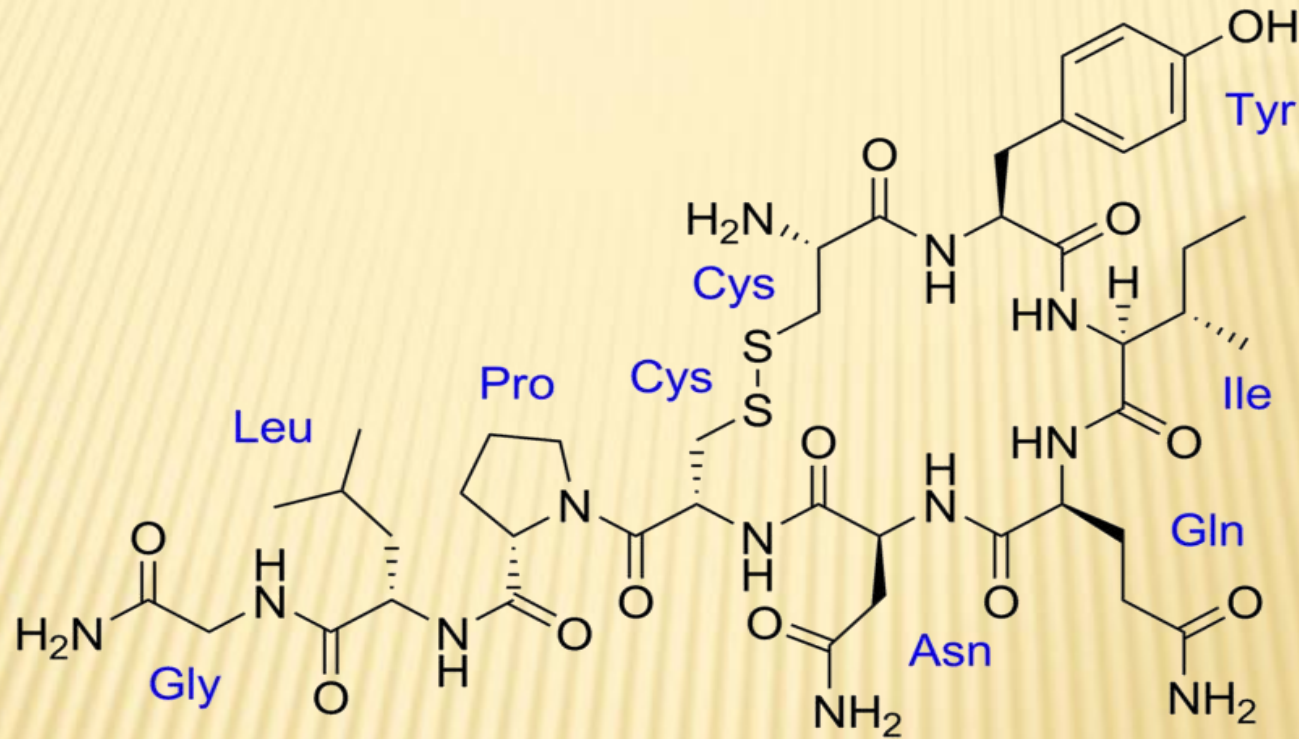


# CHEMISTRY OF OXYTOCIN



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# BIOSYNTHESIS:

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- ✘ **The oxytocin peptide is synthesized as an inactive precursor protein from the *OXT* gene.**
- ✘ **This precursor protein also includes the oxytocin carrier protein neurophysin I.**
- ✘ **The inactive precursor protein is progressively hydrolyzed into smaller fragments (one of which is neurophysin I) via a series of enzymes. The last hydrolysis that releases the active oxytocin nonapeptide is catalyzed by peptidylglycine alpha-amidating monooxygenase (PAM).**
- ✘ **The activity of the PAM enzyme system is dependent upon vitamin C (ascorbate), which is a necessary vitamin cofactor.**
- ✘ **By chance, sodium ascorbate by itself was found to stimulate the production of oxytocin from ovarian tissue over a range of concentrations in a dose-dependent manner.**
- ✘ **Many of the same tissues (*e.g.* ovaries, testes, eyes, adrenals, placenta, thymus, pancreas) where PAM (and oxytocin by default) is found are also known to store higher concentrations of vitamin C.**

