THE S-T SEGMENT AND T WAVE DURING THE FIRST WEEK OF LIFE*

BY

S. ZOE WALSH

From the Department of Pediatrics, Karolinska Hospital, and Wenner-Gren Cardiovascular Research Laboratory, Norrtnulls Hospital, Stockholm 60, Sweden

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Though much has been written about the electrocardiogram in infancy (Tudbury and Atkinson, 1950; Datey and Bharucha, 1960; Michaëlsson, 1959), the results have largely proved disappointing. This may in part be ascribed to the tendency to include infants of various ages in a single group, to insufficient attention to the first few hours and especially the first few minutes of life, as well as to inadequate follow-up. What constitutes adequate follow-up is not yet known, but judging from available data (Ziegler, 1951) there appears to be ample evidence that throughout infancy and childhood, electrocardiographic "maturation" occurs. Long-term studies are obviously needed to assess individual changes more satisfactorily.

Recent studies, however, indicate that the electrocardiogram is a much more sensitive indicator of circulatory adaptation following birth than had been thought. Prolongation of intervals and higher amplitude QRS deflections are present during the first hour of life (Walsh, 1963a, b, c). Furthermore, significant decreases in these parameters take place during the first week of life, but the rate of change varies.

Though a number of investigators have remarked on low voltages and changes in direction of præcordial T waves with age in newborns (Ziegler, 1956; Stern and Lind, 1960), few data are available on T wave duration and almost none on the duration of the S-T segment (Tudbury and Atkinson, 1950; Ziegler, 1951; Coleman, 1961). These intervals are admittedly difficult to measure, especially in the presence of low amplitude deflections. Despite this limitation, there appears to be some justification for determining normal standards, as the intervals may be significantly altered by metabolic disturbances. In a previous study, the Q-T interval was found to be prolonged during the first few days of life. It was also noted that the QRS interval was prolonged, but only in infants 30 minutes old or less (Walsh, 1963b). The present study was undertaken to clarify this further, as well as to determine the effect of age on the amplitude of the T wave, in view of the paucity of serial studies, with emphasis on the immediate neonatal period.

SUBJECTS AND METHOD

There were 68 healthy, full-term infants (42 girls, 26 boys) who were examined on the first, second, third, and fifth or sixth day of life. They were divided into four groups according to age on initial examination:

Group Ia: 30 minutes old or less (17 infants)

Group Ib: 35 to 60 minutes old (21 infants)

Group IIa: 65 minutes to 4 hours old (13 infants)

Group IIb: 4½ to 18½ hours old (17 infants)

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All infants were carefully auscultated and had radiographs of the chest in both antero-posterior and lateral projections. None had clinical evidence of heart disease. Examinations were carried out with the infants recumbent, asleep, or resting quietly without prior medication. Sixteen-lead electrocardiograms* were taken by the author with an assistant employing a 4-channel jet-writer. Great care was exercised in selection of electrode positions and in application and removal of electrode paste. The circular chest electrode had a diameter of 1.3 cm. The machine was standardized to produce a deflection of 1 cm. with the introduction of 1 mV into the circuit. Greater accuracy in measurement of intervals was obtained by using a paper speed of 100 mm./sec. A magnifying lens of $5\times$ was used for all determinations, and the smallest unit of measurement of intervals was 0.005 sec. Some difficulty was encountered in measuring the S-T segment and T wave duration. This was facilitated to some extent by comparing simultaneous leads. In præcordial leads, these intervals were measured in two leads with the largest T waves and preferably where the U wave could be more clearly distinguished. The range, means, and standard deviation of the shorter and longer intervals in these leads were then tabulated separately. In standard lead II, the S-T segment was determined directly, as well as by subtracting the sum of the maximum QRS and T wave duration from the longest Q-T interval in this lead for purposes of comparison with other data. The amplitude of the T wave was measured with reference to the T-P segment.

RESULTS

S-T Segment Duration. The groups were combined for analysis as no differences were present. In lead II, the mean and maximum S-T duration was 0.07 and 0.12 sec. on the first day and decreased to 0.03 and 0.07 sec. on the fifth or sixth day of life (Table I). Subtraction of the sum of the QRS and T wave durations from the Q-T interval gave similar values. Initially, 45 infants had an S-T duration of 0.065 sec. or more as compared to 4 at the end of the week. The mean individual decrease over this period was 0.036 sec. (Fig. 1).

