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## TIME OF INHIBITORY PAUSE IN CEREBELLAR PURKINJE CELL ACTIVITY OF MATURE AND IMMATURE BORN ANIMALS.

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The inhibitory pause after climbing fiber synaptic activation of cerebellar Purkinje cells (PC) is often used as an additional criterion for electrophysiological identification of cerebellar PC. Therefore it is reasonable to know what relationship exists between age and full maturation of cerebellar PC in mature and immature born animals. With this aim the experiments on 4 age-groups of mature (guinea pigs) and immature (kittens) born animals was performed. The four age groups were included: newborn, two weeks, three weeks, and two months old, in both mature and immature born animals. It was shown that in newborn guinea pigs the mean simple spike (SS) discharge frequency of PC was 11.5 ± 1.1 imp/s and the mean duration of inhibitory pause was 381 ± 54.5 imp/s. In newborn kittens the mean SS discharge frequency was 1.36 ± 0.2 imp/s and the inhibitory pause was more than 1000 ms. By two months the mean discharge frequency of Purkinje cells in guinea pigs increased to 23.2 ± 2.2 imp/s and the inhibitory pause decreased to 245.2 ± 38.7 ms , while the same figures in the kittens were 8.3 ± 0.6 imp/s and 261.3 ± 31.5 ms respectively. The same tendency towards increasing of the PC dischage frequency in guinea pigs lasts around 3 weeks, while in kittens it takes up over two months of postnatal life. These data suggest that the increase of Purkinje cells discharge frequency both in mature and immature animals is accompanied by a proportional decrease in the duration of the inhibitory pause in cerebellar Purkinje cell activity.

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## MORPHOMETRIC STUDY OF THE HORIZONTAL AND VERTICAL DIAMETERS OF THE RATS CEREBELLAR PURKINJE CELLS IN ONTOGENY.

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The cerebellar Purkinje cell (PC) is anatomically the only output neuron in the cerebellar cortex. Its morphology and synaptology undergo especially fast changes during ontogenesis of the lowest mammals-rodents. In this sense the rats cerebellum is a suitable tool for studying methamorphosis of cortical strutures in earliest stages of ontogenes.The aim of this morphometric study was to determine the horyzontal and vertical diameters of the Wistar rats cerebellar PC during the first three weeks of postnatal life. Four groups of animals were used in this study: newborn, one week, three weeks and adult rats. After deep anaesthesia the animals were sucrificed, the cerebellum was removed,fixed in 4% paraphormaldehyde, after treatment by different % alkaline solutions was embedded in paraffin and then serially sectioned in parasaggital plane in 30 μm sections.The sections were stained with cresyl-violet by the Nissl method. It was shown that both horizontal and vertical diameters of cerebellar PC gradually increased on course of ontogenesis from 9.5μm and 14.1 μm on 0-1 day of postnatal life up to 18.6 μm and 21.0 μm in adults respectively. The same increasing of size in both horizontal and vertical diameter was observed in PC nucleus, namely from 5.8 μm and 8.8 μm in days 0-1 up to 9.2 μm and 11.3 μm in adults. It is necessary to point out that the changes in size were more pronounced in the first week of postnatal life and concerned more with horizontal than vertical size of Purkinje cells and its nuclei.

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## STATO-KINETIC REFLEXES AND ACTIVITY OF CEREBELLAR PURKINJE CELLS IN MATURE AND IMMATURE BORN ANIMALS.

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In experiments on mature (guinea pigs) and immature (kitten,rats) born animals the stato-kinetic reflexes (antigravity reflex, stance position, lift and turnover reactions) and the activity of cerebellar Purkinje cells (PC) of the same animals were investigated. Different age animals from newborn up to 2 month of postnatal life were used in experiments. After determination of motor status the animals were anaesthetized and the cerebellum was exposed. It was shown that full maturation of stato-kinetic reflexes (SKR) in guinea pigs takes around 2 weeks of postnatal life and goes on in the next sequence: stance reflex (1st day of life) , lift reaction, stable gait and running (9-12th days of life). During this period maturation of cerebellar PC occurs gradually, but full maturation of PC activity in guinea pigs lags bthind approximately one week from maturation of the stato-kinetic reflexes. In rats the full maturation of SKR took place around 6-7 weeks of postnatal life and goes on in the next sequence: crawling, stance reflex (13-14th day of life), lift reaction, running (18-22th days of life) and soon after "kangaroo" posture. In the kitten full maturation of SKR took place approximately 8-9 weeks of postnatal life and the running reflex becomes mature on 30-32th days of life. The maturation of SKR both in rats and kittens progressed simultaneosly with maturation of cerebellar Purkinje cells.These findings suggest that in contrast to immature born animals, in mature ones the maturation of SKR for one week outstrip the full maturation of cerebellar Purkinje cells activity.

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## THE CEREBELLAR PURKINJE CELLS ACTIVITY IN YOUNG AND ADULT RATS IN CONDITION OF REDUCED BLOOD CALCIUM LEVEL.

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In experiments on young (1-1.5 month) and adult (6-8 month) Wistar rats the activity of identified cerebellar Purkinje cells (PC) was recorded. The level of calcium in blood plasma by atomic-absorption spectrophotometry method was determined. It was shown that in young animals on the 3-5 days after parathyreoidectomy the discharge frequency PC by simple spikes (SS) significantly decreased from 28.4±1.9 imp/s to 15.9±1.8 imp/s. In these animals the duration of inhibitory pause was increased from 94.0±7.3 ms up to 188.8±11.0 ms. The level of calcium in this case was diminished by 38%. In distinction from young rats in adult ones small increasing of SS activity of PC, namely from 29.3±2.6 imp/s to 35.7±2.4 imp/s was observed. The duration of inhibitory pause in these animals reduced from 126.0 ± 19.0 ms up to 79.3 ± 6.4 ms. The level of calcium in these animals decreased by 18%. Half of recorded PC in young animals had periods of absence of SS during 10-40s with increased number of complex spikes under condition of reduced calcium level. The part of the same PC in adult rats was only 6%. The obtained data suggest that calcium level reduction after parathyroidectomy was accompanied by changes in cerebellar PC activity that more marked in young rats than in adult ones and expressed predominantly by mossy fibers driven activity of cerebellar Purkinje cells.