

Abstract

This study is the first description of the descent of rubrospinal fibers through the spinal cord of the rat fetus. Either horseradish peroxidase or wheat germ agglutinin-horseradish peroxidase conjugate was injected into the spinal cord, at different levels and at different gestational ages. At embryonic day 17 (E17) fibers from all subdivisions of the nucleus ruber (NR) started their descent towards the spinal cord. At E18 fibers from the ventrolateral NR reached the lower cervical spinal cord, and those from the caudal NR reached the lower thoracic spinal cord. At E19 fibers from the dorsomedial NR and from the parvocellular NR had just reached the cervical spinal cord, while fibers from the ventrolateral and caudal NR descended to lower thoracic levels. At E21 fibers from the dorsomedial NR reached the lower cervical spinal cord. Fibers from the ventrolateral and caudal NR completed their descent through the lumbosacral spinal cord during the first three postnatal days. During their descent the rubrospinal fibers were confined to the white matter of the spinal cord. The earliest descending fibers originated in the caudal NR. Fibers from the caudal part of each magnocellular subdivision of the NR descended before their rostral counterparts. Fibers from the dorsomedial NR only reached the cervical enlargement as the fibers from the ventrolateral NR descended through the cervical enlargement. The somatotopy of the adult rubrospinal projection reflects this sequence; the dorsomedial NR (dmNR) projects to the cervical spinal cord, and the ventrolateral NR (vlNR) projects to the lumbosacral spinal cord. In general, early descending fibers originated from neurons located caudally and ventrolaterally, while later descending fibers originated from neurons located progressively more rostrally and dorsomedially in the magnocellular NR.