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AUDITORY OBJECTIVE MEASURES

Cortical Auditory Evoked Potential in Asymptomatic Congenital Cytomegalovirus Infection

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Abstract

- Congenital cytomegalovirus infection (cCMV) is the most common congenital infection worldwide, and Brazil stands out as a country with a high seroprevalence of the virus[1].
- The fetal brain is the main target of congenital CMV infection, and infection by neurotropic viruses tends to become a persistent infection in neurons[2].
- Asymptomatic newborns with cCMV are at risk of developing long-term neurodevelopmental disorders[3].
- Cortical auditory evoked potentials (CAEP) provide information about neural processing of de acoustic signal occurred at the level of the auditory cortex[4,5]

Objectives

This study characterized cortical auditory neural function in asymptomatic cCMV children compared to healthy controls(CMV negative children) matched on age and socioeconomic status.

Methods and Materials

Asymptomatic cCMV detected by CMV-DNA and control subjects (CMV negative children) with normal hearing (≤ 15dBNA).

Exclusion criteria: Genetic syndromes, Central nervous system infection, congenital malformation, genetic syndrome, microcephaly and family history of SNHL or language disorders.

Peripheral auditory evaluation: Otoscopy, tympanometry ,behavioral audiometry and central neural function.

	CAEP
Stimuli	/ ba /, / da / (114 -206 ms) - digital recordings native speaker Brazilian Portuguese
Intensity	70 dB nHL
Rate	1.1/s
Filter	0.1 - 30Hz
Sweeps	70 per syllable
transducer	ER3 Insert earphones- binaural stimulation
Eletrodo Montage	2 channel (Cz-A1, Cz-A2, Fpz ground)

Results

Participants: 23 asymptomatic cCMV 7.81 ± 1,14 age in years - 14 healthy controls (CMV negative children) 7.95 ± 0,97 age in years

TABLE 1. Presence of cortical auditory evoked potentials P1 N1 P2 N2 in response to speech stimuli /ba/ and /da/ in asymptomatic cCMV children and healthy controls

	Healthy controls children n (=14) n (%)			Asymptomatic cCMV children (n=23) n (%)		
	/ba/	/da/	*P**	/ba/	/da/	*P**
P1	14 (100)	10 (71,4)	-	23 (100)	22 (95,7)	-
N1	9 (64,3)	9 (64,3)	0,80	16 (69,6)	10 (43,5)	**0,005**
P2	6 (42,9)	4 (28,6)	0,12	11(47,8)	6 (26,1)	**0,043**
N2	14 (100)	9 (64,3)	-	23 (100)	23 (100)	-

* *Chi-square test* . The bold font identifies statistically significant p-values.

Results

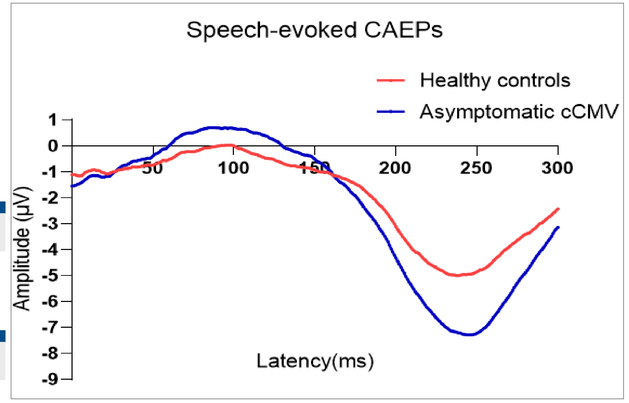

Figure 1a. *N2 amplitude is* larger (more negative) *in asymptomatic cCMV compared to controls* [F(1,15)=6,45;p=0,023].

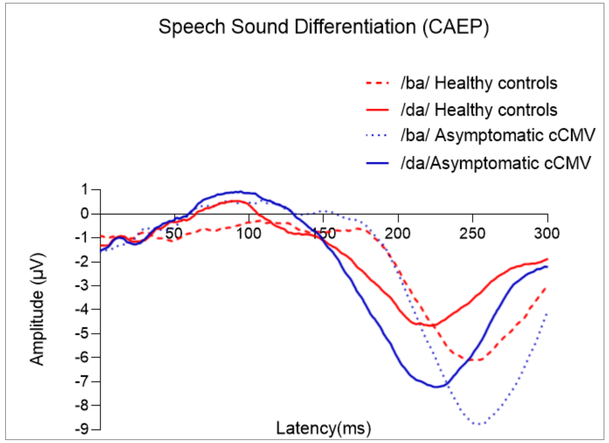

Figure 1b. *In the control group, significant effects of the stimulus were identified for the P2 [F(1,5) = 8.27; p = 0.035] and N2 [F(1,5) = 6.64; p = 0.045] latencies, both of which were slower for the syllable /ba/ compared to /da/. In the cCMV group, significant effects of the stimulus were noted for the N2 latency [F(1,10) = 6.53; p = 0.029], which was also slower for the syllable /ba/ compared to /da/."*

The reduction in N2 amplitude may be linked to the development of sensory experience over the years, improving the efficiency of neural transmission to such an extent that the involvement of additional higher-level processes is no longer necessary. Decreases in P1, N1 and N2 latency may be explained by simultaneous increases in myelination and improvements in synapse efficacy[6]

Conclusion

Current findings suggest differences in subcortical processing and reduced efficiency of cortical auditory processing in cCMV children. Cortical auditory neural responses are helpful in assessing clinical populations at risk for neurodevelopmental disabilities.

References

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