8
The Septal Region and Social Behavior

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8.1. Introduction

The septal region has been demonstrated to be involved in controlling various aspects of social behavior. A number of correlational approaches (e.g., relating neurotransmitter and receptor levels in this region with the expression of various behaviors, observing the effects of steroid hormone exposure on behavior and on septal chemoarchitecture, and detection of the c-Fos protein as an indication of cellular activity during particular behavioral experiences) have supported such involvement. Consistent with such observations, lesioning and pharmacological manipulations of this region have supported a causal relationship between septal functioning and the expression of various social behaviors.

This chapter will review literature that indicates a role of the septum in social behavior. Given that most of this research has been conducted on rodents, and the predominant role of olfaction is known to play in rodents’ behavior, much of the literature presented will be in the context of relating olfactory input and behavioral output in social situations to septal functioning. In the first section, a brief description of the chemical neuroanatomy of the septum will be presented. This will serve to indicate connections of the septum with other brain regions implicated in social behaviors, illustrate some roles of steroid hormones on the chemical makeup of the septum, and highlight some sexual and species differences in septal chemoarchitecture that correlate with sexual and species differences in social behaviors. In the second section, evidence in support of a role of the septum in modifying behavior during repeated interactions with conspecífics (i.e., social memory) will be presented. In the third section, the role of the septum in several intraspecific aggressive behaviors will be reviewed. In the fourth section, literature on the role of the septum in parental behavior will be presented, along with some possible directions for future research.
8.2. Relevant Chemical Neuroanatomy

The anatomy presented here was obtained from several excellent papers and reviews (Swanson and Cowan 1979; Jakab and Leranth 1995; Risold and Swanson 1997a,b; see also Chapters 1 and 2, this volume), but our analysis is not meant to be complete and exhaustive. Additional anatomical details will be presented in other parts of this chapter when necessary. The septal region can be divided into the following major subdivisions: medial septal nucleus and nucleus of the diagonal band of Broca (MSDB), lateral septum (LS), and the septofimbrial nucleus. Our description will focus on the MSDB and LS.

Figure 8.1 presents an overview of the chemical neuroanatomy of these nuclei, obtained mainly from research on the rat. The following points are worth noting. (1) The MSDB provides a major cholinergic and GABAergic input to the hippocampus. (2) The LS receives a massive excitatory amino acid input from the hippocampus. (3) The major output of the LS, which is heavily GABAergic, is to the various medial and lateral hypothalamic nuclei. It is also worth noting that the hypothalamus sends return peptidergic projections to both the LS and MSDB. Some of the peptides included in the hypothalamic projection to the LS are corticotropin-releasing factor (CRF; Sakanaka et al. 1988; cf Risold and Swanson 1997a)

![Diagram](image_url)

**Figure 8.1.** Diagrammatic representation of the anatomical connections of the septum and prominent neurotransmitters contained in these connections. See text for details and references. ACH, acetylcholine; AMY, amygdala; AOB, accessory olfactory bulb; BST, bed nucleus of the stria terminalis; EAA, excitatory amino acids; GABA, γ-aminobutyric acid; LS, lateral septum; MAs, monoamines; MSDB, medial septum/diagonal band of Broca; OB, main olfactory bulb.