

## The Histological changes in Human Placenta at different Stages of maturity

Ch. Sudhakarbabu<sup>1</sup> , M.Indira<sup>2</sup>

Assistant professor, dept of anatomy S.V. Medical College, Tirupati, A.P, India  
Assistant professor dept of Biochemistry S.V. Medical College Tirupati, A.P, India

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**Abstract:** The placental examination provide significant information related to intrauterine foetal death, intrauterine Growth Retardation, Malformations, infections and effects of maternal diseases on fetal growth. The magnitude of the clinical problems related to the development and the functions of the placenta is so vast that it worth to undertake Histological aspect of Human placenta. A thorough examination of placenta is neglected often underestimated by Physician and Gynecologist Pediatrician and pathologist in spite of its invaluable role in the fetal development. A sound knowledge of normal structure and development is highly essential to appreciate the pathological changes. Here I am presenting Histological findings of 25 placenta at different gestational ages present study was conducted in the Department of Anatomy Narayana Medical College Nellore in collaboration with the department of Obstetrics and Gynecology. Small placental bits of fresh tissue of various gestational ages were collected from the labour room subjected for processing for histological studies. It is observed that in 10 cases of 6-12 weeks of gestation the histological observation of Double layered trophoblast, Large Cytotrophoblastic cells with large round nucleus, Marginally thick Syncytiotrophoblast cells with small round nucleus, Numerous Hofbauer cell, Centrally placed numerous fetal blood vessels. In 10 cases of gestational period between 13-24 weeks histological finding are increased number of villi, Gradually thinned syncytiotrophoblast, Large villous capillaries, Hofbauer cells show vacuolated appearance, in 5 cases between 25 weeks to full term Numerous villi Reduced stroma Numerous syncytial knots

**Keywords :** trophoblastic layer, hofbauer cells, syncytial knots, fetal capillaries

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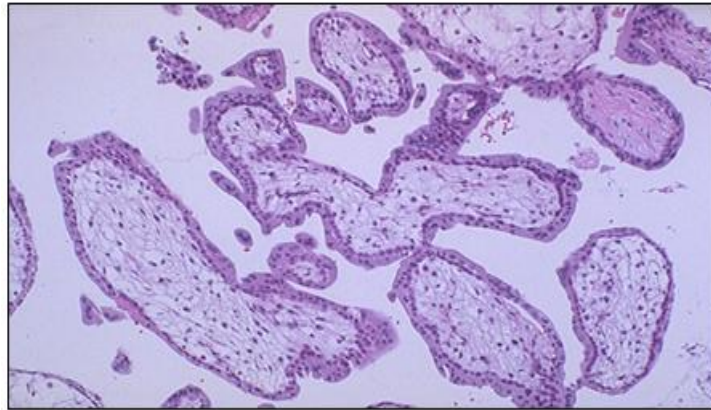
### I. Introduction

The human placenta is described as discoid, deciduate, haemochorial chorioallantoic, labyrinthine, and villous organ. The basic function of placenta is to provide nutrition for the developing fetus and to remove the fetal waste. To establish intrauterine pregnancy trophoblast must anchor and invade decidulised endometrium and the uterine vasculature must change to allow progressive increase in blood flow. Most commonly implantation takes place into the endometrium of the upper part and the more often on the posterior wall of the surface endometrium. The invading trophoblast burrow deeper into the endometrium and thus leading to the implantation the role of the trophoblast in nutrition of the conceptus is reflected in its name. Its function as an endocrine organ in human pregnancy is essential to maternal physiological adaptation and the maintenance of pregnancy. The aim of the present study to carry out histological observations of Human placenta at different stages of maturity

