

Failure of Fetal Platelets to Aggregate in Response to Adrenaline and Collagen¹ (36937)

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Platelets from newborns are known not to aggregate to the same extent in the presence of adenosinediphosphate (ADP) and adrenaline (1) as platelets from adults, but nothing is known about the effect of these substances on fetal platelets. We recently had the opportunity of examining human fetal platelets and found that they, too, did not respond so strongly to ADP, but, unlike neonatal platelets, they completely failed to aggregate in the presence of adrenaline or collagen.

Material and Method. The material consisted of platelets from 5 fetuses obtained by induced abortion. The mothers were healthy and their pregnancies had been terminated on sociomedical grounds. All the fetuses were delivered by abdominal hysterotomy under general anesthesia with O₂ + N₂O and Lep-tanal (Fentanyl) + Dridol (Janssen Pharm.). Immediately after extraction of the fetuses and the placenta, the umbilical cord was divided and a plastic catheter (French No. 3½) was introduced into one of the umbilical arteries. Blood was drawn with a disposable plastic syringe and 3.8% sodium citrate was

added in proportion 1:10. Platelet-rich plasma (PRP) was prepared by centrifuging the citrated blood at 185*g* for 10 min. The platelet count ranged from 85,000 to 180,000/ μ l PRP. Platelet aggregation was calculated from the changes in light transmission after addition of the aggregating agent. A Born aggregometer permitting constant magnetic stirring at 37° and automatic recording on UR Vitatron recorder was used (2). PRP obtained from healthy adults and diluted with plasma to the same concentration of platelets served as a control. The steepest slope of the curve produced by the fall in optical density following the addition of the aggregating agent was determined and the aggregation of the fetal platelets was expressed as a percentage of the steepest slope of control platelets.

Results and Comments. Addition of ADP in final concentration of 5×10^{-6} *M* always produced aggregation of fetal platelets as well as of adult platelets in equal concentration although the intensity of aggregation was constantly lower in the fetal platelets (Table I). Neither adrenaline in a final concentra-

TABLE I. Aggregation Induced on Fetal Platelets Suspended in Plasma by ADP 5×10^{-6} *M* (Final Conc).^a

Fetus	Pregnancy (wk)	Crown-heel length (cm)	Platelet count (platelets/ μ l)	Steepest slope (%)
1	24	27	123,000	71
2	20	23	150,000	56
3	22	24	180,000	56
4	19	18	85,000	27
5	22	24	90,000	26

^a The steepest slope was expressed as the percentage of the steepest slope produced by equimolar ADP in a suspension of adult platelets with the same count.

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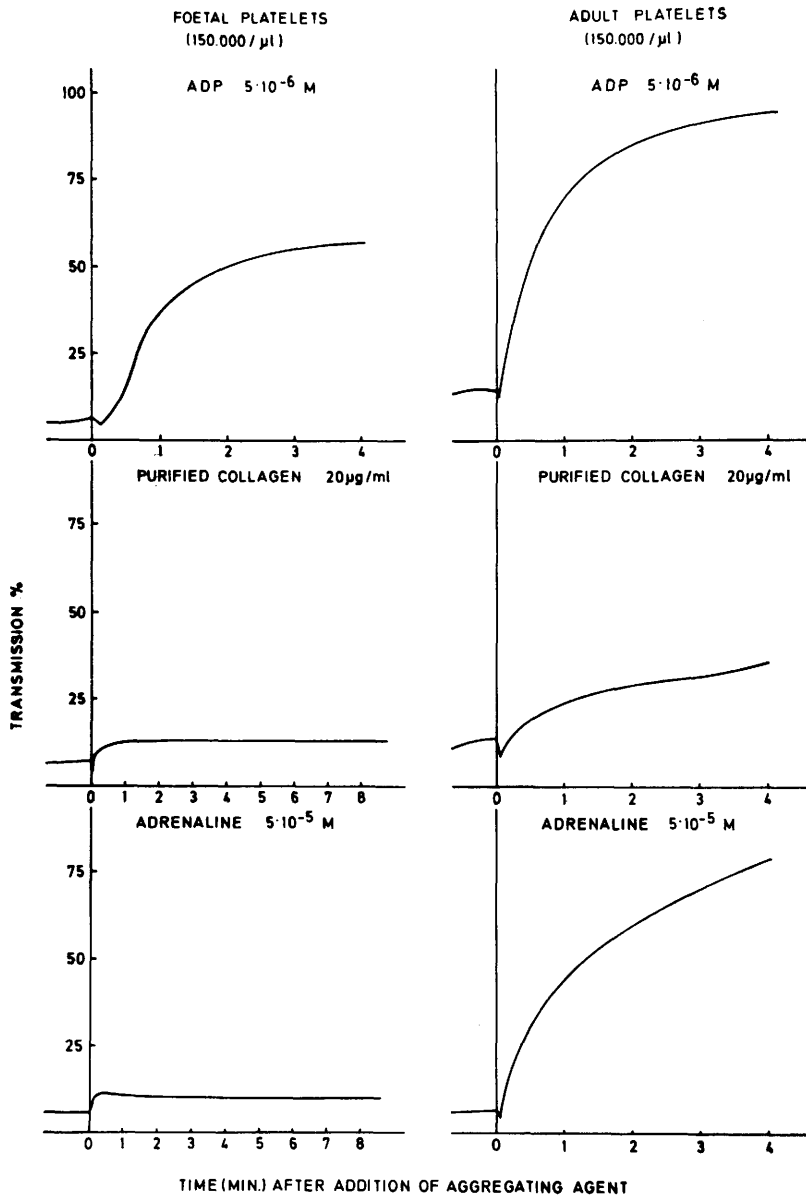


FIG. 1. Changes in optical density of citrated PRP (0.9 ml) of fetal and adult platelets after addition of 0.1 ml of ADP, collagen, and adrenaline. The final concentration of the aggregating agents is shown.

tion of 5×10^{-5} and 1×10^{-4} M nor collagen (Stago, 20 $\mu\text{g}/\text{ml}$ of PRP) induced any aggregation of fetal platelets, but adrenaline and collagen aggregated adult platelets with the same count. Figure 1 shows the aggregation curves in one case.

Judging from these results, human platelets are able to aggregate in response to ADP

already in the 19th week of fetal life, although not so strongly as adult platelets. The property to aggregate in response to collagen and adrenaline is however acquired only after the 24th week of development. This finding cannot be ascribed to the anesthesia used and/or to the surgical operation; in fact no significant variation in platelet aggrega-

tion was seen studying the blood collected from five women during hysterotomy for legal abortion. The behavior of fetal platelets is reminiscent of that of adult platelets in a group of hemorrhagic diathesis (3-5) where ADP, but neither adrenaline nor collagen, can elicit normal aggregation.

Summary. Human platelets can aggregate in response to ADP already in the 19th week of fetal life, although not so strongly as adult platelets. Fetal platelets will, however, not aggregate in response to adrenaline or col-

lagen in concentrations capable of producing aggregation of adult platelets.

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1. Hrodek, O., *Nouv. Rev. Fr. Hematol.* **8**, 569 (1969).
 2. Cronberg, S., *Coagulation* **3**, 139 (1970).
 3. Hardisty, R. M., and Hutton, R. A., *Lancet* **1**, 983 (1967).
 4. Hirsh, J., Castelan, D., and Loder, P. B., *Lancet* **2**, 18 (1967).
 5. Caen, J. P., Sultan, I., and Larrieu, M. J., *Lancet* **1**, 203 (1968).
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