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## **AN AUTOMATIC GENERAL MOVEMENT DISCRIMINATION SYSTEM BASED ON REAL – TIME VIDEO ANALYSIS**

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Scientific background: General movements (GMs) strongly reflect the nervous system integrity of fetuses and newborns, and Prechtl's method for qualitative assessment of GMs has been proven effective in the evaluation of infant neurology.

Aim: The purpose of this study was to enable automatic discrimination of GMs inspired by Prechtl's method using video images taken in real time with a single video camera. To this end, we developed a novel tool that can be used to automatically analyze and discriminate GMs in video images without the need to place markers on infants.

Methods and subjects: To verify the validity of the proposed method, we focused on four types of GMs: writhing movements, fidgety movements, cramped-synchronized movements and poor-repertoire movements. First, we implemented analysis of these four types in video images extracted from the DVD "Spontaneous motor activity as a diagnostic tool - Japanese edition". The movements of a full-term Japanese infant in a non-crying, non-sleeping state were also monitored and analyzed from birth to 15 weeks of age. For comparison, the infant's movements were assessed by a physical therapist using Prechtl's method at the same time.

Results and discussion: The four GM types extracted from the DVD were discriminated with high accuracy (average discrimination rate: 100%). For the full-term infant's movements, the evaluation results from the proposed system were similar to those of the therapist, indicating writhing or fidgety movements. These results led us to conclude that the system may support automatic discrimination of GMs in young infants using measured video images only.

## **MRI AND MOTOR IMPAIRMENT IN CEREBRAL PALSY: WHICH PREDICTIVE FACTORS?**

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Scientific background: The imaging study play a central role in diagnosis and evaluation of brain injury, but his utility to predict the outcomes and severity of cerebral palsy has not been fully clarify. Moreover, the best predictor is not yet defined: white matter, posterior limb of the internal capsule, cortex, basal ganglia-thalamic lesions.

Aim: In this retrospective study we evaluated the correlation between brain MRI features and clinical severity in children with cerebral palsy, to assess the white matter and cortex lesions as predictive factors for the motor impairment.

Subjects and methods: Our cohort consists of 69 patients with Cerebral Palsy classified into spastic diplegia (N=22) and spastic quadriplegia (N=47), who were referred to our Operative Unit between January 2006 and January 2011. Motor severity was classified by the Gross Motor Function Classification System (GMFCS).

According to the Grading of MRI findings (Modified Mc. Ardle, G. Cioni et al., Brain & Development, 1997), the following MRI parameters were scored: size of lateral ventricles, extension of white matter abnormal signal intensity and of white matter reduction, thinning of corpus callosum, presence and size of cystic areas, dimension of subarachnoid spaces and presence of cortical abnormalities.

Result and discussion: The severity of motor impairment resulted strongly associated with the size of lateral ventricles (P= < 0,001), white matter abnormal signal intensity (P= 0,0015), extension of white matter reduction (P= 0,001), thinning of corpus callosum (P= < 0,001), enlargement of subarachnoid spaces (P= < 0,001). No significant associations were found with the cortical abnormalities and the cysts.