Malnutrition and the Immune Response,
edited by R. M. Suskind.
Raven Press, New York © 1977.

Umbilical Cord Immunoglobulins and Fetal Maturity: Neonates in a Guatemalan Indian Village

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During a 9-year prospective study in a Mayan Indian village (1), umbilical cord blood was collected by untrained midwives from most newborns. Specimens mixed with maternal blood were screened according to their ratios of immunoglobulin M (IgM) to immunoglobulin A (lgA) (2). All remaining specimens with levels of IgA equal to or greater than 0.10 mg/rnl were also excluded. Of the 401 original specimens, 250 were used in the study.

The immunoglobulin levels in umbilical cord blood are summarized in Table 1. Two notable findings are the high concentrations of IgM and IgG in village neonates, and the high frequency (40%) of IgM concentrations equal to or greater than 0.20 mg/ml levels, in excess of those found in industrialized countries (3,4).

Analysis of variance revealed no clear pattern associating IgM values with birth weight or gestational age (Table 2,3). Highest values were noted in infants of 35 to 36 weeks' gestation. Comparison of IgM values with combined birth weight and gestational age (fetal maturity) showed that the highest values were in three infants classified as pretenn, moderate low birthweight (Table 4). Analysis of IgG values, on the other hand, revealed a clear pattern; mean IgG was significantly correlated with birth weight, increasing until birth weight reached 3,000 g. The correlation with gestational age was even higher, lasting until 41-42 weeks' gestation. The lowest IgG

TABLE 1. Immunoglobulin. in umbilical ~ard Nnlm (mg/ml). 250 CO",, SonIa Moria Cduque, 1964-1972

Clau	Minimum	Ma,,'mum	Mean (SDI	Elevateela
'(IM	0.025	0.850	0.217 10.17""	101 '..0 ,
IgA~	0.035	0.090	0.036 (0.008)	
,'G	6.30	28.80	13.72 '...071	66 (26 '

& Elevated level. (ma/mll, laM::::;*0.20;* IgG::::; 15.00. Numben represent number anel percent of coses studied.

~By cleflnifion,all ca.e. with 'gA::::; 0.10 ma/m. were not tabulated hee te"tl.

TABLE 2. Mean conc.llfrafion of'llM a"" *'IIG, by* birth *_ill"', 250* ca~~, Sonia Marla Callqll', 1964-1972

Birth weight	No. of COlliS	leM M±Sf	leG M±SE
<2,001	18	0.192 :I:0.0.2	11.12:1: 0.98
2,001-2,500	82	0.218 ± 0.017	lM8 ± 0.37
2,501-3,000	123	0.217 ± 0.012	U.20 ± 0.38
3,001-3,500	27	0.232 ± 0.027	"'.02 ± 0.86
F		0.279	3.23"
p		>0.05	<0.0.5

TABLE. Mean concen'ration ol'gM alld 'gG *by* gll"a'iana' a"., 244 co... , Santa Marla Cauqui, 1964-1972

Geltallonal aile (weeks)	No. of casel	IgM M±5E	I"G M±5E
31-32	2	0,2.0 ± 0.0.7	7.33 ± 0~8
33-3.	.5	0.12.5± 0.031	11.37 ± ... 1
35-36	11	0.316 ± 0.067	11.73 % 1.37
37-38	31	0.228 % 0.031	12.51 % 0.50
39-"0	15.	0.21.5± 0.011	13.91 ± 0.32
,,-.2	.1	0.211 ± 0.022	"U %0.68
F		2	3.016
p		>0.05	<0.01

values were in preterm, severe low birth weight infants, whereas the highest values were in term newborns.

Differences in IgG concentration as a function of fetal growth have been reported and reviewedby others (5-7). Preterm infants, having a lower level of maternal antibody, may exhibit a shorter period of passive immunity. Unfortunately, the proportion of preterm babies is greater in underdeveloped societies, where there is also greater risk of infection than in industrialized

TABLE-: Mean concent"";on 01 immunog'obu'in, *by* fetal maturity, 243 CCI"', Santa Marfa COllqll', J964-1972

Clan	No. of Infants	leM (m,,/mll	IgG (mg/mll
Preterm, seVere low birth weight	1.	0.218(0.195)"	10.83(...53)
Preterm, moderale low birth weight	3	0."46(0.097)	12.90(0.81)
Ter"', amall·for·"eatalionol age	81	0.207(0.1.50)	13.39(3.36)
Term, moderate blrth weight	118	0.218(0.139)	' ...13(04.2.)
Term, high birth weight	27	0.232(0.143)	1...02(.....81

~Mean value (SD)

countries. The finding of a high proportion of neonates with elevated values of IgM has been a matter of concern. A confirmatory study was conducted utilizing the infrastructure of the INeAP study of nutrition and mental development. Dr. Hernan Delgado obtained blood shortly after birth from a significant number of babies born consecutively in four lowland Guatemalan villages. Elevated IgM values were found in 15% of the neonates (8). Such findings have classically indicated congenital infection. In fact, high prevalence of antenatal infection has been demonstrated in Santa Maria Cauque **(1)** and among infants of low social class in the United States (3). Although several explanations could be advanced, the most likely is that the fetus responds to microbial antigens or components or to maternal antibodies produced during infection in pregnancy.

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