

DEMONSTRATIONS

Studies on the development of the autonomic innervation of the human iris.

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The response of the human iris to sympathomimetic drugs has been used to study the state of adrenergic innervation in adults (Sneddon & Turner, 1969) and children (Shinebourne, Sneddon & Turner, 1967). The technique has been applied to the study of neurone and receptor development in eighty human infants ranging from about 28 weeks gestation to 60 days after term.

The mydriatic agents used were prepared in buffered saline ($\text{pH} \approx 7.0$) and instilled into the conjunctival sac before routine ophthalmoscopic inspection. Pupil photographs were taken using a Nikon F single reflex camera and a Mecablitz 163S electronic flash-gun. Illumination was kept constant at 7 foot-lamberts. The final magnification on projection was $\times 15$. Percentage mydriasis at 30 min was calculated as the change in pupil diameter over the base-line diameter (Sneddon & Turner, 1969). The mydriases were correlated with the stages of gestation and birth weights of the infants, and the results are shown in Table 1.

TABLE 1. *Correlations between percentage mydriasis produced in babies by sympathomimetic amines and eucatropine, and gestational age and birth weight.*

Drug		Gestational age			Birth weight		
		Correlation coefficient	<i>n</i>	<i>P</i>	Correlation coefficient	<i>n</i>	<i>P</i>
Phenylephrine hydrochloride	5%	0.034	30	n.s.	0.592	16	<0.05
Adrenaline bitartrate	1%	No response	6				
Hydroxyamphetamine hydrobromide	1%	0.525	27	<0.01	0.499	13	<0.05
Tyramine hydrochloride	2%	0.596	27	<0.001	0.469	20	<0.02
Eucatropine hydrochloride	10%	0.968	6	<0.01			

Phenylephrine and eucatropine produced significant mydriases in all babies studied. Tyramine and hydroxyamphetamine produced no mydriasis in the younger babies, but from about 37 weeks the intensity of mydriasis correlated directly with age.

The responses of the iris muscle to sympathomimetic and parasympatholytic mydriatic drugs at the earliest age that it was possible to study suggest that the effector cell receptor for sympathomimetic amines is functional and that parasympathetic tone is present. Some increases in mydriatic response would be expected with increasing age or maturity as measured by birth weight. The muscle was not supersensitive, adrenaline producing no mydriasis as in denervation supersensitivity (Sneddon & Turner, 1967). The absence of a mydriatic response to the indirectly acting amines tyramine and hydroxyamphetamine until within about 3 weeks of term suggests that the sympathetic nerve terminals in the iris are not fully functional until that time.

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