Research Clinical Institute for Pediatrics
named after Yuri Veltischev

Pirogov Russian Medical University
Ministry of Health of Russia

2016
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General Information

The Research Clinical Institute of Pediatrics named after Academician Yuri Veltischev of Pirogov Russian National Research Medical University of the Russian Ministry of Health (hereinafter referred to as Pedklin) is a leading Russian Federal Pediatric Center.

Pedklin was established in 1927 by Resolution of the Council of People’s Commissars of Russia as a national medical research and methodology center for solving urgent health problems in the field of child and adolescent health. Pedklin has been pursuing this goal up until now, this, being a major pediatric treatment and research center of the Ministry of Health of the Russian Federation.

Pedklin is featured by the unique expert community dealing with the most complicated clinical problems. Pedklin gathered a team of highly qualified specialists. It includes 34 research faculty members holding a Ph.D. degree in various fields of medicine, 11 distinguished doctors of the Russian Federation, 2 honored researchers of the Russian Federation, 42 candidates of medical sciences, and doctors and candidates of physics and mathematics, technical and biology sciences. The team also contains laureates of the State Prize of the Russian Federation, winners of the Moscow City Hall science awards as well as winners of other Russian and international professional awards.

Pedklin clinical schools such as neurologists, geneticists, cardiologists, nephrologists, pulmonologists, allergists, neonatologists, are widely known in our country and abroad. The unique center for the diagnostics and treatment of cardiac arrhythmias, convulsions, lung diseases, allergic diseases, neuromuscular diseases, radiation ecopathology serves to deliver effective treatment for children of all regions in Russia.

Treatment and surgery for children of Russia directed to Pedklin by local doctors is free of charge and is funded from the federal budget.

Our efforts are aimed at developing scientific bases of children’s healthcare standards and clinical protocols for specialized and high-tech treatment. The Institute is equipped with modern equipment that allows diagnosing and treating children with cutting-edge medical technology. In parallel with the diagnostics and treatment process provided by expert scientific analysis and systematization of clinical experience, clinical guidelines are developed, new diagnostic and treatment technologies are created. Representatives of the Institute are key experts of the Russian Ministry of Health on various problems in pediatrics, i.e. medical genetics, cardiology, nephrology, allergology, otolaryngology, neurology, pediatric surgery and rehabilitation.

Various research and clinical teams of the Institute are well known worldwide, such as the neurology group, genetics group, cardiology group, nephrology group, pulmonology group, allergy group, and others. The neonatology and otolaryngology groups are actively collaborating with hospitals and research institutions in different countries of Europe, America, and CIS. The unique center for the diagnostics and treatment of cardiac arrhythmias, convulsions, lung diseases, allergic diseases, neuromuscular diseases, radiation-associated diseases in childhood has developed effective treatment strategies.
The surgical group of the Institute performs cardiac, neurosurgical, urological and otolaryngological surgery for children with different comorbidities, many patients require a multi-specialist approach, where several surgeons work simultaneously, using the latest technologies in pediatric surgery. International recognition of cardiac surgeons of the Institute is due to the world largest experience in surgical treatment of all known types of cardiac arrhythmias in children, such as implantation of defibrillators and pacemakers.

There are several laboratories at the Institute, conducting fundamental and clinical research, which help evaluate diseases and complex cases, especially in children with congenital and genetic disorders. Our laboratory group includes the Laboratory of Molecular Cytogenetics and Laboratory of General Pathology (clinical pathomorphology, biochemistry, immunology and membranology).

Our mission/goal

Our goal is to provide specialized high-tech medical care for children with chronic diseases, based on the latest data of scientific and clinical potential of the professional community of highly experienced experts in pediatric healthcare.

Research Departments

Division of Allergy and Clinical Immunology

History

The Department was founded in 1975 on the basis of Children’s Clinical Hospital № 9 named after Felix Dzerzhinsky (later renamed to Speransky Hospital). Since its foundation and until 1989, the Department was headed by Professor Moses B. Kuberger. A large portion of the department’s work was dedicated to clinical diagnostic tests in children with autonomic dysfunction and gastroenterology and allergic disorders.

A great contribution to the development and research results of the Department have been made by researchers Soboleva, Lyalikova, Izachik and Smolkin.

From 1989 to 1993 the Department was headed by Professor Georgy M. Chistyakov. The major focus of research was diagnostics and treatment of food allergies, atopic dermatitis of all forms, including diffuse frequent secondary infections of skin, allergic rhinitis and allergic rhinoconjunctivitis, and allergic multiorgan failure.

From 1993 to 2003 the Department was headed by Professor Andrey A. Cheburkin. In 1995, given the high relevance of the study of allergic diseases and changes in priority research areas of the clinical and diagnostic department was renamed into the Department of Allergology and Clinical Immunology. In
2002, the Institute opened a Federal Center for Pediatric Dermatology and Allergology based on the Department. During this period, researchers continued work on the diagnostics and treatment of multi-organ allergic diseases.

From August 2003 to the present time, the Department is headed by Professor Alexander N. Pampura. The priority areas of research is the study of risk factors for food allergy in children, as well as optimization of prevention and treatment of severe allergic diseases, including those related to food allergy. Researchers are searching for new methods of anti-inflammatory therapy of atopic dermatitis, prevention of allergic multiple organ injuries, and anaphylaxis. They are also developing new approached to early detection, forecasting and preventive therapy of atopic diseases in children on the basis of determining the value of mediator-cytokine relationships in the development of allergic inflammation.

Since inception, the staff of the Department defended 33 dissertations (6 doctoral and 27 candidate theses), published more than 900 research papers, including 8 monographs, chapters in medical textbooks and teaching manuals.

Major Developments

The major research work of the Department is done on "New methods for early diagnostics and preventive treatment of atopic diseases" that will improve the efficiency of treatment of children with a variety of allergic diseases, and prevent the development of "allergic march".

The priority goal of the Department is to improve diagnostics methodologies and optimize diet therapy in patients with food allergy, especially in young children. A special attention is given to the criteria for predicting food allergies, which suggest the duration of elimination diet and avoid its unjustified extension.

