

SEROLOGICAL INVESTIGATION OF CYTOMEGALOVIRUS ANTIBODY DISTRIBUTION AMONG PEOPLE OF DIFFERENT AGE

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Cytomegalovirus infection distribution varies in broad limits [11,14-16,19]. Complement binding antibodies in adults aged over 25-35 years vary between 50 and 60 per cent in industrially developed countries and reach up to 100 per cent in the developing countries. A study carried out in Bulgaria revealed antibodies in 43 per cent of newborns, in 39.9 per cent of 1-3 year-old infants and between 55.50 and 65.40 per cent in 19-55 year-old adults [1].

However, no investigation of cytomegalovirus infection distribution in the region of Varna has been performed yet. That is why the purposes of the present work were to establish the distribution and to reveal the dynamics in the appearance and the level of antibodies towards cytomegalovirus (CMV) in dependence on the age of the contingent studied.

MATERIAL AND METHODS

Detection of specific serum antibodies presents a marker of a realized cytomegalovirus infection. A total of 1006 serum samples of individuals aged up to 60 years divided into 12 age groups as well as 80 serum samples from parturient mothers were studied. Sera of newborns were examined parallelly to these of corresponding mothers. According to literature data, reaction of complement binding presents the most appropriate method for seroepidemiological screening because it enables the detection of the greatest number of serologically positive cases due to the common complement-binding antigen [3]. Antibodies proved by the aforementioned reaction can be stored for a long time similarly to neutralizing antibodies which results from the latency and the chronic course of cytomegalovirus infection [22]. We used the method described by Bradstreet and Taylor in Dobrev's modification [6]. Sera with antibody titre equal to over 1:4 were considered positive.

Results obtained were processed by means of the alternative and variation analyses [2,4].

RESULTS AND DISCUSSION

Results from the parallel investigation of serum samples from newborns and their mothers demonstrate certain peculiarities in the antibody transfer. Fig.1 indicates the distribution of newborns and their mothers according to the titre of complement-binding antibodies established in their sera. According to Vigny et al. [21], titres between 1:4 and 1:16 indicate a realized infection, while titres between 1:32 and 1:64 as well as above these levels argue for a primary or reactivated CMV-infection. Of a total of 80 newborns, antibody titre is 1:32 in 13 cases and 1:64 - in 6 ones. It is known from the literature that antibodies determined by the reaction of complement binding belong to the Ig G class and can pass transplacentarily from the mother into the newborn. That is why one need a very careful interpretation of results demonstrating in newborns a suspected congenital cytomegaly. Besides the comparison of titres of antibodies from mothers and their newborns reveals that there exists a complete transfer and even in some cases higher

CMV antibody titres in serum samples from the newborns. In the course of a similar study performed in England and Yugoslavia Terzin and Masic [20] proved that only the half of mother's antibodies pass through the placenta. However, data of other investigators [8,9] are similar to our results. Such a peculiar mechanism of "concentration" of mother's antibodies is noted by other authors, too [3,8]. However, there are no convicting records enabling the explanation of this phenomenon yet.

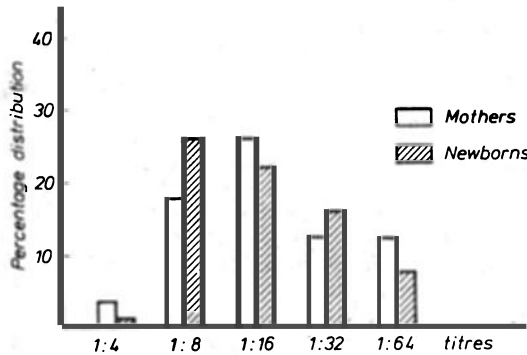


Fig. 1 Distribution of complement-binding antibodies in dependence on their titre in newborns and their mothers

As shown on fig. 2 and table 1, data about the age distribution of individuals examined reveal a total of 591 positive cases (58.75 per cent). This percentage varies in dependence on the age of the single group. The number of infants possessing antibodies decreases already during the first 3 months of life. The percentage falls from 73.75 per cent down to 36 per cent in 3-month-old babies. After this age there is a gradual seropositivity increase up to 47.71 per cent in 4-10 year-old children but more sharply - up to 62.82 per cent and 74.44. per cent in 15-18 year and 19-40 year old individuals, respectively. CMV antibody persistence in 36 per cent of 3 month-old babies when one supposes that most transplacentarily passed antibodies are almost exhausted as well as seropositivity percentage increase already in 6 month-old infants up to 42.16 per cent argues, in our opinion, for an early CMV infection. It is assumed that the main factor for infants' invasion already in the first year of life is presented by breastfeeding as virus is excreted by mother's milk [10,12,17,18]. The more sharp seropositivity elevation in 15-18 and 19-40 year-old persons can be explained by the beginning and maintenance of sexual contacts. According to some authors [5,7,13], sexual contact is the most common way of infection transmission in the age between 20 and 40 years.

