HISTOLOGICAL STUDY OF CEREBRAL CORTEX IN HUMAN FETUSES

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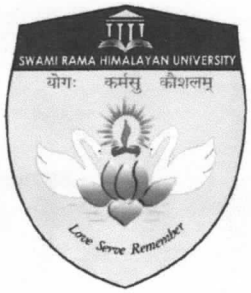

SWAMI RAMA HIMALAYAN UNIVERSITY
SWAMI RAM NAGAR
DEHRADUN
UTTARAKHAND

Dr. PRERNA JAGDISH

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SUMMARY

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In most parts of the human cerebral cortex, a six-layered pattern has become an accepted as the standard. It was first introduced by the anatomist Brodmann and was based upon Nissl staining. Traditionally, these layers have been described from myelin-stained preparations, but they can also be discerned in well-stained Golgi and reduced silver preparations which stain axons and dendrites.

The present study is an effort to provide a developmental scheme with the help of histological study performed on human fetal brain tissue. This would contribute to the knowledge of histogenesis of the cerebral cortex in humans. The generation of related data would help in identifying the normal steps of development, thereby helping in identifying deviations from the normal.

In our research we have extensively studied all the four lobes of the human fetal cerebral cortex (frontal, parietal, occipital and temporal) at various gestational weeks with the aid of histology. 33 human fetuses were procured from the Department of Obstetrics & Gynaecology, HIMS. The skulls were dissected and the brains obtained were fixed in formalin. Sections were taken from all the four lobes and were stained with H&E and Cresyl Violet to study the laminar architecture.

Upto 12th week only five laminae were seen: marginal, cortical, intermediate, subventricular and ventricular zone. From the 13th week, a new zone appeared beneath the cortical region, i.e., the subcortical plate (sandwiched between the cortical and the intermediate zone). From the 25th week this region of the subplate was found to reduce in thickness. Also, no clear demarcation was observed between the intermediate and subventricular region and they were treated as a single unit. The cell counts were found to be comparatively more in the region of cortical and ventricular zone and were regarded as cell dense regions. The marginal zone was seen to be a cell sparse zone whereas the subplate, intermediate and the subventricular zone were the regions of medium cell density. The TCT as well as thickness of each lamina were found to increase with increasing gestational weeks.

Present study lays out detailed analysis of the lamination seen in different lobes of the cerebral cortex at different gestational weeks and therefore can prove to be helpful to detect any deviation from the normal growth pattern. Also, the data can be used in forensic analysis for age determination from fetal cortical remains.

Although lamination, TCT and the cell density of various lobes of cerebral cortex at various weeks of gestation was well studied, the identification of types of cells and the pattern of neuronal migration

which maybe the basis of appearance and disappearance of different laminae can be studied further.