# **METABOLISM:**

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- × Oxytocin is known to be metabolized by the oxytocinase, leucyl/cystinyl aminopeptidase.**
- × Other oxytocinases are also known to exist.**
- × Amastatin, bestatin (ubenimex), leupeptin, and puromycin have been found to inhibit the enzymatic degradation of oxytocin, though they also inhibit the degradation of various other peptides, such as vasopressin, met-enkephalin, and dynorphin A.**

### Vertebrate Oxytocin Family

Cys-Tyr-Ile-Gln-Asn-Cys-Pro-Leu-Gly-NH <sub>2</sub>	<u>Oxytocin</u> (OXT)	Most mammals, <u>ratfish</u>
Cys-Tyr-Ile-Gln-Asn-Cys-Pro-Pro-Gly-NH <sub>2</sub>	<u>Prol-Oxytocin</u>	Some <u>New World</u> monkeys, <u>northern tree shrews</u>
Cys-Tyr-Ile-Gln-Asn-Cys-Pro-Ile-Gly-NH <sub>2</sub>	<u>Mesotocin</u>	Most marsupials, all <u>birds, reptiles, amphibians, lungfishes, coelacanths</u>
Cys-Tyr-Ile-Gln-Ser-Cys-Pro-Ile-Gly-NH <sub>2</sub>	<u>Seritocin</u>	<u>Frogs</u>
Cys-Tyr-Ile-Ser-Asn-Cys-Pro-Ile-Gly-NH <sub>2</sub>	<u>Isotocin</u>	<u>Bony fishes</u>
Cys-Tyr-Ile-Ser-Asn-Cys-Pro-Gln-Gly-NH <sub>2</sub>	<u>Glumitocin</u>	<u>skates</u>
Cys-Tyr-Ile-Asn/Gln-Asn-Cys-Pro-Leu/Val-Gly-NH <sub>2</sub>	Various tocins	<u>Sharks</u>

### Vertebrate Vasopressin Family

Cys-Tyr-Phe-Gln-Asn-Cys-Pro-Arg-Gly-NH <sub>2</sub>	<u>Argipressin</u> (AVP, ADH)	Most <u>mammals</u>
Cys-Tyr-Phe-Gln-Asn-Cys-Pro-lys-Gly-NH <sub>2</sub>	<u>Lypressin</u> (LVP)	<u>Pigs, hippos,</u> <u>warthogs,</u> <u>some</u> <u>marsupials</u>
Cys-Phe-Phe-Gln-Asn-Cys-Pro-Arg-Gly-NH <sub>2</sub>	<u>Phenypressin</u>	<u>Some</u> <u>marsupials</u>
Cys-Tyr-Ile-Gln-Asn-Cys-Pro-Arg-Gly-NH <sub>2</sub>	<u>Vasotocin</u> †	Non-mammals

### Invertebrate VP/OT Superfamily

Cys-Leu-Ile-Thr-Asn-Cys-Pro-Arg-Gly-NH <sub>2</sub>	<u>Inotocin</u>	<u>Locust</u>
Cys-Phe-Val-Arg-Asn-Cys-Pro-Thr-Gly-NH <sub>2</sub>	<u>Annetocin</u>	<u>Earthworm</u>
Cys-Phe-Ile-Arg-Asn-Cys-Pro-lys-Gly-NH <sub>2</sub>	<u>Lys-</u> <u>Connopressin</u>	<u>Geography &amp;</u> <u>imperial cone</u> <u>snail, pond</u> <u>snail, sea hare,</u> <u>leech</u>
Cys-Ile-Ile-Arg-Asn-Cys-Pro-Arg-Gly-NH <sub>2</sub>	<u>Arg-</u> <u>Connopressin</u>	<u>Striped cone</u> <u>snail</u>
Cys-Tyr-Phe-Arg-Asn-Cys-Pro-Ile-Gly-NH <sub>2</sub>	<u>Cephalotocin</u>	<u>Octopus</u>
Cys-Phe-Trp-Thr-Ser-Cys-Pro-Ile-Gly-NH <sub>2</sub>	<u>Octopressin</u>	<u>Octopus</u>

†Vasotocin is the evolutionary progenitor of all the vertebrate neurohypophysial hormones.<sup>[40]</sup>