of the rat iris, being in striking contrast to the osmiophilic (cytolysomal) degeneration patterns observed elsewhere.

When comparing the effects of this 'chemical sympathectomy' with those after the surgical removal of the superior cervical sympathetic ganglion, 2 main differential features are conspicuous. First, the time course is different. 36 h after surgery virtually no fluorescent (norepinephrine-containing) nerve fiber can be seen in the iris as shown already by one of us[3]. Secondly, even after a considerably longer period after 6-HODA administration (72 h), catecholamines disappear from the very terminal apparatus only, whereas the reaction of pre-terminal (non-varicous) axons remains unchanged. In striking contrast to this, after surgery catecholamines disappear from both terminal and pre-terminal axons virtually at the same time.

Preferential degeneration of adrenergic terminals (versus pre-terminals) may be due to the preferential uptake of the 'false transmitter' (6-HODA) by the terminals (versus pre-terminals), possibly this drug inducing a neuronecrotizing effect. On the other hand, the possibility cannot be excluded that it is the supporting element of the terminal nerve plexus, i.e. the enveloping interstitial cells, that are subjected to alterations by 6-HODA treatment. The interstitial cell of Cajal (similar to the lemmoblastic Schwann cells) can be regarded as a nutritive element of the terminal autonomic nerve fiber. Thus any damage to these cells will inevitably result in the destruction of the (terminal) nerve fibers 'nursed' by them, not apparently affecting structure or chemistry of the pre-terminal axon, and being in a real 'direct' trophic (nutritive) relation with the cell of its origin, i.e. with the non-attacked sympathetic ganglion cell[4].

Zusammenfassung. Eine systematische Verabreichung von 6-Hydroxydopamin bewirkt eine Noradrenalin-Depletion aus terminalen Sympathikusfasern der Rattenіris. Die adrenergischen Nervenfasern werden von einer sekundären Degeneration ergriffen («osmiophobe» Degenerationsform), entsprechend der Degeneration der Nervenfasern nach Exstirpation des Ganglion cervicale superius.

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Foetal Blood Vessels on the Chorial Surface of the Human Placenta in Abnormal Pregnancy and Development

Involvement of the placenta as a whole in abnormal states of pregnancy and development has been reported by many workers[1–5].

Modifications in anatomy of foetal blood vessels of placenta have been shown in congenital anomalies[6], multiple pregnancies[7], hydramnios[8] and ante partum haemorrhage[9]. While elaborating their earlier reports, BHARGAVA and RAJA[10] have described the 'Parameters of stress', in the anatomy of foetal blood vessels of the chorial surface of the placenta, namely tortuosity of veins and arteries, arterio-venous dissociation, reversal of normal arteriovenous relationship of artery crossing superficially to vein and reversal of primary division ratio of veins and arteries. They have graded these parameters in relation to their level of occurrence (primary, secondary, terminal and singly and in combinations) and degree of severity (mild, moderate, marked and severe). These parameters develop in response to functional demands in later part of first trimester of pregnancy (BHARGAVA[11]).

Injection of corrosion preparations, using buterite acetate cellulose in acetone, have been made on 463 placentae (prematurity 53; placenta previa 27; hydramnios 116; multiple pregnancy 149; and developmental defects 118). Anatomical features in relation to the incidence, level of occurrence and degree of severity of all the parameters in individual groups of these placentae have been tested for association with similar observations on 167 placentae from normal cases by means of chi-square test. Interpretations of these analyses in relation to their significance are presented in Table I.

Attempts at ranking of these clinical entities by parameters or vice versa show a significant value of coefficient of concordance, thereby showing a high degree of agreement between the ranking and ranked entities. The above inferences are strongly suggestive of involvement of foetal vascular bed, resulting in marked exaggeration of the venous component as such in hydramnios and placenta previa, jointly with the arterial one, in developmental defects and multiple pregnancies, and mildly in cases of prematurity.

[1] P. M. ZEEK and N. S. ASSALI, Am. J. clin. Path. *20*, 1099 (1950).
[2] M. MAYER, M. PANIGEL and H. LECLERC POLYAK, Gynéc. et Obstét. *55*, 257 (1956).
[3] M. MAGUCO, J. CHAVEZ AZUELA, S. KARCHINER and J. CINCA ARENAS, Obstet. Gynec. *26*, 184 (1965).
[4] G. RUZICKA, Gynéc. Prat. *16*, 413 (1965).
[5] B. S. TEN BERGE, B. BLOEMEL and Z. SEWZ, Gynaecologia *159*, 359 (1965).
[6] I. BHARGAVA and M. B. INDURKAR, J. Anat. Soc. India *14*, 43 (1965).
[7] I. BHARGAVA and P. T. K. RAJA, J. Anat. Soc. India *16*, 36 (1967).
[8] I. BHARGAVA and P. T. K. RAJA, J. Anat. Soc. India *15*, 44 (1966).
[9] I. BHARGAVA and P. T. K. RAJA, J. Anat. Soc. India *16*, 37 (1967).
[10] I. BHARGAVA and P. T. K. RAJA, in press (1969).
[11] I. BHARGAVA, Thesis D. Sc., Vikram University (1967).

