## HISTOLOGICAL STUDY OF CEREBRAL CORTEX IN HUMAN FETUSES

Thesis submitted to Swami Rama Himalayan University

for award of

## DOCTOR OF MEDICINE IN ANATOMY

2016



# SWAMI RAMA HIMALAYAN UNIVERSITY SWAMI RAM NAGAR DEHRADUN UTTARAKHAND

Dr. PRERNA JAGDISH

### **CONTENTS**

S.No. Title		Page No.
1.	Introduction	1-4
2.	Review of Literature	5-15
3.	Aims and Objectives	16
4.	Materials and Methods	17-28
5.	Results	29-62
6.	Discussion	63-78
7.	Conclusion	79
8.	Summary	80-82
9.	References	83-89
	Annexures:	
	Informed Consent Form (Hindi and English)	I(a) & I(b)
	Case Reporting Form	П
	Abbreviations	III
	Master Chart	IV
	Ethical Clearance Certificate	V

In most parts of the human content meters, a six-layered nature has become an accepted as the standard it was first introduced by the materials. Brodings and was based upon Niesi standing Traditionally, these layers have been described from accelerationed preparations, but they can also be discerned in well-stained Corpi and reduced advertices.

SUMMARY

ntifying the nomial steps of development, thereby beining in

In our research we have extensively modied all the four lobes of the can fetal cerebral comes (frontal parietal, occipinal and temporal) at their gestational weeks with the sid of histology 33 human fetuses to procured from the Department of Obstetrics & Oyanecology, HIMS.

I shalls were dissected and the brains obtained were fixed in fermalin.

Tons were taken from all the four lobes and were stained with H&E.

Cresyl Violet to study the laminar architecture.

#### **SUMMARY**

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 12<sup>th</sup> week only five laminae were seen: marginal, cortical, intermediate, subventricular and ventricular zone. From the 13<sup>th</sup> week, a new zone appeared beneath the cortical region, i.e., the subcortical plate (sandwiched between the cortical and the intermediate zone). From the 25<sup>th</sup> 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.