Spinal Cord Development

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Distal Spinal Cord development (secondary neurulation)

- formation of neural tube below caudal neuropore (caudal neuropore is located in lower lumbar region)

* *after neurulation (primary neurulation) is complete*, distal (sacrococcygeal) spinal cord begins to form as caudal end of neural tube blends into **caudal cell mass** (large mass of undifferentiated pluripotential cells that eventually give rise to components of nervous, urogenital, and digestive systems - common association of anomalies in these systems).
* **canalization** - within caudal cell mass, small vacuoles form, coalesce, and eventually connect with central canal of spinal cord.
* distal spinal cord then begins **retrogressive differentiation** (continues for ≈ 7 weeks), leaving ***conus medullaris*** and ***filum terminale***.

Formation of caudal spinal cord: vacuolization *(A)* and coalescence of caudal cell mass *(B)*; formation of filum terminale *(C)*:



Disorders of secondary neurulation (e.g. tethered filum) → **occult dysraphic states** (abnormalities of sacrococcygeal segments beneath intact dermal elements; no exposed neural tissue). [see p. Dev5 >>](http://WWW.NEUROSURGERYRESIDENT.NET/Dev.%20Developmental%20anomalies/Dev5.%20Spinal%20Cord%20Anomalies.pdf)

* these anomalies (sacral agenesis, conus hypoplasia) may be associated with other abnormalities (imperforate anus, malformed genitalia, renal dysplasias, etc) - as part of broader ***caudal regression syndrome***.

Bibliography for ch. “General Development” → follow this [link >>](http://www.neurosurgeryresident.net/A.%20Neuroscience%20Basics%5CA.%20Bibliography.pdf)

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