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Department of Clinical Genetics

History

In March 1970, the then Director of the Institute Academician Yuri Veltischev founded a department of clinical genetics with a specialized clinic for 20 beds. The department changed its name several times, since 2010, it was titled the Department of Psychoneurology and Mental Disorders.

The Department was first headed by Professor Barashnev, who held the post from 1970 to 1987. Later on, Professor Kazantseva took over leading the Department from 1987 (Acting Head from 1987 to 1989) to 2001. From 2001 to 2015, it was led by Professor Novikov (Acting Head from October 2001 to January 2002). Currently, the Acting Head of the Department is Professor Nikolaeva.

The Department started publishing research in clinical genetics in 1975. The first collection, released in 1975, entitled "Clinical Genetics", was dedicated to the diagnostics and treatment of hereditary metabolic diseases. It also provided information about the health of children living in the northern isolates. It also covered issues of medical and genetic assistance to children. In 1980, a team of researchers prepared a collection of research papers for publication titled "Congenital and hereditary cerebral pathology in children," in which the main emphasis was placed on the diagnostics and treatment of problems of cerebral disorders, particularly neurological changes in hereditary metabolic diseases, neurological care for children with diseases of the nervous system. Both collections received distinguished awards from the Russian Ministry of Healthcare.

During this period, the Department was rapidly developing clinical genetics issues. A special attention was paid to the creation of modern diagnostics testing systems, and development of objective criteria for the differential diagnostics of phenotypically similar, but genetically heterogeneous diseases.

The Department also focused on the most rational provision of specialized medical care for children with hereditary diseases.

The research results of the Department during this period were often demonstrated at the Exhibition of Economic Achievements and marked with gold, silver and bronze medals.

Major Developments

The research focus of the department is metabolic and cytogenetic mechanisms of the development of mental and physical disorders of children.

The key objectives of the Department are:

• Developing a system of early diagnostics of hereditary metabolic diseases

• Searching criteria for the differential diagnostics of hereditary diseases of childhood and verification of hereditary diseases of undifferentiated conditions in children
• Studying pathogenic mechanisms of hereditary disorders of mental and physical development of children, leading to disability
• Developing and launching new methods of complex treatment of hereditary childhood diseases
• Developing methods for the prevention of hereditary and congenital childhood diseases.

The research activity of the Department is based on the constant application of the latest achievements of modern genetics and pediatrics at the Institute.

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Voinova, Victoria Yurievna
Degree: MD
Position: Senior Researcher
Research topics: X-linked form of mental development disorders in children, hereditary syndromes, accompanied by mental retardation and autism

Yablonskya, Maria Igorevna
Degree: Candidate of Medical Sciences
Position: Researcher
Research topics: hereditary metabolic disorders of purine and pyrimidine
Department of Gastroenterology

History

The study of gastrointestinal pathology problems at the Institute is always associated with the name of Professor Kubberger, who founded and led for 15 years a clinical and diagnostic department where the research in the field of pediatric gastroenterology began in 1982. Much attention was paid to the role of atopy in gastrointestinal pathology (Prof. Cheburkin), autonomic nervous and immune systems (Prof. Khavkin) and pyloric Helicobacter (Prof. Korsunsky). Unique research was focused on the study of celiac disease in children (Prof. Izachik). Researchers published monographs on celiac disease (1991) and functional diseases of the digestive system (1992).

Since 2000, the Institute formed a day hospital providing services of gastroenterological endoscopy and functional diagnostics under the guidance of Professor Havkin. Research works included immunopathological processes in diseases of the upper gastrointestinal tract (Volynets), pathology of anorectal area, the problem of chronic constipation (Babayan), functional digestive disorders, acid related disorders, disorders of the intestine microecology (Zhikhareva, Rachkova, Blut). Currently, researchers are focusing on enteral and parenteral nutrition and balanced diet for children with rare hereditary disorders (acidemia, organic aciduria, etc.) (Komarova).

The Department gives lectures for practitioners, arranges seminars and conferences devoted to children’s gastroenterology. The Department also co-published monographs "Pharmacotherapy in pediatric gastroenterology", and "Microecology of the gastrointestinal tract."

Medical care is provided for children of up to 18 years with various diseases of the gastrointestinal tract, liver and biliary tract. The Department provides treatment for 15 to 20 children from Moscow and the Moscow region, for children with gastroenterological pathology from other regions of Russia. The Department does endoscopic research with the use of H pylori tests and studies lactase activity in the biopsy of the small intestine mucosa, Esophageal pH monitoring, holds computer electrogastrography, anorectal profilometry, and respiratory Helic-test.

Staff

Anatoly I. Khavkin, Head of Department, MD, Ph.D., Professor
In 1983, Anatoly Khavkin graduated from the pediatric faculty of the Pirogov Medical University. He later had a clinical internship at the Institute of Nutrition of the Academy of Medical Sciences of the USSR. After graduation in 1985, he joined the Moscow Research Institute of Pediatrics and Pediatric Surgery.

In 1989, he defended his thesis for the degree of Candidate of Medical Sciences on "Clinical and instrumental characteristics of gastroesophageal and duodenal reflux in children and their relationship with the functional state of the autonomic nervous system". In 1993, he defended his doctoral thesis on "Clinical options and immune and morphological basis for the formation of chronic inflammatory diseases of the stomach and duodenum in children to justify differentiated pathogenetic therapy". Since 2000, he heads the Department of Gastroenterology of the Institute, combining research and teaching. Since 2011 Professor Khavkin is a faculty member of the Department of Nutrition and Dietetics of the Pirogov Medical University.

Professor Khavkin supervised 25 Ph.D. and doctoral dissertations. He is the author and co-author of 12 monographs on various issues of gastroenterology and nutrition.

**Margarita L. Babayan** – Pediatrician, Gastroenterologist, Ph.D.

In 1996, Margarita graduated from the pediatric faculty of the Russian State Medical University (SMU). From 1996 to 1998, she had a clinical internship at the Department of Childhood Diseases at SMU. Since 1998, she studied at the clinical postgraduate program at the same department. In 2001, she defended a thesis on "Peculiarities of state of the connective tissue in the pathology of the upper digestive tract in children".

