

most part secondary to copper deficiency. Yet internal kinetics of an intravenous tracer dose of radioactive copper are remarkably similar in each disease: in both there is prolonged whole-body and hepatic retention of the tracer and decreased gastrointestinal excretion.

Presumably, the genetic abnormality that determines the disordered physiology of copper in these diseases is present from the time of conception. The chronogenetics, however, of each condition is vastly different. Both genes are "lethal", clinically speaking; In Menkes' disease the condition is manifest at or soon after birth and runs its course to death in a few months to a year or so. In Wilson's disease, however, the phenotypical manifestations are frequently delayed for years. The contrast in chronogenetics of these two diseases emphasises the necessity of considering factors other than the demonstrable disorder of copper physiology in each condition.

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## TIME-DEPENDENT ELECTROLYTIC RATE IN TWINS

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The levels of Na<sup>+</sup> and Cl<sup>-</sup> electrolytes in the human sweat having already been shown, by a previous twin study, to undergo genetic conditioning, the age modifications of the electrolytic rate have now been examined in a sample of 4-20-year-old MZ male twins.

A separate analysis has been carried out for the two age groups, 4-10 and 11-20, so as to account for possible effects of puberal processes.

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## TWIN CHRONOGENETICS: EVIDENCE FOR TRENDS IN EARLY MENTAL DEVELOPMENT AND PHYSICAL GROWTH

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When DZ twins were evaluated for the degree of concordance in mental development during the preschool years, they exhibited relatively high within-pair correlations up to 3 years of age, then dropped significantly at subsequent ages. It was notable that as the measures of intelligence stabilized, the degree of concordance for DZ twins gradually regressed towards the value expected from within-family gene segregation plus assortative mating. It appeared that there was a time-linked differential gene action operating for DZ twins which gradually reached full expression by school age.

The evidence for timed gene action was further reinforced by the data for MZ twins, who maintained high concordance at each age, and who displayed coordinated patterns of spurt and lag between ages. Evidently, the course of mental development in the preschool years was heavily dependent upon the genetic blueprint of each twin. The data on physical growth confirmed results, and showed further that disparities in birth size for MZ twins were rapidly equalized as each twin got on his genetic growth curve.

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## TWINS: CONCORDANCE FOR CHANGES IN HAIR COLOR AND EYE COLOR DURING EARLY CHILDHOOD

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Hair color and eye color were assessed routinely from 3 months to 6 years for twins participating in a longitudinal study of