Quantitation of \textit{Trans}-Vitamin K\textsubscript{1} in Small Serum Samples: A Study Emphasizing Vitamin K\textsubscript{1} Status at Delivery and After Birth, Related to Feeding Conditions

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Despite increasing interest in vitamin K\textsubscript{1}, very few analytical techniques have been described for this substance. Moreover, most of the techniques are impractical for use in routine clinical studies and biochemical research.

We recently described a method for coping with small samples from newborns, mother’s milk, and liver homogenates. After highly dependable cleaning measures, vitamin K\textsubscript{1} is quantitated by fluorometry after postcolumn coulometric reduction. Applying our method to cord blood serum, we found vitamin K\textsubscript{1} levels to be far below 1 pmol/liter (450 pg/liter). In liver homogenates obtained from stillborns, vitamin K\textsubscript{1} content was less than 1 pmol/g wet tissue. The volume of blood available from newborns is limited, putting an operational limit of detectability on our assay. In newborn serum, vitamin K\textsubscript{1} was first detected 12 hr after delivery in some neonates. With and without breast-feeding, 60\% of the neonates studied had detectable vitamin K\textsubscript{1} levels (0.1–1.4 nmol/liter) within 24 hr after delivery. During the following days, up to the 28th day, vitamin K\textsubscript{1} levels increased significantly and even became comparable to adult values (0.8–8 nmol/liter). During the same period, vitamin K\textsubscript{1}-dependent clotting factors did not change significantly.

Mothers receiving Konakion (5 mg) shortly before delivery showed vitamin K\textsubscript{1} serum levels up to 800 nmol/liter, whereas the cord blood of their babies revealed far less than 0.1 nmol/liter. Apparently, a high placental barrier exists for vitamin K\textsubscript{1}. Mother’s milk vitamin K\textsubscript{1} levels remain fairly constant during several days after delivery (3.6 ± 2.5 nmol/liter). Formula milk, as used routinely in our hospital, contains 150 to 160 nmol/liter vitamin K\textsubscript{1}.

Many questions remain to be answered, but it is obvious that the serum vitamin K\textsubscript{1} level of the neonate is governed by feeding and not by the vitamin K\textsubscript{1} intake during pregnancy.