From 2001 to 2002, she worked as an assistant at the Department of Childhood Diseases at SMU.

Since 2002, she works at the Department of Gastroenterology at the Institute. Margarita Babayan applies modern methods of examination of children with the use of myography machine for peripheral electrogastrogram, and polygraph for anorectal manometry.

She is constantly engaged in medical diagnostics and consulting work and actively participates in research conferences. She is the author of 67 publications, including a teaching manual for physicians “Treatment of chronic constipation: clinic, diagnostics, and treatment”.

**Oxana N. Komarova** - Pediatrician, Gastroenterologist, Nutritionist, Ph.D.

In 1998, she graduated from the pediatric faculty of the Russian State Medical University (SMU). From 1998 to 2000, she had a clinical internship at SMU. After graduation, she became a Ph.D. student at the Department of Children’s Nutrition at the Research Institute of Nutrition of the Russian Academy of Medical Sciences. In March 2007, she defended her thesis on "Clinical and pathogenetic rationale for the use of polyunsaturated fatty acids of Ω-3 class in the complex therapy of bronchial asthma in children". The thesis was made on the basis of the Institute.
Oxana Komarova received a professional training in dietetics in 2007 and in gastroenterology in 2008. She is a certified dietician and gastroenterologist. She also holds certificates of advanced training on artificial nutrition of patients in intensive care and nutritional support in pediatric gastroenterology and hepatology.

Oxana Komarova also provides consulting support for inpatients, including children with rare hereditary disorders (acidemia, organic aciduria, etc.) and outpatients with gastroenterology profile. She conducts examination and treatment of patients in the gastroenterology hospital with different pathology of the gastrointestinal tract, liver and biliary tract.

Oxana Komarova actively participates in research conferences of her area of interest. She authored more than 25 publications.

Department of Information Technologies and Monitoring

History and Objectives

The Department for Information Technology and Monitoring (DITM) was established in 1970 as a computer-diagnostic department, the first in the field of pediatrics in Russia (former USSR). The department was headed by Professor Margarita Vladimirovna Zhilinskaya. Under her leadership, DITM launched a series of studies to quantify comprehensive assessment of risk factors and chronic diseases in childhood. Since 1975, for 40 years DITM was headed by Academician of the Russian Academy of Natural Sciences, Professor Boris Abramovich Kobrinsky.

The major achievements of DITM were the first computerized system of clinical examination of children (1979), one of the first expert diagnostic systems (1980s), a federal epidemiological register of congenital malformations (1999), the first national system of disaster telemedicine (2000), Russian federal system of clinical examination of the child population (2002), specialized registers, and educational multimedia systems.

The DITM objective is development of information systems for various areas, including education, search for new approached to modeling knowledge, and computer monitoring of diseases.

DITM tasks include:

- Monitoring of children’s health (development and maintenance of computer registers and analysis of accumulated data),
- Development of theoretical foundations and applications for intellectual decision implementation systems, e-learning and information resources, including distance learning systems,
- Epidemiological analysis of regional data of congenital malformations and their dynamics; assessment of the impact of preventive measures,


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Andrey Mikhailovich Akimenkov, Senior Researcher, Ph.D.
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Department of Kidney Diseases

History

On March 5, 1970 the prominent pediatrician and academician, Professor Yuri Veltischev opened a nephrology department at the Institute. Since its inception before 2006 the Department was headed by Professor Maya S. Ignatova. Since 2006, Professor Vladimir V. Dlin is heading the Department.

In 1972, the Department held the first nefrobiopsiya using light and electron microscopy and immunohistochemistry.

In 1974, the Department was awarded a gold medal of the Exhibition of Economic Achievements for the development of the system "Staged treatment of children with kidney diseases."

In 1978, the Department published the first monograph in the Soviet Union titled "Congenital and hereditary kidney diseases in children", edited by Professor Maya Ignatova and Professor Yuri Veltischev.
In 1983, the Department pioneered the creation of the National Center for Pediatric Nephrology and day hospital as a new form of clinical work.

In 1997, Professor Papayan founded a Russian Society of Pediatric Nephrology, a so called Creative Association of Pediatric Nephrologists, which unites more than 450 pediatric nephrologists from different regions of Russia, Belarus, Ukraine, Moldova, Kazakhstan, and Uzbekistan.

The main goal of the Department is improving the efficiency of diagnostics and treatment of diseases of the urinary system and reducing the incidence of disability in children.

Since the inception, the Department continues research in pediatric nephrology:

- Epidemiology of nephropathy.
- Organization of nephrology services in the country.
- The role of heredity in the development of nephropathy. Gen and phenotypic correlations (Alport syndrome, cystic kidney, etc.)
- Environmental impact on the morphological and functional state of kidneys.
- Clinical and morphological features of glomerulonephritis.
- Characteristics of nephropathy developed during instability of cell membranes.
- The impact of viral infection on the occurrence and/or progression of nephropathy.
- Disembryogenesis of kidneys, malformations and hereditary renal diseases (hereditary nephritis, polycystic kidney diseases, nephrotoxicity noftiz, Denys-Drash and Fraser syndromes, etc.).
- Metabolism nephropathy (oxaluria).
- Treatment of nephropathy with the development of pharmacotherapy. Progression of nephropathy and nephrotoxicity protection options.
- Introduction of new concepts in pediatric nephrology: chronic kidney disease, and acute renal parenchymal damage.
- Early detection of renal failure and intensification of work with experts on replacement therapy and kidney transplantation.

Currently, the clinic has more than 40 years of experience in the treatment of children with various hereditary and acquired disorders of the urinary system.

Major Developments

The research work of the Department is based on the study and implementation of the latest world achievements in modern pediatric nephrology and pediatric clinical practice.
The key areas of research work are:

- Pathogenic mechanisms of development of kidney diseases in children and adolescents,
- Molecular genetic studies in pediatric nephrology: steroid-resistant nephrotic syndrome, Alport syndrome, autosomal dominant polycystic disease,
- Clinical and morphological features of glomerulopathy in children and adolescents,
- Genetically determined course of nephrotic syndrome, including hereditary syndromes,
- Tubulopathy in the early development of nephrocalcinosis/urolithiasis in children,
- Nature and frequency of diseases of the cardiovascular system in children with chronic kidney diseases,
- Development and implementation of modern methods of treatment of kidney diseases in children,
- Development of prevention methods for progression of chronic renal diseases of childhood.