In præcordial leads, the shorter and longer values were analysed separately and the means calculated. These values were 0.069 and 0.086 sec. on the first, and 0.022 and 0.031 sec. on the last examination. Readings were generally made in leads V1 to V3 and Ve as described. Differences between paired readings of 0.04 sec. or more were present in 11 per cent but were least common on the last examination. This discrepancy may be due to inclusion of the U wave in some cases, and in others to inscription of an isoelectric segment because of spread of the impulse in a plane parallel to that of the lead (Pipberger and Tanenbaum, 1958). The respective mean individual decreases were 0.047 and 0.057 sec. No infant had an increase in S-T duration with age, while individual decreases of 0.02 sec. or more occurred in 52 infants (78%).

TABLE I

RANGE AND MEAN S-T SEGMENT DURATION (SEC.) IN LEAD II DURING FIRST WEEK OF LIFE (S.D. = STANDARD DEVIATION)

Day	No. of infants	Mean	Range	S.D.
1	65	0.070	0.01-0.12	0.022
2	68	0.061	0.0-0.14	0.028
3	67	0.047	0.0-0.12	0.022
5-6	68	0.034	0.0-0.07	0.020

No clear-cut statistically significant relation to heart rate was found, though on the first day of life infants less than 1 hour old tended to have an inverse correlation, i.e. faster heart rates tended to be associated with shorter intervals. Contrary to expectation, the amplitude of the T wave in lead II

* Standard bipolar, augmented unipolar, and præcordial leads V4R, V1 to V6, Ve (tip of xyphoid process), 2V1, and 2V2 (second right and left intercostal spaces at the sternal border).

was not found to influence the duration of this interval either at the beginning or at the end of the first week. On the other hand, a direct correlation was found between the magnitude of individual changes in duration of the S-T segment and the Q-T interval from the first to the fifth or sixth day of life ($p < 0.05$, correlation coefficient $r = 0.249$), i.e. the greater the decrease with age in length of the S-T segment, the greater the decrease in length of the Q-T interval.

Comparison is limited as the only values available are those based on single examinations of infants 12 hours to 7 days old and 2 weeks to 1 year of age. In accord with the findings of Tudbury and Atkinson (1950), there was no apparent S-T interval in some instances, but they noted no change with age, considered the duration of this interval in different leads to be constant for each subject, and reported only mean values which resemble more closely those of infants examined on the third day of life in this series. On the other hand, Coleman's (1961) values of the shortest S-T segment in lead II significantly exceed those encountered in this study even when the difference in measurement of this interval is taken into account. However, he considered the T wave to commence where the even course of the S-T segment was interrupted by a distinct change or angulation, while in this investigation slight departure from the isoelectric line was considered to represent the onset of this wave. None the less, he also found that the length of this segment decreased with age.

T Wave Duration. Since age on initial examination was not found to influence T wave duration, the groups were combined for analysis. On the first day of life, the mean and maximum T wave duration in lead II was 0.165 and 0.26 sec. By the last examination, the mean had increased to 0.18 sec. without any corresponding

FIG. 1.—Male infant (Group Ia). Tracing recorded (A) at 30 minutes after birth and (B) at 6 days, showing decrease in duration of S-T segment with age. On initial examination, T waves in all precordial leads are positive. Distance between heavy vertical lines = 0.05 sec. Guide leads: II and aVR.

TABLE II

RANGE AND MEAN T WAVE DURATION (SEC.) IN LEAD II DURING FIRST WEEK OF LIFE

Day	No. of infants	Mean	Range	S.D.
1	65	0.165	0.10-0.26	0.031
2	68	0.174	0.10-0.24	0.044
3	67	0.182	0.12-0.26	0.038
5-6	68	0.181	0.11-0.26	0.041

change in the maximum value (Table II). When individual differences were determined, 57 per cent of the infants were found to have had increases of 0.02 sec. or more in this interval with age, while only 15 per cent had decreases of the same magnitude. Similarly, when the mean individual difference was calculated from the first to the last examination, a mean increase of 0.018 sec. was observed. In præcordial leads, a mean increase of 0.015 sec. occurred with age irrespective of whether the shorter or longer value was analysed. As in the case of the S-T segment, measurements were generally made in leads V1 to V3 and Ve. In this case, a difference of 0.04 sec. or more was found between one-fifth of the paired readings.