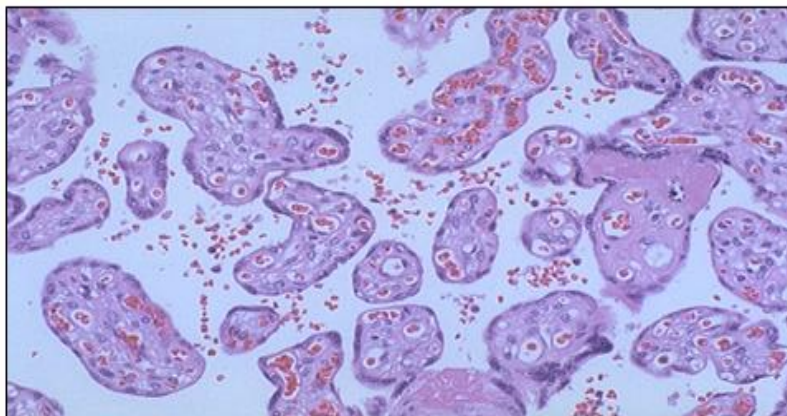
### II. Materials and Methods

The present study was primarily carried out at department of Anatomy, Narayana Medical College, Nellore, in collaboration with Government maternity hospital, Tirupati, Government maternity hospital, Nellore and department of Obstetrics and Gynaecology, Narayana Medical College, Nellore. Small placental bits of fresh tissue of various gestational ages were collected from the labour room subjected for processing for histological studies

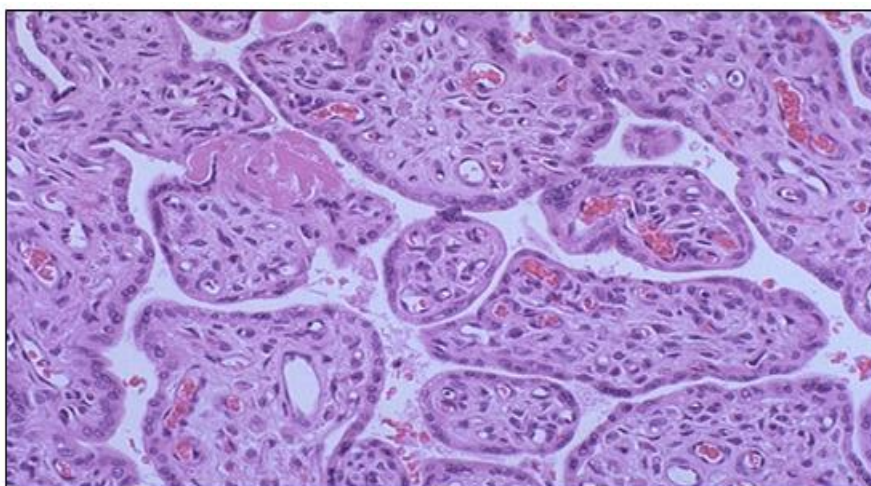
There are preserved 10% formalin for about 5 days and then subjected to routine tissue processing method adopted for the formalin preserve tissue. 5-microns thickness slides were made from paraffin blocks and stained with haematoxylin and eosin. Slides thus made observed for nature of stroma, cytotrophoblast cells, syncytiotrophoblast cells, syncytial knots, stromal villi, and vessels, Hofbauer cells, location of fetal capillaries within the villi (Table-1) and microphotographs were taken.