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**Department of Lung Diseases**

**History**

The Department of Lung Diseases is one of the oldest departments at the Institute. Every year about 800 to 1200 children with pulmonary diseases from all regions of Russia receive treatment from the Department.
As an independent department, it was formed in 1970 after the merger of the early age and adult clinics. It was headed by the Honored Scholar of Russia, Professor Samuel Y. Kaganov (1926-2005), who, in fact, created a large research school and became one of the founders of the national pediatric pulmonology. The clinic established a classification of various forms of chronic lung diseases in children, developed authentic methods of diagnostics of primary ciliary dyskinesia, aspirin asthma, and pulmonary fibrosis. It also defined diagnostics criteria, mechanisms of development and basic principles of therapy of modern forms of lung disease in children.


Since 1999, the Department hosts the Federal Children’s Research Center for Pulmonology of the Russian Healthcare Ministry supervised by Professor Mizernitsky.

Since 2001 the Department publishes an annual almanac "Pulmonary of the Childhood: Problems and Solutions", which highlights the latest achievements in the field of pediatric pulmonology.

The clinic of the Department helped defend more than 110 dissertations and found a research school of children’s pulmonologists, which includes heads of pediatric departments of medical schools and research institutions of Russia. The staff of the clinic consist of highly qualified doctors with Ph.D. degree.

Currently, the Institute is developing an All-Russian register of rare lung diseases in children, which was initiated by Professor Mizernitsky, Professor Rozinova and Professor Bogorad.

Major Developments

The major field of research at the Department includes diagnostics and treatment of the following diseases:

• Asthma, respiratory hypersensitivity hay fever, allergic bronchitis, allergic bronchopulmonary aspergillosis,
• Chronic and recurrent bronchitis,
• Lung malformations,
• Hereditary lung diseases, primary ciliary dyskinesia, cystic fibrosis,
• Hypersensitivity pneumonitis.

The researchers are also actively studying lung ecopathology, asthmology, and other complex and/or rare lung diseases, including various infectious, inflammatory and allergic lung diseases, as well as issues of providing pulmonology care for children.

The Department arranges regular advanced training sessions and master classes on modern topics of pediatric pulmonology and respiratory functional diagnostics. The Department offers post-graduate and doctoral programs for young professionals interested in pediatric pulmonology. Questions and applications shall be addressed to the Head of Research, Professor Mizernitsky by email: yulmiz@mail.ru.

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Department of Neonatology and Pathology of Early Childhood

History

The Center for the correction of early childhood development was established in 1998 to provide medical care for young children with various pathologies. The major focus of the Center is dynamic observation and treatment of premature infants, including those with very low and extremely low birth weight. The Center includes the Department of Neonatology and Pathology of Early Childhood.

The Department of Neonatology and Pathology of Early Childhood is the successor of the Department of Physiology and Pathology of Newborns, which was the first center in Russia to begin research in prematurity problems. The first head of the Department Professor K.A. Sotnikova made an enormous contribution to the study of the problems, classification and treatment of pneumonia in newborns, the differential features of infectious and non-infectious pulmonary lesions, as well as formation of departments for nursing preterm infants all over Russia. In this position, Professor Sotnikova was replaced by Professor G.M. Dementeva. To date, the classification of delay in fetal development and maturity of the newborn is operating in all departments of neonatal profile. Currently, the Department somewhat changed its initial direction, focusing more on the development of approaches to management of preterm infants in the post-neonatal period, correction of growth disorders and development of children born with low and extremely low birth weight.

Major Developments

Today the organizational structure of the Centre includes hospital and outpatient advisory unit. The outpatient advisory unit provides counselling and dynamic monitoring of children with various pathologies specific to young age, i.e. premature babies, children with perinatal pathology, children with feeding problems, atopy, functional disorders of the gastrointestinal tract, etc. However, the main research and practical focus of the Center is correction of preterm infants development. The basic ideology of the Center is to focus on the development of the child’s own capacities.

The Center believes it important to control the development and health of the child, thus, using only evidence-based treatment methods, the best national and international practices, as well as
recommendations developed by the World Health Organization. The main criterion of the child’s health is development of his/her psychomotor skills, which indicates the proper maturation of the nervous system, compensation of all adverse effects associated with premature or "unsuccessful" birth. The Center offers the opportunity to go through all necessary procedures for the full assessment of the child, including ultrasound diagnostics, encephalography, hearing and vision assessment, electrocardiogram and echocardiogram. When analyzing the psychomotor development of children, the Center uses special international methodologies, i.e. the CAT-CLAMS scale (used in North America and approved by the American Academy of Pediatrics) and Griffiths scale (used in Europe and Asia).

The Center implements vaccination of children at risk, passive immunization by Sinagisom of premature babies, and especially children with bronchopulmonary dysplasia.

During consulting, the doctor determines the required volume of screenings and correction measures, provides recommendations on feeding and development of the child for a period of 1-2 months, and determines the date for the next consultation. As a rule, one doctor is assigned to a specific child during the whole observation period at the Center. All doctors of the Department have a neonatal and pediatric education and specialization in the field of neurology, nutrition, vaccination and may provide general and comprehensive consultation. However, the Institute may gather larger consiliums consisting of various invited experts.

The patients of the hospital are children in need of special observation and treatment. The Center accepts children to both the outpatient advisory unit and hospital upon directives from local clinics and second stage nursing hospitals, regional health departments of Russia and voluntary medical insurance programs.

The Department has experienced neonatologists and doctors specializing in neurology, orthopedic pathology, gastroenterology, and functional diagnostics in young children. If necessary, the Department provides consultations of other professionals working at the Institute.

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Department of Otorhinolaryngology

History
The Department of Otorhinolaryngology was founded in 1986. In 2012, the Department was restructured into a day-stay hospital.