As a result of this analysis, the following parameters have been regarded as normal and abnormal quanta of its manifestations (Table II). Manifestation of abnormal quanta of these parameters in combinations of 3, 4 or 5, show a progressively significant association with the abnormal conditions, in the same descending order as for parameters.

Table I. Interpretation of parameters in various states

Parameters	Prematurity	Placenta previa	Multiple pregnancy	Hydramnions	Developmental defects
Tortuosity (vein) *P*					
Incidence	–	< 0.001	< 0.001	< 0.001	< 0.001
Level	< 0.01	< 0.001	< 0.001	< 0.001	< 0.001
Degree	< 0.01	< 0.01	< 0.001	< 0.001	< 0.001
Tortuosity (artery) *P*					
Incidence	–	–	–	–	–
Level	< 0.05	–	< 0.001	< 0.001	< 0.001
Degree	–	< 0.05	< 0.001	< 0.001	< 0.001
Arteriovenous dissociation *P*					
Incidence	–	–	–	< 0.05	< 0.001
Level	–	–	< 0.05	< 0.001	< 0.001
Degree	Insignificant	< 0.05	< 0.001	< 0.001	< 0.001
Arteriovenous reversal *P*					
Incidence	–	–	–	–	< 0.05
Level	< 0.05	–	< 0.01	< 0.001	< 0.001
Degree	–	< 0.05	< 0.001	< 0.001	< 0.001
Reversal primary division ratio *P*	–	–	< 0.01	–	< 0.01

P values denote levels of significance.

Table II. Normal and abnormal quanta of parameters

Parameter		Normal	Abnormal
Tortuosity of veins	Level Degree	P, S, T, PT mild, moderate	PS, ST, PST marked, severe
Tortuosity of artery	Level Degree	P, S, T, PT mild, moderate, marked	PS, ST, PST severe
Arteriovenous dissociation	Level Degree	P, S, T, PT mild, moderate	PS, ST, PST marked, severe
Arteriovenous reversal	Level Degree	P, S, T, PT mild, moderate	PS, ST, PST marked, severe
Primary division ratio		normal	reversal

P, primary levels; S, secondary levels; T, terminal levels.

The foetal blood vessels of placenta are in a state of a delicate haemodynamic equilibrium between its arterial and venous components. This equilibrium can possibly be disturbed in favour of either of the components on account of exaggeration or reduction of anyone or both of them. A structural increase is manifested by a wider calibre, tortuous course and profuse branching, while a reduction is shown by a narrow calibre, straight course and sparse branching.

Selective elongation of arterial or venous component is directed towards complementing the action of other slowing devices for reducing the pressure and blood flow. This leads to: (1) increased tortuosity of the vessel concerned e.g. artery or vein; (2) arteriovenous dissociation; (3) profuse branching, which may be of a magnitude big enough to alter primary division ratio of arteries and veins. Arteriovenous dissociation and reversal can result in a poorer utilization of the force of arterial pulse in propelling blood in venous channels.

These gross slowing devices are found under normal conditions at varying levels namely primary, secondary and terminal either individually or in combinations, and to different degrees, which have been classified as mild, moderate, marked and severe. An exaggeration of these devices in any combination of their incidence, level and degree shall slow down the circulation excessively and lead to relative placental hypoxia, the precise effects of this hypoxia will depend upon the combination of the parameters, and stages of organogenesis and gestation.

The above findings are strongly suggestive of the presence of a common factor or combination of factors in these clinical entities, which focuses its effect on foetal blood vessels of the placenta. The manifestations of this common factor are recognized as 'parameters of stress'. It presents a significant gradient in relation to these clinical entities, namely prematurity, placenta previa, multiple pregnancies, hydramnios and developmental defects in an ascending order.

In view of the above facts, it is suggested that a routine examination of the anatomical features of the foetal blood vessels of the placenta towards a proper appraisal should contribute significantly to the developmental history, early recognition of developmental defects and corresponding prognostication of the new-born[12].

Zusammenfassung. Variationen in Verteilung, Aufzweigungsmodus, Überkreuzung von Arterien und Venen sowie arteriovenöse Anastomosen kommen in immer grösserem Ausmass vor, wenn ein falscher Sitz der Plazenta, Mehrlingsschwangerschaft, Hydramnion sowie Missbildungen des Feten vorliegen. Missbildungen des Feten sind meistens mit solchen Variationen gekoppelt.

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