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Increased Monoester Lipase Activity in Red Blood Cells in Late Pregnancy

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We have recently identified a monoester lipase (MEL) activity in human red blood cells (RBC) [1]. This MEL exhibited features typical of an ectoenzyme: it was tightly associated with the cell membrane and had its active site externally oriented, as inferred from the ability of intact RBC to hydrolyze an exogenously added lipid substrate. No attempt has been made so far to search for physiological variations of this enzyme activity. We have in this study measured MEL activity in RBC during pregnancy.

Blood samples (5 ml) were obtained after an overnight fast from 31 healthy women aged 19-36 years at 25-40 week's gestation. They were not obese and did not take any medication. 29 hematologically normal, nonpregnant women aged 18-40 years served as controls. Blood was collected into siliconized tubes containing 0.5 ml of 0.13 M sodium citrate, kept at 4°C and processed within 48 h. MEL activity was assayed using as the enzyme source a fraction (0.1 ml, about 108 RBC) of a suspension of intact RBC purified for each individual sample by filtration on cellulose. The assay medium contained emulsified ethyl-[3H]oleate (2 mM, about 2×10^6 cpm) as the substrate in a final volume of 1 ml at 37 °C. More detailed technical data have been reported earlier [1]. Results are expressed in milliunits (mU) of lipase activity per 10¹² RBC. 1 mU of activity corresponds to the release of 1 nmol acid/min. Red cell counts, mean cellular volume (MCV) and mean cellular hemoglobin (MCH) were determined using a Coulter Counter model S.

Table I shows that RBC from pregnant women exhibited a significant increase in mean MEL activity, compared to the control group ($p < 0.001$, unpaired t test). The mean ($\pm$ SD) values of MCV (91.1 ± 4.75 fl) and MCH (31.2 ± 2.18 pg) were not statistically different ($p > 0.05$) in pregnant subjects as compared to the

Table I. MEL activity values (mU/10¹² RBC) of human RBC in late pregnancy

	Pregnant women	Control women
Number of subjects	31	29
Mean values	1,234	1,009
SD	187	120
Range	889-1,688	784-1,244

control group (89.9 ± 5.23 fl and 31.4 ± 1.1 Opg, respectively).

Little is known on the effect of physiological condition of the organism and that of the age of the cell on MEL activity. In all likelihood, our previous findings of high levels of MEL activity in RBC from cord blood of normal newborns [1] as well as in regenerative anemias and acute proliferative blood disorders [2] reflect in both cases an increased proportion of young RBC in the circulation. The increase in MEL activity of RBC during pregnancy may be consonant with such an interpretation, inasmuch as increases in total blood volume, plasma volume and RBC volume denote a general trend to sustained erythropoietic activity in pregnant women [3]. On the other hand, hyperlipoproteinemia often occurs in late pregnancy and is characterized by rises in levels of plasma triglycerides and, to a lesser extent, of plasma cholesterol [4]. Similarities in this lipid pattern and that during estrogen treatment suggest a hormonal basis for gestational hyperlipoproteinemia. The increase in MEL activity might then represent a response to a hyperlipemic state, outwardly comparable, at the RBC level, to the physiological increase in lipoprotein lipase activity of adipose cells associated with alimentary li-

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pemia. Studies are in progress to explore these hypotheses. Whatever the mechanism, the increased lipolytic potency of RBC constitutes a new hematological characteristic of human pregnancy.

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