The influence of heart rate on T wave duration was also determined. Although the relation was not linear, faster heart rates were associated with shorter intervals both on the first and fifth or sixth day of life. No correlation was found, however, between individual differences with age in the length of the S-T segment and T wave duration.

The trend of progressive increase in length of this interval with age accords with the findings of Ziegler (1951) and Coleman (1961) in older infants. The mean values are similar to those of Ziegler, but greatly exceed those of Coleman in infants 2 weeks to 3 months old. This too may be ascribed to the above-mentioned difference in method of measurement.

It appears, therefore, that the previously described decrease in Q-T interval during the first week of life is primarily the result of a decrease in duration of the S-T segment. This decrease is slightly offset by the concomitant increase in T wave duration occurring over the same period; but in only 15 per cent of the cases did this increase exceed by 0.02 sec. or more the decrease in duration of the S-T segment.

T Wave Amplitude and Direction. The influence of age on amplitude and direction of T waves in præcordial leads was analysed. On the first day of life, statistically significant differences in leads V3 to V5 were present between infants in Group Ia and Group IIb, i.e. the former tended to have positive and the latter negative waves in these leads* (Table III). As a result, the majority of younger infants had positive T waves in all præcordial leads while older infants had a greater incidence of flat and negative T waves in leads from the left and diphase waves from the right chest. By the end of the week, almost all T waves were negative in V4R, 2V1, 2V2, V3; either negative or diphase in V1, Ve, V2, V4; and positive in V5 and V6 (Fig. 2). In other words, over the left præcordium, T waves at birth were positive, became negative some hours later, and then were positive again.

The rate of T wave change from that characteristic of the newborn to that of the infant was faster in leads from the left præcordium. That is, T waves in *left* præcordial leads usually became and remained positive on the first or second examination, according to the age at initial examination (49 of 68 cases); while in *right* præcordial leads they became and remained negative generally not until the third or fourth examination (43 of 68 cases). The main exceptions to this pattern of change may be classified as follows.

Right præcordial leads: (a) Cases with negative T waves from birth: 9 infants had negative T waves in V1 on all four examinations. Age did not appear to influence significantly the incidence of this finding, as the youngest infant was 25 minutes old. T waves in other right præcordial leads also tended to be negative, while 7 of them had positive T waves in V6 on the last three examinations.

(b) Cases with positive T waves on all four examinations: 2 infants had positive T waves in V4R, V1, V2, and Ve. Their T waves were inverted in V6 on the second and third examination and then became positive on the last examination. The mother of one of these infants had albuminuria and œdema during pregnancy and has a contracted pelvis. Her child had an S-T duration in lead II which measured 0.02 sec. initially.

(c) Cases with altered sequence: T wave did not remain negative but became positive or isoelectric on the last two examinations. Three infants had this finding in V1 and 2 had a similar change in V2. In these infants, T waves became positive only on the third or fourth examination over the left præcordium.

* V3, V5= $p<0.05$; V4= $p<0.01$; V6= $p<0.06$, i.e. just short of significant.

TABLE III

MINIMUM, MEAN, AND MAXIMUM T WAVE AMPLITUDES ON THE FIRST AND FIFTH OR SIXTH DAY OF LIFE ACCORDING TO AGE ON INITIAL EXAMINATION (MEASURED IN 1/10 mV)