In September 2014, the Institute opened a research unit of acute and chronic diseases of the throat, nose and ear to empower and expand research of new methods of treatment and diagnostics of diseases of the upper respiratory tract in children.

In April 2015, the clinic opened a department of otolaryngology at the Faculty of Pediatrics of the Pirogov Russian National Medical Research University headed by the Honored Scholar of Russia, Academician of the Russian Academy of Sciences, Professor M.R. Bogomilsky.

As part of the clinical modernization, in 2015 the Institute formed a new clinic of otorhinolaryngology with the capacity of 15 beds.

Today the clinic has an outpatient, inpatient and research units. It performs a full range of surgical procedures for diseases of the nasal cavity and paranasal sinuses, nasopharynx, oropharynx, and ear infections in children.

Major Developments
The clinic of otorhinolaryngology carries out a wide range of surgical treatment of acute and chronic nasal diseases (endoscopic septoplasty, laser destruction of inferior turbinate, polipotomia, coagulation of vessels of Kiesselbach area), sinus (functional endoscopic sinus surgery, endoscopic sinusotony), outer and middle ear (aurikuloplastika, excision of parotid fistula, removal of atheroma and pendants ear, bypass the tympanic cavity, etc.), oropharynx and nasopharynx (endoscopic adenotomy, tonsillectomy, laser destruction of pipe tonsils, removal of cysts and warts of oropharynx, and laser destruction of follicles of the throat back).

All surgical procedures are performed with the use of modern microscopic and endoscopic techniques. The Department is widely using minimally invasive surgical methods for the treatment of various diseases of the upper respiratory tract.

Adenotomy is one of the most common operations in children's surgery, which involves the removal of the tonsils (adenoids), located in the posterior part of the nose (nasopharynx). With current available technologies, this operation is held with the minimum discomfort for the child and maximum length of stay in the hospital of no more than 24 hours. In some cases, adenotomy is accompanied by partial
removal of the tonsils (tonzillotomiya), since many children experience not only hypertrophy of the adenoids, but also concomitant hypertrophy of the tonsils. In identifying concomitant hypertrophy of the tonsils tonzillotomiya performed simultaneously with adenotomy. In our clinic, we perform this operation under general anesthesia (endotracheal anesthesia) with the most modern instruments such as shaver, aspiration diatreme, and bipolar coagulation. This approach allows us to shorten the length of stay in the hospital and minimize the child’s discomfort after the surgical operation. In most cases, our patients return to normal life in two or three days.

**Tonsillectomy** is a surgical removal of the tonsils, when irreversible changes occur in the structure of the amygdala, resulting in their constant chronic inflammation. Today there are many methods for removing the tonsils. In our clinic, we have the ability to perform both classical cold dissection and radiowave knife, which minimizes pain after the surgical operation and significantly shortens the process of rehabilitation. When performing such operations, the average stay in the hospital usually varies from three to five days. We perform most tonsillectomies under general anesthesia to minimize stress for the child. For children over the age of 14 years the operation may be performed under local anesthesia given the approval of the surgeon.

**Septoplasty** is a surgical operation aimed at correcting the nasal septum, which does not affect the shape of the external nose. The nasal septum plays a great importance in respiratory physiology, however many people have different types of deformation. From birth, the nasal septum is almost never perfectly flat, but the surgical operation is needed only when such a deformation prevents normal nasal breathing. Septoplasty is usually performed at the age of 12 to 14 years, but can be performed at an earlier age, if necessary. The length of stay in the hospital after septoplasty varies from three to seven days depending on the complexity of the deformation and the need to change tamponade. In our clinic, this operation is performed, as well as all surgical procedures, under general anesthesia with endoscopic control. Tamponade is performed by self-expanding modern hemostatic tampons that are painlessly extracted in two or three days after the operation.

**Drainage of the tympanic cavity** is carried out in case of exudative or adhesive otitis media, which is most likely to occur due to the block of the mouth of the Eustachian tube of the lymphoid tissue of the pharyngeal tonsil (adenoids). Such a condition in children often develops in the long-term history of adenoid hypertrophy and chronic adenoiditis. Drainage of the tympanic cavity (bypass surgery) is performed, as a rule, simultaneously with adenotomy and does not increase the length of stay in the hospital.

**Endoscopic surgery of the paranasal sinuses** can be performed in case of chronic and acute sinusitis through the opening of a sinus or few sinuses at once. In children, most often the cause of such operations are cystic and polyposis sinusitits. Previously, before the advent of modern endoscopic equipment such operations have been traumatic and performed through outside access, but now with the use of modern endoscopic equipment it is possible to perform such operations inside the nasal cavity through the natural anastomosis, which greatly reduces the trauma to surrounding structures and reduces the time of retention at the hospital. In our clinic, we perform similar operations for children of any age.
Conservative treatment of various inflammatory diseases of the upper respiratory tract is carried out widely in our clinic. It includes such inpatient treatment of diseases of the upper respiratory tract as otitis, sinusitis, boils, and nose injuries, as well as outpatient treatment of chronic adenoiditis and tonsillitis, opening abscesses, treatment vasomotor rhinitis, and many more.

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Department of Pediatric Cardiology and Arrhythmology

History
In November 1981, the then Director of the Institute Academician Yuri Veltischev opened a new department of congenital and hereditary diseases of the cardiovascular system. From 1984 to 1989, the Department was headed by a prominent cardiologist, Professor Natalia Alexeevna Belokon. She united her most talented students around the Department. Her broad research interests included congenital heart disease, non-rheumatic carditis, cardiomyopathy, cardiac arrhythmia, problems of early diagnostics and prevention of atherosclerosis, and functional pathology of the cardiovascular system, which is closely associated with autonomic dysfunction in children and adolescents. Contagious enthusiasm and energy of Professor Belokon attracted many professionals to work at the Department along with pediatricians. These professionals were represented by vegetologists, psychologists, psychiatrists, cardiac surgeons, and other specialists.

Professor Belokon was the author of the national research school of pediatric cardiologists, defining priorities for the development of the national pediatric cardiology for many years.

