Atrial natriuretic peptide secretion during development of the rat supraoptic nucleus

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Since a relationship between atrial natriuretic peptide and oxytocin was recently demonstrated in the heart (Gutkowska et al., 1997), the aim of this study was to determine whether a relationship between the two peptides is present also in the rat hypothalamus. For this purpose, we measured ANP-ontogeny in the rat hypothalamus immunohistochemically and compared it with oxytocin-ontogeny which we previously studied. The results showed that the ANP-peptide and mRNA-ANP start at the 18th day of the fetal life. Our earlier data for oxytocin in the rat hypothalamus showed that only mRNA-oxytocin appeared the 18th day of foetal life (Farina Lipari et al., 2001); thus, at the 18th day of foetal life, mRNA-ANP, ANP-peptide and mRNA-oxytocin are present. We conclude that in the hypothalamus, differently from that in the heart, ANP might play a role on the synthesis of the oxytocin since ANP and its mRNA appear earlier than oxytocin.

Key words: ANP, supraoptic nucleus, hypothalamus, rat, development.

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The natriuretic peptide family is composed of three peptides: atrial natriuretic peptide (ANP) (Gutkowska, 1979), brain natriuretic peptide (BNP)(Minamino *et al.,*1988) and C-type natriuretic peptide (CNP)(Sudoh *et al.,* 1990; Komatsu *et al.,* 1991; Gutkowska *et al.,* 1993). These peptides participate in the regulation of body fluid volume, blood pressure and electrolyte concentration; specific receptors for ANP, BNP and CNP linked to guanylate cyclase have been identified in almost all tissues, in addition to so-called *clearance receptors* (Chinkers *et al.,* 1989, Chinkers *et al.,* 1991; Fuller *et al.,* 1988).

ANP (de Bold, 1985) and BNP (Minamino *et al.,* 1988; Saito *et al.,* 1989) are circulating hormones secreted from the heart; they have similar structure, bind to the same GC-A receptor and have comparable biological activity. ANP is distributed throughout the brain and its concentration is very high in the hypothalamus and septum (Kawata *et al.,* 1985a; 1985b; Morii *et al.,* 1985).CNP is also distributed widely, but homogeneously, in brain (Minamino *et al.,* 1993).

The importance of the role of ANP in rat brain was evidenced by Tong and Pelletier (1990), who suggested that ANP is involved in brain maturation; indeed, they observed that ANP-binding appeared in rat brain before the 13th day of foetal life. The ontogeny of ANP binding was different in various brain areas; in particular, in some hypothalamic nuclei, ANP binding appeared around the time of birth, increased until adulthood and then remained stable.

In addition, a functional correlation between ANP and oxytocin in rat adult brain has been established. Indeed, Jirikowsky *et al.,* (1986) and Chriguer *et al*. (2001) noticed the coexistence of ANP and oxytocin in the supraoptic, paraventricular and periventricular nuclei of the hypothalamus