Lead	Day	Group I					Group II				
		No.	Min.	Mean	Max.	S.D.	No.	Min.	Mean.	Max.	S.D.
V4R	1	38	-0.5	0.82	3.0	0.70	28	-2.0	1.14	3.0	1.51
	2	38	-3.0	0	3.0	0.76	29	-3.0	-0.26	2.0	0.81
	3	38	-3.0	-0.96	1.5	0.92	30	-3.5	-1.13	1.0	0.97
	5-6	38	-4.0	-2.18	-1.0	0.87	30	-4.0	-2.15	0.5	0.88
V1	1	38	-3.5	1.74	5.0	1.33	29	-4.0	1.79	5.0	1.68
	2	38	-3.5	0.82	5.0	1.45	30	-3.5	0.28	4.0	0.64
	3	38	-7.5	-0.96	4.0	1.57	30	-4.5	-1.05	1.0	1.36
	5-6	38	-7.0	-3.30	0.5	1.86	30	-6.0	-2.95	1.0	1.77
V2	1	38	-4.0	2.01	7.0	1.50	29	-4.0	2.00	7.5	1.88
	2	38	-8.0	0.55	6.0	1.52	29	-3.5	0.55	6.0	1.27
	3	38	-7.0	-1.25	3.5	1.71	30	-4.0	-0.97	4.5	1.21
	5-6	38	-8.5	-3.00	3.0	2.22	30	-6.0	-2.93	4.5	1.73
V3	1	38	-3.5	(1.56) 1.32	5.0	1.15	29	-6.0	(-0.25) 0.16	5.5	0.18
	2	37	-6.5	-0.49	3.5	1.49	30	-4.5	-1.02	7.0	0.62
	3	38	-8.0	-1.75	2.0	2.01	30	-5.0	-2.03	5.0	1.21
	5-6	38	-8.0	-2.37	2.5	1.87	30	-6.0	-2.67	1.0	2.05
V4	1	37	-3.0	(0.78) 0.64	4.0	1.06	29	-5.0	(-1.28) -0.98	4.0	1.30
	2	38	-9.5	-0.20	3.5	1.64	30	-9.0	-0.85	2.5	2.15
	3	37	-6.5	-0.47	4.0	1.61	29	-6.5	-0.62	4.0	1.69
	5-6	38	-9.0	0.04	5.0	1.42	30	-6.0	0.06	6.0	0.52
V5	1	38	-3.0	(0.41) 0.33	2.0	0.42	30	-1.5	(-0.35) 0.13	3.0	0.95
	2	38	-4.0	0.43	3.0	0.79	30	-3.0	0.15	4.0	0.60
	3	38	-2.0	0.64	2.5	0.66	29	-2.0	0.76	4.5	1.02
	5-6	38	-0.5	1.98	4.0	1.06	30	-1.0	1.83	5.0	1.23
V6	1	38	-2.0	(0.23) 0.21	1.5	0.30	30	-1.5	(-0.23) 0.05	2.5	0.35
	2	38	-2.5	0.62	2.5	0.59	30	-2.5	0.63	4.5	0.85
	3	38	-1.5	0.99	3.0	0.74	29	-2.5	0.88	3.5	0.79
	5-6	38	0.5	1.92	4.0	0.94	30	-2.0	1.90	5.5	1.27
Ve	1	38	-3.0	2.70	5.5	1.34	29	-3.5	2.68	6.5	2.14
	2	38	-3.0	1.72	5.0	1.73	29	-3.0	1.05	5.0	1.43
	3	38	-5.0	-0.36	3.5	1.58	30	-5.5	-0.60	5.0	1.14
	5-6	37	-6.5	-2.13	1.0	1.54	30	-5.0	-1.80	3.5	1.53
2V1	1	38	-2.0	0.96	3.5	0.91	29	-3.0	1.12	4.0	1.08
	2	38	-4.0	-0.40	3.0	1.01	29	-2.5	-0.43	2.0	0.62
	3	38	-4.0	-1.50	1.5	1.15	29	-3.0	-1.19	2.5	0.91
	5-6	38	-5.0	-3.01	-1.5	0.89	30	-4.0	-2.67	-0.5	0.86
2V2	1	38	-3.0	1.07	4.0	1.04	29	-3.0	1.33	7.0	1.56
	2	38	-5.5	-0.38	3.0	1.12	29	-2.5	0.05	4.5	0.90
	3	38	-6.5	-1.66	2.0	1.62	30	-3.5	-1.15	1.5	1.07
	5-6	37	-9.0	-3.29	-1.0	1.43	30	-4.5	-2.60	0	1.04

Group I=infants 1 hour old or less. Group II=infants more than 1 hour old. Figures in parentheses correspond to significant differences in mean T wave amplitude for infants in Group Ia and IIb. S.D.=Standard deviation.

FIG. 2.—Direction of præcordial T waves on the first and fifth day of life according to age on initial examination. On the first day, the majority of infants less than 30 minutes old (Group Ia) tend to have positive waves in all præcordial leads while infants 4½ hours old or more (Group IIB) tend to have negative to diphasic waves in V3 to V6. By the end of the week, most infants have negative T waves in V4R, 2V1, 2V2, V3; diphasic or negative waves in V1, Ve, V2, V4; and positive waves in V5 and V6.

Left præcordial leads. (a) Cases with negative T waves on all four examinations: no infants. (b) Cases with altered sequence: T wave became negative or isoelectric on the last two examinations. This was an isolated finding in V5 for 6 infants, and in V6 in an additional 3 infants.