From 1990 to 2009 the Department was headed by Professor Yury Belozerov. He not only continued the teamwork on the development of diagnostic and prognostic criteria of the functional state of the cardiovascular system in healthy and sick children with cardiac pathology, but also identified a number of new areas, based, inter alia, on the study of genetic factors in the formation of organic and functional heart disease. Researchers studied formation mechanisms of arrhythmogenic cardiomyopathy in
children with premature beats, showed the importance of small anomalies of heart development in cardiac arrhythmias. Professor Belozerov was the founding father of an important trend in pediatric cardiology, i.e. diagnostics and treatment of dysplastic heart.

Since the 1990s of the last century, under the leadership of Professor Belozerov the Department focused on the development of early detection and risk factors of cardiac decompensation in children with pulmonary hypertension.

Since 2009, the Department was headed by Professor Irina Leontieva. Under the leadership of Professor Leontieva the Department conducted a series of scientific studies on the problems of early diagnostics, treatment and prevention of arterial hyper- and hypotension, and degenerative changes in the myocardium. The problem of early development of cardiovascular disease due to metabolic disorders and early progression of vascular lesions have formed a basis for the development of diagnostic algorithms and treatment of metabolic syndrome in children and adolescents.

In April 2015, the Academic Council made a decision to merge two research departments, i.e. the department of congenital and hereditary diseases of the cardiovascular system and the department of arrhythmology. Professor Igor Kovalev was appointed the head of the newly established Department of Pediatric Cardiology and Arrhythmology. The research staff of the Department continued to actively study the most urgent problems of pediatric cardiology, including cardiomyopathies, pulmonary hypertension, and cardiac arrhythmias. The new focus of research was congenital heart defects and other inherited and acquired heart diseases.

Over the last 30 years of research, the Department published more than 600 research papers, including 16 monographs, defense of 22 doctoral and 44 master theses. The staff of the Department are active members of the Association of Pediatric Cardiologists of Russia and the European Children's Heart Association. Professor Kovalev and Professor Leontieva are vice-presidents of the Association of Pediatric Cardiologists of Russia.

Major Developments

Currently, the Department is focusing on the following research areas:

• Development of new pathogenesis and prognosis criteria, prevention of cardiac decompensation and sudden death in cardiomyopathies of various types of genesis, congenital heart defects, and life-threatening heart rhythm disorders,

• Diagnostics and treatment of inflammatory diseases of the myocardium (myocarditis, pericarditis, endocarditis, and others) of various origins,

• Clinical and genetic polymorphism of life-threatening arrhythmias,

• Development and implementation of monitoring systems for patients with chronic forms of arrhythmias,
• Development of the strategy of differentiated medical and interventional treatment of idiopathic tachy and bradyarrhythmias in children, as well as structural and organic diseases of the myocardium,
• Diagnostics, risk stratification and determining of tactics of pulmonary hypertension in children,
• Early detection and treatment of cardiac and vascular lesions in patients with arterial hypertension in children,
• Creation and maintenance of the register of children with life-threatening cardiac arrhythmias and pulmonary hypertension.

**Staff**

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Hamnagadaev, Igor Alexeevich, Researcher, MD, Ph.D.

**Department of Psychoneurology and Epileptology**

**History**

The Department of Psychoneurology was created in 1944 on the basis of Children's Hospital №1 (Chief of Hospital: Ermolai V. Prokhorovich). The first head of the Department was Professor Isaac M. Prisman (1944-1946).

In the following years, the heads of the Department were:
• Honored Scholar of Russia, Professor David S. Footer (1946-1964)
• Honored Scholar of Russia, Professor Yuri A. Yakunin (1965-1984, 1991-1996)
• Professor Igor A. Skvortsov, MD, Ph.D. (1984-1991)
• Professor Pavel A. Temin, MD, Ph.D. (1996-1999)
The Department paid a great attention to the diagnostics and intensive care of polio and TB meningitis (IM Prisman, DS Footer). Professor Yuri A. Yakunin with colleagues proposed clinical classification of CNS lesions in infants and young children, developed methods for differentiated treatment of perinatal damage of the nervous system. The Department developed new rehabilitation methods for children with cerebral palsy and methods for neuropsychological testing of pre-school and primary school children (IA Skvortsov).

With the appointment of Professor P.A. Temin the Department focuses on two main problems, i.e. epilepsy and convulsive disorders in children and mitochondrial pathology. Jointly with the Department of Clinical Genetics and Pathomorphology Laboratory, the Department developed a mitochondrial disease diagnostics algorithm with the use of modern research methods, i.e. e-histochemistry, determination of activity of mitochondrial enzymes in peripheral blood leukocytes, as well as the strategy for the treatment of mitochondrial encephalomyopathies. For the first time in Russia, the book "Hereditary diseases of the nervous system" included sections on diseases of the mitochondria caused by mutations in mitochondrial DNA, and diseases of the mitochondria caused by mutations in nuclear DNA.

The major emphasis of research has been made on resistant forms of epilepsy in children, i.e. the study of factors and causes of resistance, and development of new treatment approaches. In 1994, Professor P.A. Temin renamed the Department into the Department of Psychoneurology and Epileptology. Professor Temin was also the first head of the Children’s Anticonvulsant Research Center established in 1998.

Later on, headed by Professor Temin’s student Marina Nikanorova, the Department continued its work in child epileptology. During this period, the Department launched research in curable epileptic encephalopathies, such as West syndrome and electrical status epilepticus in slow wave sleep phase. For treatment of these conditions, hormonal therapy has been gradually introduced. Currently, Marina Nikanorova works at the Danish Epileptic Center (Dianalund, Denmark).

The other direction of scientific and practical work started by Professor Temin were neuromuscular disorders and rare (orphan) diseases, including tuberous sclerosis.

Since 2002, the Department is headed by Professor Elena D. Belousova. Nowadays, the Department is the reference Al-Russian center for children with pharmacoresistant epilepsy, neuromuscular diseases and tuberous sclerosis complex.

