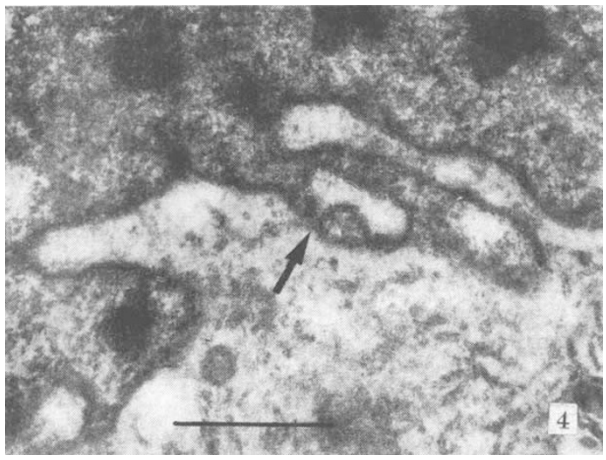

Fig. 4. Nuclear projections in an amelanotic albino melanoma cell. Arrow indicates where the projections seem to undergo pocket formation.

increasing the area of chromatin in contact with the cytoplasm (see refs. 2 and 9).

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Unique Vascular Relationship in the Human Umbilical Cord

THE reactivity of both perfused and isolated segments of human umbilical vessels to various pharmacological agents has already been reported[1–5]. Without exception, serotonin (5-hydroxytryptamine) has been found to be a potent constricting agent of both umbilical artery and vein. In perfusion studies, however, arteries and vein were generally not perfused simultaneously or, in cases where they were, drugs were administered only to the arterial perfusing fluid.

We have perfused both the arteries and the vein simultaneously in 10 cm segments of human umbilical cords, and injected drugs into both the arterial and venous perfusing fluids, which consisted of Krebs–Henseleit solution, equilibrated with oxygen: carbon dioxide (95 per cent : 5 per cent), in physiological pressures (10 mm of Hg in the vein, 55 mm of Hg in the arteries), although the flows obtained (12 ml./min in the vein, 6 ml./min in each artery) were considerably less than those found *in utero*[6]. Decreased flow is a familiar problem in studies of isolated perfused placentae and umbilical cords[2]. Perfusion pressure was measured in the vein using a Statham pressure transducer. Spirally and longitudinally cut strips of umbilical artery and vein were examined in a tissue bath, and the muscular activity was recorded isotonically on a kymograph.

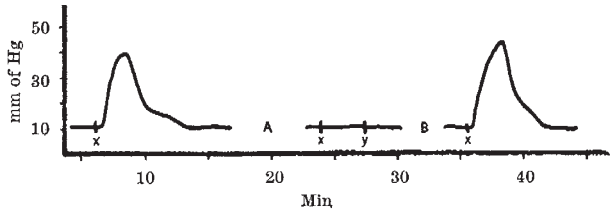

Fig. 1. Pressure changes from serotonin in perfused umbilical vein before and after insertion of a stainless steel rod into one artery. Serotonin was injected as a bolus at x (10^{-8} g) and at y (10^{-7} g). The rod was inserted during interval A. Note that changes in perfusion pressure could not be obtained with serotonin while the rod was in place. Removal of the rod (in interval B) was followed by a return of the response to intravenous serotonin.

Very small doses (2×10^{-9} to 1×10^{-8} g) of serotonin injected as a bolus in the venous perfusing fluid caused increases in venous perfusion pressure while the arteries were present in the segment of cord, whether or not the arteries were perfused. Administration of as much as 10^{-5} g of serotonin to the arterial perfusing fluid did not alter venous perfusion pressure, although arterial flow was terminated rapidly. When the arteries were dissected sharply from thirty segments their response to intravenous serotonin was abolished. This response was also abolished in twenty cords when a stainless steel rod was inserted through one of their arteries, thus uncoiling the vessels from around the vein. When the rod was removed the system recorded its sensitivity to serotonin, which indicates that the contractile mechanism involved was undamaged by the procedure (Fig. 1).

We then investigated whether removal of the arteries from the segment of cord had damaged the contractile mechanisms of the vein. Spirally and longitudinally cut strips of umbilical vein were prepared from unperfused segments of the cord, from segments perfused with the arteries in place, and from segments perfused after removal of the arteries. In every case, the venous strips prepared from these three kinds of tissue had identical sensitivity to serotonin in the tissue bath, each contracting at a threshold dose of serotonin of 10^{-9} g/ml.

Longitudinally cut strips of human umbilical artery contracted in response to serotonin, with a threshold concentration of 1 to 5×10^{-9} g/ml., representing a unique component of human arterial tissue. We suggest that the contraction of the longitudinal muscle fibres in the arteries, which coil around the vein in the human umbilical cord, was responsible for the increase in venous perfusion pressure after addition of serotonin to the venous perfusing fluid. That this may be a unique mechanism in man, or at least in the higher primates, is suggested by the observation that sheep umbilical cords contain two arteries and two veins with little coiling of one about the other, and the apparent absence of functional longitudinal muscle in either vessel[7].

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