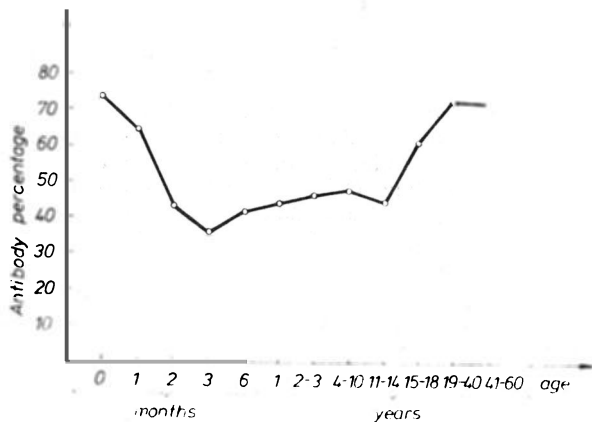


Fig. 2 Presence of complement-binding antibodies towards CMV in individuals of different age

Table 1

Percentage of serologically positive individuals and mean geometric titres of antibodies against CMV in different age groups after RCB

Age	Antibody titres against CMV								Total	% of positive	mean error	MGT	mean error
	negative	1:4	1:8	1:16	1:32	1:64							
newborn	21	1	21	18	13	6			80	73.75	+/-4.94	7.6	+/-0.22
1 month	18	18	12	3	-	-			51	64.70	+/-6.69	3.1	+/-0.19
2 month	30	13	10	-	-	-			53	43.10	+/-6.80	2.1	+/-0.17
3 month	32	11	6	1	-	-			50	36.00	+/-6.79	1.76	+/-0.17
6 month	31	13	11	2	-	-			57	42.16	+/-6.54	2.2	+/-0.17
1 year	30	13	7	3	1	-			54	44.44	+/-6.81	2.3	+/-0.20
2-3 years	59	29	19	3	1	-			111	46.85	+/-4.74	2.3	+/-0.13
4-10 years	57	28	19	4	1	-			109	47.71	+/-4.75	2.3	+/-0.13
11-14 years	29	10	11	3	-	-			53	45.28	+/-6.84	2.3	+/-0.20
15-18 years	21	15	13	5	1	-			55	61.82	+/-6.55	3.2	+/-0.20
19-40 years	57	61	64	29	11	1			223	74.44	+/-2.92	4.6	+/-0.10
41-60 years	30	24	37	14	5	-			116	72.73	+/-4.28	4.5	+/-0.15
Total	415	236	230	85	33	7			1006	58.75	+/-1.55	3.2	+/-0.05

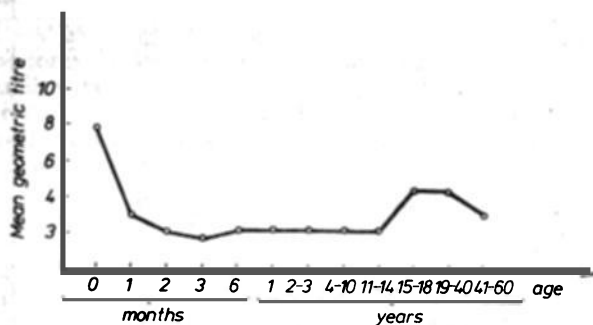


Fig. 3 Mean geometric titres of complement-binding antibodies towards CMV in various age groups

Mean geometric titres (MGT) demonstrate the same dependence like seropositivity does (fig.3). There is a relatively high MGT in newborns (of 7.9) which falls down to 1.76 in 3 month-old babies. Since that age till the age of 15 years there is a flat line and MGT varies between 2.2 and 2.3 thus indicating a latently persisting infection. MGT increases up to 3.2 and 4.6 in 15-18 and 19-40 year-old people and varies insignificantly over this age. MGT elevation after 15 years of age is probably determined by the more perfect immunological response in adults than that in children.

We can conclude that our data reveal a broad CMV infection dissemination in our contingent studied and that seropositivity rate increases with advancing age.

CONCLUSIONS

1. We establish the complete and even in some cases by higher titres transfer of mother's antibodies against CMV-infection.
2. CMV-infection begins at the early infancy. It is realized mainly by two ways - by breastfeeding and sexual contacts.
3. CMV-infection incidence rate depends on age resulting in seropositivity rate increase with advancing age.
4. CMV-infection distribution among the population of the region of Varna is at the average 58,75 per cent.

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СЕРОЛОГИЧЕСКОЕ ИССЛЕДОВАНИЕ РАСПРОСТРАНЕНИЯ ЦИТОМЕГАЛОВИРУСНЫХ АНТИТЕЛ СРЕДИ ЛЮДЕЙ РАЗНОГО ВОЗРАСТА

С. Антонова, Е. Магунска, Л. Петкова

РЕЗЮМЕ

Авторами установлено широкое распространение цитомегаловирусной инфекции среди населения Варненского округа - в среднем это распространение показывает 58.75 %. Маркером цитомегаловирусной инфекции послужило выявление специфических антител против цитомегаловирусов. Установлено, что сероположительность возрастает с возрастом. У трехмесячных грудных детей она составляет 36 %, а у 19-40-летних лиц она возрастает до 74.44 %. Инфицирование цитомегаловирусами начинается еще с первого года жизни детей. Степень инвазивности цитомегаловирусов резко повышается с пятнадцатилетнего возраста.