

TECHNICAL WHITE PAPER: ALLEN SPINAL CORD REFERENCE ATLAS

The Allen Spinal Cord Reference Atlas includes atlases for the postnatal day 4 (P4) and day 56 (P56) C57Bl/6J male mouse drawn by Charles Watson and Gulgun Kayalioglu based on the Nissl sections they identified from 34 levels of the cervical, thoracic, lumbar, sacral, and coccygeal segments. Adjacent sections stained enzymatically for acetylcholinesterase informed the designation of each level. The specimens were prepared by cutting into four pieces and embedding as described for the Allen Spinal Cord Atlas in the [Overview](#). Serial sections of the entire P4 column and P56 cord were collected at 20um from fresh-frozen tissue, consistent with the Allen Spinal Cord Atlas, and stained for acetylcholinesterase, or for Nissl bodies with 0.25% thionin as described for the Allen Mouse Brain Atlas in [Data Production Processes](#). Over 80 structures in the cords can be identified with the associated high-resolution reference atlases (Table 1).

Table 1. Structures in the Allen Spinal Cord Reference Atlas

| Structure | Name | Abbreviation |
|-----------|---|--------------|
| 1 | accessory nerve nucleus | 11N |
| 2 | spinal accessory nerve | 11n |
| 3 | lamina 1 of the spinal gray | 1Sp |
| 4 | lamina 2 of the spinal gray | 2Sp |
| 5 | lamina 2 of the spinal gray, inner part | 2Spl |
| 6 | lamina 2 of the spinal gray, outer part | 2SpO |
| 7 | lamina 3 of the spinal gray | 3Sp |
| 8 | lamina 4 of the spinal gray | 4Sp |
| 9 | lamina 5 of the spinal gray | 5Sp |
| 10 | lamina 5 of the spinal gray, lateral part | 5SpL |
| 11 | lamina 5 of the spinal gray, medial part | 5SpM |
| 12 | lamina 6 of the spinal gray | 6Sp |
| 13 | lamina 6 of the spinal gray, lateral part | 6SpL |
| 14 | lamina 6 of the spinal gray, medial part | 6SpM |
| 15 | lamina 7 of the spinal gray | 7Sp |
| 16 | lamina 8 of the spinal gray | 8Sp |
| 17 | lamina 9 of the spinal gray | 9Sp |
| 18 | lamina 10 of the spinal gray | 10Sp |
| 19 | adductor motoneurons of lamina 9 | Ad9 |
| 20 | anterior spinal artery | asp |
| 21 | axial muscle motoneurons of lamina 9 | Ax9 |
| 22 | biceps motoneurons of lamina 9 | Bi9 |
| 23 | central canal | CC |
| 24 | cauda equina | CE |

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|----|---|--------|
| 25 | central cervical nucleus | CeCv |
| 26 | crural extensor motoneurons of lamina 9 | CEx9 |
| 27 | crural flexor motoneurons of lamina 9 | CFI9 |
| 28 | coccygeal vertebra | CoVert |
| 29 | cremaster motoneurons of lamina 9 | Cr9 |
| 30 | cuneate fasciculus | cu |
| 31 | dorsal nucleus (Clarke) | D |
| 32 | dorsal corticospinal tract | dcs |
| 33 | deltoid motoneurons of lamina 9 | De9 |
| 34 | dorsal funiculus | df |
| 35 | dorsolateral fasciculus (Lissauer) | dl |
| 36 | dorsal root | dr |
| 37 | dorsal root ganglion | DRG |
| 38 | external anal sphincter motoneurons of lamina 9 | ExA9 |
| 39 | external urethral sphincter motoneurons of lamina 9 | ExU9 |
| 40 | forearm extensor motoneurons of lamina 9 | FEx9 |
| 41 | forearm flexor motoneurons of lamina 9 | FFI9 |
| 42 | gluteal motoneurons of lamina 9 | GI9 |
| 43 | gracile fasciculus | gr |
| 44 | hamstring motoneurons of lamina 9 | Hm9 |
| 45 | internal basilar nucleus | IB |
| 46 | intercalated nucleus | ICI |
| 47 | intercalated nucleus, paraependymal part | ICIPe |
| 48 | intercostal muscle motoneurons of lamina 9 | ICo9 |
| 49 | infrahyoid muscle motoneurons of lamina 9 | IH9 |
| 50 | intermediolateral column | IML |
| 51 | intermediomedial column | IMM |
| 52 | iliopsoas motoneurons of lamina 9 | IPs9 |
| 53 | lateral cervical nucleus | LatC |
| 54 | latissimus dorsi motoneurons of lamina 9 | LD9 |
| 55 | lumbar dorsal commissural nucleus | LDCom |
| 56 | lateral funiculus | lf |
| 57 | lumbar precerebellar nucleus | LPrCb |
| 58 | levator scapulae motoneurons of lamina 9 | LS9 |
| 59 | lateral spinal nucleus | LSp |
| 60 | manus motoneurons of lamina 9 | Man9 |
| 61 | pectoral muscle motoneurons of lamina 9 | Pec9 |
| 62 | pes motoneurons of lamina 9 | Pes9 |
| 63 | phrenic motoneurons of lamina 9 | Ph9 |
| 64 | psoas motoneurons of lamina 9 | Ps9 |
| 65 | postsynaptic dorsal column pathway | psdc |
| 66 | quadriceps motoneurons of lamina 9 | Q9 |
| 67 | quadratus lumborum motoneurons of lamina 9 | QL9 |
| 68 | rhomboid muscle motoneurons of lamina 9 | Rh9 |
| 69 | rubrospinal tract | rs |
| 70 | scalene muscle motoneurons of lamina 9 | Sc9 |
| 71 | sacral dorsal commissural nucleus | SDCom |

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|----|---|-------|
| 72 | supraspinatus and infraspinatus motoneurons of lamina 9 | SI9 |
| 73 | sternomastoid motoneurons of lamina 9 | SM9 |
| 74 | spinous process of vertebra | SpPr |
| 75 | sacral precerebellar nucleus | SPrCb |
| 76 | sacral parasympathetic nucleus | SPSy |
| 77 | serratus anterior motoneurons in lamina 9 | Sr9 |
| 78 | tail muscle motoneurons of lamina 9 | Tail9 |
| 79 | thoracoabdominal wall muscle motoneurons of lamina 9 | ThAb9 |
| 80 | triceps motoneurons of lamina 9 | Tr9 |
| 81 | trapezius motoneurons of lamina 9 | Tz9 |
| 82 | trapezius and sternomastoid motoneurons of lamina 9 | TzSM9 |
| 83 | vertebral arch | VAr |
| 84 | vertebral body | VB |
| 85 | ventral funiculus | vf |
| 86 | ventral median fissure | vmf |
| 87 | ventral root | vr |
| 88 | ventral white commissure | vwc |