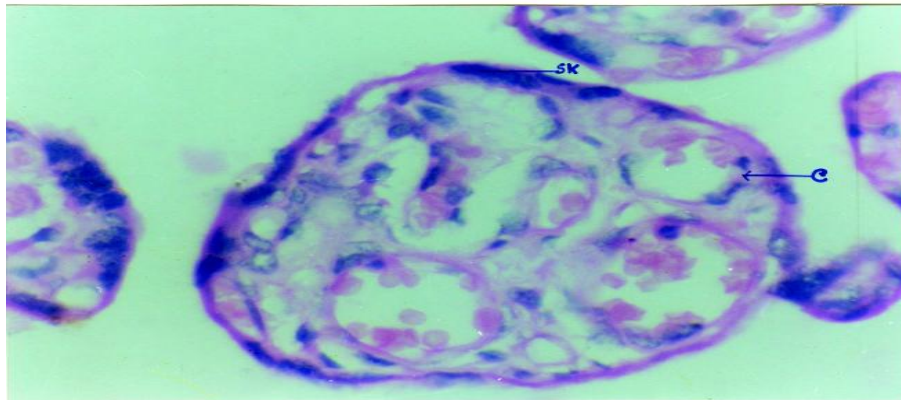
**Figure 1:** Histological picture showing the placental chorionic villi in chorionic frondosum in 1<sup>st</sup> group (6 weeks – 12 weeks). In the first trimester of placenta, the chorionic villi are large and covered by two cell layers – the cytotrophoblast and syncytiotrophoblast. The blood vessels in the villi are not prominent.



**Figure 2:** Histological picture showing the highly vascularized placental chorionic villi in chorionic frondosum in 3<sup>rd</sup> group (13 weeks – 24 weeks). The vascularized villi support in blood gas and nutrient exchange of maternal-fetal circulation required by the growing fetus approaching the term gestation. Syncytial knots and intervillous fibrin are prominent.



**Figure 3:** Histological picture showing the 2<sup>nd</sup> trimester placenta. The villi become smaller and more vascular. The syncytiotrophoblast cell layer draws up into “syncytial knots” which are small clusters of cells, leaving cytotrophoblast layer. Clumps of pink fibrin appear between chorionic villi.



**Figure4:** Histological picture showing the 3<sup>rd</sup> trimester placenta syncytial knots and capillaries

**Table 1: Summary of histological observations**

Sl.no.	Gestational weeks	N	Observations
1.	6-12 weeks	10	<ol style="list-style-type: none"> <li>1. Double layered trophoblast</li> <li>2. Large cytotrophoblast</li> <li>3. Cytotrophoblastic cells with large round nucleus</li> <li>4. Marginally thick syncytiotrophoblast</li> <li>5. Syncytiotrophoblast cells with small round nucleus</li> <li>6. Numerous Hofbauer cells</li> <li>7. Centrally placed numerous fetal blood vessels</li> </ol>
2.	13-24 Weeks	10	<ol style="list-style-type: none"> <li>1. Increase in number of villi</li> <li>2. Gradually thinned syncytiotrophoblast</li> <li>3. Evenly dispersed nuclei of syncytiotrophoblast</li> <li>4. Thinned, discontinuous cytotrophoblast</li> <li>5. Large villous capillaries</li> <li>6. Peripherally located Hofbauer cells</li> <li>7. Hofbauer cells show vacuolated appearance</li> </ol>
3.	25weeks to full term	5	<ol style="list-style-type: none"> <li>1. Numerous villi</li> <li>2. Reduced stroma</li> <li>3. Numerous syncytial knots</li> <li>4. Peripherally placed fetal capillaries</li> <li>5. Less number of Hofbauer cells, without vacuolated appearance</li> </ol>