**Major Developments**

*Diagnoses and treatment of various forms of epilepsy in children, including:*

- Study of genetic early epileptic encephalopathies,
- Study of pharmacoresistant forms of epilepsy (the causes of resistance, true and "false" resistance, search for new treatment approaches),
• Development of computer diagnostic programs that help diagnose various forms of epilepsy,
• Development of alternative treatments for drug-resistant forms of epilepsy (hormones, immunoglobulins, VNS),
• Clinical trials of new antiepileptic drugs in children,
• Participation in international research in collaboration with leading European clinics on various aspects of epilepsy, including comparative evaluation of various pharmacological approaches to treatment, quality of life assessment in patients with epilepsy, etc.,
• Certification courses in epileptology and neuropaediatrics.

*Diagnoses and treatment of hereditary diseases of the nervous and neuromuscular systems, participation in international trials of new drugs in neuromuscular disorders including:

  • Congenital structural myopathies,
  • Progressive muscular dystrophies,
  • Spinal muscular atrophies,
  • Other rare neurogenetic diseases and syndromes.

**Staff**

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Department of Radiation Ecopathology

History

The Department of Radiation Ecopathology serves as part of the Children Research Center for Radiation Protection founded in 1991 after the catastrophe at the Chernobyl Nuclear Power Plant.

Major Developments

The important part of work of the Department is to determine the significance of the effects of radiation in the genesis of each individual patient’s disease, prepare medical documentation and provide expert recommendations for the Russian inter-departmental expert council that sets up a causal relationship between disease and disability influenced by radiation.

While examining medical records of children, the Department focuses on:

- Genetic consequences of irradiation of their parents (hereditary diseases with autosomal dominant inheritance, first emerged in the pedigree),
- Probability of occurrence of congenital anomalies (birth defects) in various organs and systems,
- Probability of cancer occurrence,
- Non-differentiated mental retardation.

The Department created a database that includes information on the health status of children of different observation cohorts, demographic and epidemiological indicators for the entire period since the Chernobyl accident, and for 10 years prior to the disaster. The cooperative work of the Department and healthcare authorities of the Russian Federation enables the fairness of healthcare for children exposed to radiation. As international experience shows, monitoring of children’s health, a set of measures for medical and social protection should be continuous and long-term, which forms the basis for the Russian State National Medical and Dosimetry Register of child population. Currently, successful implementation of this set of measures is crucial for the health of future generations.

The Department developed basic principles of long-term follow-up (monitoring), survey algorithms and of various cohorts of patients exposed to radiation, as well as a system of differentiated methods of treatment and rehabilitation.

The major problems the researchers are currently facing are:

- Health status characteristics of children of different observation cohorts with a focus on organs and systems, which are mostly exposed to radiation,
- Individual radiation sensitivity as a basis for the formation of pathological conditions in children,
- Genomic instability and its importance for the formation of radiation-induced (tumors, malignancies, congenital malformations, hereditary diseases) and somatic diseases associated with disorders of the target organs of radiation exposure (thyroid pathology, diseases of the gastrointestinal tract, urinary and musculoskeletal systems) in the pediatric population,
• Monitoring of demographic and epidemiological indicators in order to determine risks of radiation-induced diseases and develop strategies to respond to the situation.

The Department is currently collaborating with Japanese research centers dealing with the problems that arose after the accident at the nuclear power plant in Fukushima. The Department is involved in arranging joint conferences and writing joint research papers.

Staff
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3. Natalia M. Karahan, Senior Researcher, Ph.D.
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Laboratory of General Pathology
History and Objectives

Organizational problems faced by the Institute in 1998-2000 led to the merger of several laboratories. The new united laboratory was named the Laboratory of General Pathology.

The major focus of research for the laboratory was developing diagnostic and treatment programs based on the study of typical pathological processes in children. Despite many disadvantages associated with the disappearance of the famous, traditionally established laboratories and loss of staff, the merger allowed to focus on the development of unified technological approaches in diagnostic medicine and pediatric pathology. Thus, the new laboratory refocused on the study of minimally invasive diagnostic
methods, approaches to "pre-clinical" diagnostics, methods for detecting hidden disease states on the two level basis (in-depth screening and diagnostics). The laboratory continued research in characteristics of syndromic approach to the diagnostics and pathogenesis, analyzing threads of prepathological states turning into pathological states (syndromes). Currently, combined in one division, researchers continue studies in clinical pathomorphology, biochemistry, molecular genetics, immunology, and membranology. The research is facilitated by modern high-tech laboratory equipment, including the equipment for research in molecular genetics, biochemistry, allergy, immunohistochemistry, immunofluorescence, and morphometry, as well as highly sensitive and highly specific ELISA studies for computer tele photometry. Currently, the laboratory includes a laboratory of molecular genetics.

The Laboratory of General Pathology is a department dedicated to conducting research and diagnostics, requiring sophisticated laboratory support. It includes the following research groups: molecular genetics, morphology, immunology, biochemistry and chromatography. Substantially all of these groups are actively underway using high biomedical technologies. It should be noted that molecular genetic studies (genome-sequencer of new generation, capillary sequencers, Nanostring - Russia’s first system of studying genome expression), biochemical studies (GC-MS and chromatography and biochemical analyzers), morphological studies (immunohistochemistry, morphometry, electron microscopy) are playing a leading role in the laboratory.

Each year, the laboratory’s staff is involved in the organization of the Russian Congress "Innovative Technologies in Pediatrics and Pediatric Surgery."

Cooperation
The laboratory cooperates with most clinics of the Institute. Since its inception, the laboratory has established a long-term cooperation with research and educational institutions such as Moscow State University; Pirogov Russian National Research Medical University, Research Institute of Virology, Smolensk State Medical Academy, Evdokimov Medical University, International Association for Mitochondrial Diseases, and Russian Interregional Association of Patients with Tuberous Sclerosis.

Training
The staff of the laboratory regularly improves skills by participating in professional development programs and training cycles. The staff also provides consulting for the clinical staff on laboratory medicine and gives lectures and seminars.

Staff
1. Vladimir S. Sukhorukov, Head of Laboratory, MD, Ph.D., Professor
2. Vera V. Nevstrueva, Senior Researcher, MD, Ph.D.
3. Ekaterina S. Vozdvizhenskaya, Researcher, MD, Ph.D.
Laboratory of Molecular Cytogenetics

History

The Laboratory of Molecular Cytogenetics was founded in 1992. Headed by the Honored Scholar of Russia, Ph.D. in Biology, Professor Svetlana Grigorievna Vorsanova, the laboratory does a wide range of research to identify genomic and chromosomal abnormalities in children with neuro-psychiatric diseases.