The notion that positive T waves in right præcordial leads after 24 hours of postnatal life are highly suggestive, if not diagnostic, of pathological right ventricular hypertrophy (Ziegler, 1956), does not seem tenable. On the contrary, the data obtained from this investigation suggest that in

the majority of infants T waves do not become negative until the third day of life, which here corresponds to a minimum age of 42 hours. Even at this age, positive T waves were still present in 10 infants in lead V4R, 13 infants in V1, 17 infants in V2, 25 infants in Ve, and 7 infants each in 2V1 and 2V2. Furthermore, at the end of the week, 3 infants still had positive T waves in V1. This view is supported by the findings of Rosen and Gardberg (1957b), as well as by those of Rothfeld *et al.* (1960).

Positive T waves in *all* præcordial leads were present on the first day of life in 20 of 38 infants in Group I and in 5 of 29 infants in Group II. By the second day, 6 had this finding, only 1 of whom had not had it previously. It persisted in one infant until the third day, but none had it at the end of the week (Fig. 3).

Negative T waves in *all* præcordial leads were found in 4 infants on their third examination. In adults, according to Sodi Pallares and Calder (1956), this is indicative, in practically all cases, of extensive anterior ischæmia. The transitory nature of this finding and the time of its appearance clearly indicate its physiological nature.

In an effort to rule out some of the many factors possibly involved in determining these T wave changes, the health of the mothers during pregnancy, condition of mother and foetus during labour, and drugs administered before delivery were retrospectively analysed. No direct relation was found. In this connexion, 60 of the 68 mothers received no medication whatsoever, and the others were given a single injection of pethidine from 2 to 15 hours before delivery. None had diabetes and one was pre-eclamptic.

The effect of other factors such as posture, food intake, heart rate, and form of the QRS complex was also considered. As all infants were recumbent at the time of examination, and care had been taken in positioning them to minimize changes in electrode position, the effect of posture was probably minimal.

At this hospital, healthy full-term infants are at least 12 hours old before feeding at four-hour intervals is instituted. For this reason, only one infant in Group IIb had received 10 g. glucose two and one-half hours before the first electrocardiogram. As breast-feeding is actively encouraged, all infants had been given about 20 g. glucose at varying intervals before the second examination, with the exception of one infant in Group IIb, who received 30 g. breast milk immediately before. This infant, on initial examination, had a positive T wave in lead V4R which became negative on the second and positive on the third examination. Reciprocal changes in direction of other T waves were not observed. Before the third examination, 27 of the infants were receiving adequate amounts of breast milk, but the remainder were still only on glucose. In a few instances of altered sequence in which T wave amplitude was increasing in a particular direction only to change suddenly on a single examination, food had been ingested immediately before the recording, which would suggest a possible relation. It must, however, be emphasized that the relation of time of feedings to electrocardiographic registration was determined retrospectively. Rosen and Gardberg (1957a), studying healthy young adults, found that the post-prandial changes in T waves were greater after the ingestion of glucose than after the usual mixed meal. There appear to be no data on this in infancy and certainly not in the newborn baby. The effect of crying or hyperventilation on the electrocardiogram in the newborn, common enough phenomena, is also unknown. Although infants were asleep or resting quietly at the time of recording, minor stimuli can produce significant changes in heart rate.

FIG. 3.—Female infant (Group IIb). Tracing recorded at 9½ hours. T waves in V4 to V6 are negative, which is normal for this age.

However, no relation could be found between the direction or the amplitude of T waves and heart rate.

The form of the QRS complex was also correlated to the presence of *negative* T waves in leads V5 and V6. In accord with Goldberger (1946), the majority of infants had dominant S waves consistent with right ventricular epicardial complexes. However, this was not true of one-fourth of the cases in lead V5 and one-third of the cases in V6. For this reason, the appearance of these deflections in the presence of *positive* T waves was also determined. It was then found that the majority of these infants also had dominant S waves, but in this instance one-third of the cases in lead V5 and one-fourth of the cases in V6 had dominant R waves. The data suggest that at this age, therefore, the form of the QRS complex is not related to the direction of the T wave. On the other hand, the amplitude of the T wave in V5 at the end of the week appeared to be influenced by the systolic blood pressure, i.e. the lower the blood pressure, the lower the amplitude. This was not true of previous examinations nor was it found in lead V6 and may therefore be a chance finding.