### III. Discussion

In the present study of 25 placentae at different gestational periods of 6-12 weeks, 13-24 weeks, and 24 weeks to full term are subjected for histological work. It is observed that in 10 cases of 6-12 weeks of gestation the histological observation of Double layered trophoblast, Large Cytotrophoblastic cells with large round nucleus, Marginally thick Syncytiotrophoblast cells with small round nucleus, Numerous Hofbauer cells, Centrally placed numerous fetal blood vessels, In 10 cases of gestational period between 13-24 weeks histological findings are increased number of villi, Gradually thinned syncytiotrophoblast, Large villous capillaries, Hofbauer cells show vacuolated appearance, in 5 cases between 25 weeks to full term Numerous villi, Reduced stroma, Numerous syncytial knots. According to Martinoli et al (ref.1)1984 small reticulum cells appear to delimit collagen free stromal channel system through which the Hofbauer cells migrate. According to Midgley et al (ref.2)1963 in earlier stages of gestation cytotrophoblast cells form almost continuous layer on the basal lamina but after 4<sup>th</sup> month it gradually expands itself producing syncytium. Jones and Fox (ref.3)1991 stated that core of villi contain small and large reticular cells, fibroblast and large phagocytic cells (Hofbauers) which are numerous in 1<sup>st</sup> half of pregnancy. According to D.J Gersell (ref.4)1994 1<sup>st</sup> trimester villi are of 170 Micron in diameter and 2 layers of trophoblast, an inner cytotrophoblast and outer syncytiotrophoblast are seen. Cross et al (ref.5)1994 suggested that maternal perfusion of the placenta not only supplies blood to the fetus but as well creates an environment favorable to trophoblast differentiation to become more invasive. Trophoblast close to the inner cell mass continue to proliferate and those that are removed from inner cell mass become primary trophoblastic giant cells. Benischke K & Kaufman P (ref.6)1995 described that villus macrophages (Hofbauer cells) are numerous throughout gestation they may be seen conspicuous with spindle appearance. According to Schmorl (ref.7)1893 Park 1958 there is remarkable liberation of small portions (Spouts) of syncytiotrophoblast from the villi into the intervillous space. From here spouts pass to maternal veins and eventually to the capillaries of the lungs. According to Fox 1978 (ref.8) by term up to 30% of villi may be involved in the formation of syncytial knots.

#### **IV. Summary and conclusion**

In the current study 25 specimens of placental bits at various gestational periods were collected from Obstetric and gynecology department Narayana hospital Nellore and subjected for histological study .

In the spectrum of histological study the 1<sup>st</sup> trimester observation of Double layered trophoblast Large Cytotrophoblastic cells with large round nucleus Marginally thick Syncytiotrophoblast cells with small round nucleus Numerous Hofbauer cells Centrally placed numerous fetal blood vessels

The histological features of 2<sup>nd</sup> trimester histological finding are increased number of villi Gradually thinned syncytiotrophoblast Large villous capillaries Hofbauer cells show vacuolated appearance

In the 3<sup>rd</sup> trimester numerous villi Reduced stroma Numerous syncytial knots seen

Peripherally placed fetal capillaries less number of Hofbauer cells, without vacuolated appearance

#### **References**

- [1]. 1.Martinoli .C Castellucci M.Zaccheo .O. Kaufmann.P1984 scanning electron microscopy of stromal cells of human placental villi through out pregnancy cell tissue Res 235;647-655
- [2]. 2. .Midgley A.R Pierce,G.B.Gosling J.R 1963.Morphogenesis of syncytiotrophoblast in vivo an autoradiographic demonstration science 141,349-350
- [3]. 3. Jones C.J.P .Fox H 1991Ultrastucture of normal human placenta .Elxtromicrography reviews 4;129-178
- [4]. 4.Gersell D. J Philips .N.j Becker ,Man,K 1994,Chorionic Chorioomniitis Aclinical pathological study of 17 cases of international J .Gyneacological paphological 10; 217-229 in pathology of female genital tract
- [5]. Cross J.C Z Werb S. J Fisher1994 implantation and the placenta ;key pieces of developmental Puzzle ,Science 2666, 1508-1518
- [6]. Benirschke .K .Kaufmann, P.1995 pathology of Human placenta 2<sup>nd</sup> ed .pp 1-79 New York ,Springer –Verlag
- [7]. Schmorl ,G .1893, Pathological –anatomische under suchangen under puerperal –E Klampsie Vogel ,Leipzig.
- [8]. 8..Fox H ,editor .1978 .pathology of placenta London 1978 Saunders .
- [9]. 9.Boe F .Vascular morphology Human placenta .Symp,Quant ,Biol .1954;19:: 29-35.
- [10]. AL-OKail MS and AL-Attas OS .Histological changes in placenta 1994 41; 8: 355-360.