

in 3 cases the absence of the posterior cerebral arteries, previous cerebral artery were registered. These variations are not considered as pathological if there is a congenital issue, and the perfusion is assured. This cannot be said about the postnatal manifestation, as it may cause the dysfunction of the cerebral vascularisation cycle.

Conclusions: As a final overview, referring to the basic form of the arterial circle of Willis we may notice that it opens symmetrically where the communicating and cerebral arteries derive from previous internal carotid artery and posterior cerebral artery is the termination branches of the basilar artery. Willis arterial polygon can be opened unilateral in case of the absence of posterior communicating artery, as well as in the case when the posterior cerebral artery originates from the internal carotid artery. In rare cases arterial circle of Willis may be opened in the anterior section in the case of the absence of the anterior cerebral artery. As well different versions are often met to individual constituents that are having the arterial circle of Willis in the form of aplasia, hypoplasia, hyperplasia and other forms of branching of the arterial circle components, including the atypical formation.

Keywords: Polygon Willis, as the basic primitive form, dysplasia.

PERFECTING PREVENTION OF OCCUPATIONAL PATHOLOGIES IN MEDICAL SONOGRAPHERS

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Introduction: Ultrasound has a negative effect on the health of medical staff exposed to it in their work. This effect is manifested primarily by symptoms of vegetative polyneuropathy of the upper extremities, which lead to sensory, vascular and trophic changes.

The objectives: of this paper is to determine the prevalent complaints of worsened health in medical sonographers and to develop new, more advanced methods of prevention.

The subjects of the study are sonographers working at medical facilities of the Grodno district of Belarus.

Materials and Methods: We used surveys to collect data describing the health of medical sonographers and the measures they take to prevent the harmful effects of ultrasound on their bodies. We developed and assessed the efficacy of our method by then used already for one year to prevent polyneuropathy of the upper extremities. The method makes use of a spraying brush mounted on a cold and hot water faucet. The collected data were treated with statistics software package. Statistics 6.1.

Results: Medical sonographers with ten or more years of work experience in the field had complaints mostly of pathological changes in the hands: excessive sweating, intermittent pain, cold sensation in the hands, as well as irritability, emotional liability, unsteady blood pressure, head aches and lumber pain. The study revealed inconsistent use of workwear: only 18% of the respondents reported use of protective gloves all the times, while 21% of the respondents use them occasionally and the rest only when their work is checked by superiors. Only 58% of the respondents regularly take planned breaks, while 24% take them sometimes. Only 28% of the respondents do a regular massage of their hands, while 18% do this occasionally and 54% do not do this at all. 14% of sonographers with five or more years of work experience resorted to rehab exercises only after having felt lumber and thoracic back pain symptoms. Only 21% of the respondents take their meals at regular times.

Hydro massage therapy of hands and forearms helped decrease the complaints of pain in the forearm and shoulder region, decreased sweating and cold sensation in 75% of sonographers with 10 or more years of experience and in 92% with experience between 5 and 10 years.

Conclusions: An efficient method to prevent polyneuropathy of the upper extremities in medical sonographers is warm water hydro massage therapy of the hands and forearms for 2 minutes every hour of work. A special spray brush mounted on the water faucet can be used for such therapy.

Keywords: sonographers, polyneuropathy.

STEM CELL THERAPY IN EXPERIMENTAL TYPE I DIABETES IN RATS

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Introduction: Diabetes mellitus is a multisystem disease with biochemical and structural consequences. It is a chronic disease which results from the progressive inability of the pancreas to secrete insulin because of autoimmune destruction of the beta cells.

Type 1 diabetes causes an estimated 5%–10% of all diabetes cases or 11–22 million worldwide. Type 1 diabetes usually starts in children aged 4 years or older, with the peak incidence at 11–13 years. The stem cell therapy is a new direction in the treatment of type 1 diabetes mellitus.

Materials and Methods: The experiment was done on 100 rats which weighed 180–220g and were 9–12 months old.

The diabetes was induced by intraperitoneal injection of 1 ml of 5% alloxan solution, that causes insulin-dependent diabetes in animals, called alloxanic diabetes, similar to type I diabetes in humans. After 7 days of hyperglycemia, alloxan induced diabetes was considered stable.

The pancreatic cells were extracted from the pancreas of donor rats. The pancreases were first cut in small fragments of 1mm³ then washed 2–3 times with HBSS and then digested with 0,5 g/l collagenase (Sigma Type V 663 U/mg). The pancreatic fragments were incubated for 1 hour in enzyme solution, and then the enzyme was inactivated with Hanks solution. The obtained mass was centrifuged at 1000 rpm and the cells from the upper portion of the supernatant were extracted and then cultivated. The digestion of the pancreatic substance and the extraction of the upper portion of the supernatant were done 3 times. The cells were cultivated in DMEM/F12 (8mM glucose) medium with 1g/l ITS supplement (5mg/l insulin, 5mg/l transferin, 5mg/l selenium, Sigma), 100 UN/ml penicillin, 100µg/ml streptomycin, 2g/l BSA, 10 mM nicotinamide and with keratinocid growth factor (KGF). The cells were cultivated 3, 5, 7, 9, 13 days.

The umbilical stem cells were obtained from the umbilical cord blood of rat embryos.

Results: The animals were treated with pancreatic cells in suspension injected intraperitoneally 1 ml 3 times with an interval of three days between injections and with umbilical stem cells in suspension $9,8 \times 10^6$ cells/ml - 1 ml intraperitoneally 3 times with 3 days between injections.

The results show that rats treated with umbilical stem cells and pancreatic cells significantly lowered their blood glucose levels and increased their lifespan, as compared with untreated mice.

The mice that received pancreatic cells show a blood glucose level slightly lower than in mice treated with umbilical stem cells.

Key words: stem cells, pancreatic beta cells, rats, type I diabetes, hyperglycemia, alloxan.