hormones act on the AUTONOMIC NERVOUS SYSTEM and regulate the VAGUS NERVE

THE VAGUS (10TH CRANIAL NERVE), SHOWN HERE, LINKS THE BODY TO THE BRAIN, AND IS CRITICAL TO EXPLAINING THE HEALTH BENEFITS OF FEELING SAFE AND THE HEALTH RISKS OF FEAR AND ANXIETY.

OXYTOCIN & VASOPRESSIN BOTH REGULATE THE ADAPTIVE FUNCTIONS OF THE AUTONOMIC NERVOUS SYSTEM AS WELL AS REGULATING INFLAMMATION AND HEALING.

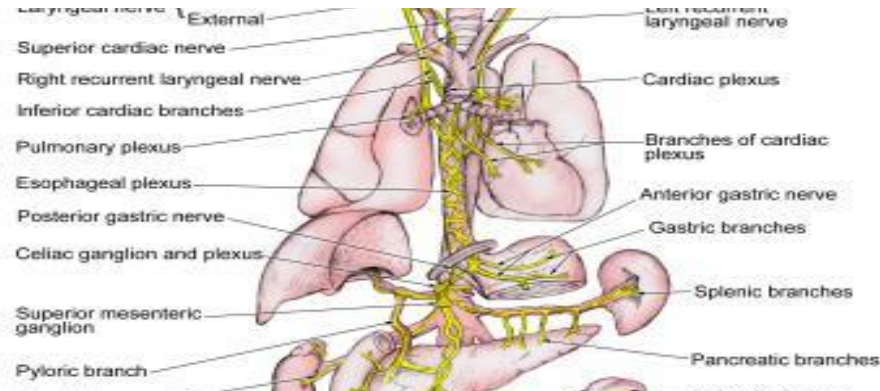


DISORDERS LINKED TO OXYTOCIN DEFICIENCY OR DYSFUNCTION (or ATYPICAL/EXCESS VASOPRESSIN) (Based on both human conditions and animal models)

MENTAL HEALTH

Social & Emotional Dysfunction
Autism Spectrum Disorders
Schizophrenia
Anxiety
Depression (general)
Postpartum depression
Trauma
Prader-Willi Syndrome
Fragile X
Substance Abuse
Williams Syndrome (hi PEPTIDES)

LINKED BY VAGUS/AUTONOMICS and OXYTOCIN – VASOPRESSIN AN INTEGRATED SYSTEM



PHYSICAL HEALTH

Stress management
Cardiovascular Devel. & Disease
Obesity & Metabolism
Wound Healing
Bone Health (Osteoporosis)
Muscle Strength (Myopenia)
Chronic Pain
Fibromyalgia
Immune dysfunction (HIV?)
Longevity

INFLAMMATION
OXYTOCIN IS ANTI-INFLAMMATORY
VASOPRESSIN PREDOMINANTLY PRO-INFLAMMATORY



**What is the power of love?
How does it overcome fear?**

**UNDERSTANDING THE BIOLOGY OF LOVE AND SAFETY OFFERS
NEW INSIGHTS INTO THE PHYSIOLOGY OF GOOD HEALTH.**

**LOVE originated from the same processes that underlie
MOTHERHOOD. The biological mechanisms that allow us to give
BIRTH, NURTURE our young and form SECURE ATTACHMENTS, also
PROTECT OUR BODIES in the FACE OF THE CHALLENGES OF LIFE
ACROSS THE LIFE-SPAN.**

LOVE AND CONNECTION ARE STRONG MEDICINE



This is the power of love

It originates in the biology of birth, and allows us to bond to and support others throughout life

The soul is healed by being with children.”
F. Dostoyevsky

It is critical that we support and love the next generation – our children and each other – promoting health and healing.

