

15 α -HYDROXYLATED STEROIDS PRODUCED *IN VITRO* AND *IN VIVO* IN THE SEA LAMPREY, *PETROMYZON MARINUS*

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The sea lamprey (*Petromyzon marinus*) is an useful model species in studies of comparative and evolutionary reproductive endocrinology. As a member of superclass Agnatha, the lamprey is one of the earliest evolving vertebrates still alive today. Considerable research has been performed to establish that, similar to teleosts and higher vertebrates, the sea lamprey has a hypothalamus-pituitary-gonadal axis that controls reproduction. Previous research has indicated that sea lamprey may use unusual steroid hormones that are the result of a specific pathway. These studies demonstrated that the major products of exogenous androsteindione in sea lamprey testes are 15 α -hydroxyandrosteinedione and

15 α -hydroxytestosterone (15 α -T). Another study established that the ovaries and testes of another lamprey species, *Lampetra fluviatilis*, produce 15 α -hydroxyprogesterone (15 α -P) and 15 β -hydroxytestosterone (15 β -T), respectively.

Our research was conducted to confirm that 15 α -testosterone is produced in sea lamprey testes, and to determine if it is circulated in the plasma and used as a functional hormone. We have demonstrated that 15 α -hydroxytestosterone is produced by sea lamprey testes through incubation experiments using tritiated testosterone and subsequent analysis using HPLC and TLC. Additionally, we have confirmed the presence of 15 α -T in plasma by developing enzyme-linked immunosorbent assays (ELISAs) for both 15 α -T and 15 β -T to measure small amounts of these steroids, and found only 15 α -T to be present. To further substantiate these results, sea lamprey plasma was extracted, fractionated via HPLC, and ELISAs were performed on the fractions. 15 α -T was present only in the expected fraction, and 15 β -T was not detected. Plasma was collected and assayed from sea lamprey at several life stages, and a trend toward elevated 15 α -T levels were found only in fully mature spermiating males. Thus, there is chemical and immunoreactive evidence that 15 α -T is produced both *in vitro* and *in vivo*. Additional experiments are being performed to further elucidate the role of 15 α -T in sea lamprey reproduction, and a project similar to the current one has been initiated to study the occurrence of 15 α -hydroxyprogesterone in sea lamprey.

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