Major Developments

"The development and implementation of new laboratory technologies to study mental retardation and autism in children on the basis of fluorescent hybridization techniques of the in situ nucleic acid (FISH), multicolor staining of chromosomes (MCB), metaphase comparative genomic hybridization (HR CGH) and high-resolution serial comparative genomic hybridization (array CGH)».

The most important features of modern clinical and molecular medicine are the widespread use of highly informative laboratory technologies and the rapid implementation in public health of advanced methods based on the success in the analysis of the human genome in normal and hereditary diseases.
The introduction of high-tech in medicine based on genomic analysis have greatly expanded, and in some cases have changed the understanding of the etiology and pathogenesis of many well-known diseases of genetic nature, such as mental retardation and autism. Modern medical diagnostic technologies include a wide arsenal of methods, such as genetic diagnostics. Modern molecular diagnostics in medicine presents a combination of physical, chemical and biochemical methods, the purpose of which is to determine the pathogenic cellular processes occurring at the molecular and/or supramolecular level (the level of DNA molecules).

Modern molecular medicine has no more effective nanotechnology detection of nucleic acids on a single cell level compared to fluorescence hybridization in situ (FISH). This technology is already widely used in the diagnostics of hereditary diseases associated with mental retardation and congenital malformations, cancer and neuro-psychiatric disorders in children and disorders that lead to fetal death.

Furthermore, this technology allows for monitoring of dynamic intracellular and interstitial biochemical processes associated with the life of the organism impaired. Diagnostic methods based on the FISH technology, have high efficiency (e.g., detection resolution of some FISH methods reaches the first DNA monomer of the polymer chain) which, thanks to the continuous modifications, tends to increase resolution. Among the latest features of technology based on FISH are options for injecting exogenous DNA into the cell, followed by the monitoring of its behavior. The latter is a promising direction in the context of the nanotechnology development, which allows for correction of abnormal intracellular processes and, as a consequence, successful treatment of many diseases associated with disruption of the structure and functional activity of the DNA molecules in the cell.

One of the latest modern medical and genetic technologies that are under development and introduction into clinical medicine, is a serial comparative genomic hybridization or molecular karyotyping (genome-wide microarray comparative genomic hybridization - array CGH), based on the use of genetic microarrays. The method allows for a computer analysis of DNA violations at the genome level of a sick child with the help of genome microarray and comparative genomic hybridization. This method identifies micro anomalies of the genome that cannot be detected by other methods, which contributes to effective diagnostics of hereditary diseases.

The aim of the complex innovative program is to develop innovative methods for genetic diagnostics of undifferentiated mental retardation, autism and multiple birth defects, based on the hybridization of in situ nucleic acids and a series of comparative genomic hybridization (array CGH).

The laboratory’s contribution to the development of international research cooperation includes creation of a new scientific international journal on cellular and molecular biology titled Molecular Cytogenetic (impact factor 2.14): [http://molecularcytogenetics.biomedcentral.com](http://molecularcytogenetics.biomedcentral.com)

Diagnostic research of the laboratory include:

- Diagnostics of chromosomal (genomic) anomalies and syndromes,
- Diagnostics of undifferentiated genetically determined forms of mental retardation in children,
• Diagnostics of autism and early childhood schizophrenia and disorders caused by chromosomal (genomic) set,
• Diagnostics of microanomalies of the genome in children with mental retardation and developmental microanomalies,
• Diagnostics of certain monogenic syndromes.

Currently, the laboratory is doing research in the following areas:
• Molecular cytogenetic study of undifferentiated forms of mental retardation with multiple birth defects and/or microanomalies development in children and married couples with reproductive dysfunction by fluorescence in situ hybridization and authentic collection of DNA probes on all human chromosomes and portions thereof,
• Cytogenetic diagnostics of chromosomal disorders such as Down syndrome, Edwards, Patau, Turner, Klinefelter, X trisomy, Y disomy, as well as their mosaic forms, and cases with marker chromosomes,
• Cytogenetic and molecular cytogenetic diagnostics of chromosomal abnormalities in children living in ecologically unfavorable areas (radiation, heavy metals, etc.),
• Diagnostics of special forms of monogenic syndromes, such as Rett syndrome, using molecular cytogenetic markers,
• Molecular cytogenetic study of somatic cells of various tissues (skin fibroblast epithelium, nerve cells, muscle cells, lung, and others),
• Molecular cytogenetic study of cells of spontaneous abortions (miscarriages);
• Molecular cytogenetic study of germ cells (cells of semen and oocytes).

List of laboratory research
• DNA extraction from blood samples;
• Cytogenetic study: karyotype;
• Cytogenetic study of married couples: karyotypes;
• Cytogenetic diagnostics of Rett syndrome and disease carriers;
• Prometaphase analysis of chromosomal abnormalities;
• Molecular cytogenetic studies of peripheral blood lymphocyte cells (fluorescent hybridization in situ - FISH, chrome specific multicolor staining - MCB; comparative genomic hybridization - CGH);
• Molecular cytogenetic studies of marker chromosomes with 2 to 7 DNA probes;
• Molecular cytogenetic study of the shift of X chromosome inactivation in girls and mothers-carriers for X-linked hereditary diseases;
• Molecular cytogenetic study of somatic cells of different tissues (skin fibroblasts, epithelium, cells of brain, muscles, lung and others);

• Molecular cytogenetic study of cells of spontaneous abortions (miscarriages);

• Molecular cytogenetic study of germ cells (semen and oocytes cells);

• Molecular cytogenetic study of subtelomeric deletions and micro translocations with non-syndromic forms of mental retardation;

• Molecular study of complex unbalanced genomic abnormalities by comparative genomic hybridization (CGH).

Staff

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Alexey D. Kolotiy, Senior Researcher, Ph.D.
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Key Publications

2016


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rhythm in non-demented adults. //Frontiers in Aging Neuroscience. 18 Nov 2013. 22p. Impact factor 4.0


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