The means and range of values resemble to some extent those of Ziegler (1951). However, as consecutive changes in amplitude and direction of T waves take place throughout the first week of life, comparison with reported values is probably of limited significance, especially if the infants have not been serially examined.

U Wave. U waves were generally of very low amplitude, never exceeded 1.5 mm. (0.15 mV), and were present in one-third to one-half of the cases in all leads with the exception of V4R. They were commonest in V2 and V4 on the first day, and in V3 to V5 at the end of the week. Minimal changes with age were observed. These were similar to the changes in direction of the T waves, though much less marked. That is, as the incidence of negative or positive T waves increased with age, so did the number of negative or positive U waves tend to increase, although there appeared to be a time lag with changes in U waves occurring later. From the first to the last examination, the number of T waves in the *same* direction in *left* præcordial leads and in the *opposite* direction in *right* præcordial leads appeared to increase.

COMMENT

Interpretation of electrocardiographic findings in the newborn baby is hampered by changes accompanying circulatory and metabolic adaptation to extrauterine life. In this study, differences in the rate of change with age, in the length of the S-T segment and T wave, as well as in the direction and amplitude of the latter were observed. This suggests a difference in causal relation.

Prolongation of the S-T segment is usually ascribed to hypocalcaemia. In normal newborns, the lowest serum calcium levels are recorded during the immediate postnatal fasting period. In general, the longer this period, the lower the level (Bruck and Weintraub, 1955). Still lower values have been observed in infants delivered by caesarean section (Gittleman *et al.*, 1956). In this study, all infants except one had received only glucose before the second and the majority (40/67) were still only on glucose before the third recording. Though no determinations of calcium were obtained and all infants had been delivered by the vaginal route, it seems likely that relatively low serum calcium levels may have been present in view of the long fasting period. However, no specific relation could be found between duration of this interval and diet at the time of recording. In addition, the decrease in length of the S-T segment was gradual and took place over the entire week, which can scarcely be attributed to hypocalcaemia alone.

The change in direction of T waves in mid and left præcordial leads from positive to negative on the first day of life has not been described previously, although T waves in bipolar extremity leads following birth have been noted to be of higher amplitude than subsequently (Stern and Lind, 1960). These changes are difficult to explain. Form of the QRS complex, heart rate, and blood pressure were found not to influence amplitude and direction of T waves at this age. Anoxaemia may be present during the first hour of life but, at least in experimental studies on human foetuses (Enhörning and Westin, 1954), produces low or negative T waves. The lability of T waves has been well documented. Not only are they significantly affected by heart disease but also by a number of

extracardiac factors. Furthermore, it is the interaction of these various factors which probably determine the end-result, thereby rendering efforts at interpretation largely speculative. Inducing changes in direction of T waves by administration of various agents is therefore not conclusive proof of an ætiological role. There is evidence in adults that adrenergic factors lower and cholinergic factors raise T waves (Hartwell *et al.*, 1942). The exact site and mechanism of action is not clear. But is neonatal response to these factors the same? The paucity of available data does not permit any conclusion to be drawn; nevertheless, there is some evidence that neonatal cardiovascular response to various agents, such as adrenaline, noradrenaline, acetylcholine, 10 per cent and 100 per cent oxygen, is not the expected one (Adams, Lind, and Rauramo, 1958; Dupuis *et al.*, 1958). Then, too, as the electrocardiogram is caused by movements of electrolytes across the myocardial cell membrane, alterations in electrolyte metabolism are of primary importance (Lepeschkin, 1959). In a previous investigation, the amplitude of deflections reflecting right ventricular potential decreased significantly after the first hour of life (Walsh, 1963c). This is presumably the result of the change-over from a foetal circulation with right-to-left shunting across the ductus to a neonatal one with declining pulmonary resistance, bidirectional and then left-to-right flow. This rather sudden circulatory adjustment to a hard-working left ventricle as yet somewhat unaccustomed to its task might well result in transient T wave inversion. This T wave change might then be ascribed to relative coronary insufficiency from a disproportionate increase in cardiac oxygen consumption.

SUMMARY

Serial electrocardiograms were taken on 68 healthy full-term infants during their first week of life. The length of the S-T segment decreased and duration of the T wave increased with age. Mid and left præcordial T waves tended to be positive at birth and to become negative some hours later. Various factors possibly responsible for these changes are discussed.

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ADDENDUM

Since submission of this paper, similar changes in direction of præcordial T waves over the left præcordium have been described by Hait and Gasul (1963).

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