MILITARY INSTITUTE OF MEDICINE
NATIONAL RESEARCH INSTITUTE

PRIORITIES • INNOVATION • FUTURE

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A quarter of a century, 25 years, approximately the duration of a generation, is a long enough time to reliably summarise the cooperation to date, the resulting measurable and non-measurable, tangible and intangible benefits – the added value of the social and public good created together.

Formally contracted, but above all based on partnership and trust, the relationship between the Military Institute of Medicine – National Research Institute (MIM – NRI) and the company Agat exemplifies activities that put the idea of a corporate social mission into practice in the best possible form: a strategy that takes into account social interests and cooperation with other stakeholder groups, with a positive impact on the efficiency of the business. After all, nothing expresses the sensitivity and responsibility of an employer more than concern for the health of the employees, striving to keep it in the best possible shape and for as long as possible. This is especially true if the priceless value of health can – thanks to the cooperation – be provided by a healthcare provider of the highest level of credentials, the maintenance and constant improvement of which would not be possible without the help and support provided by such a reliable and responsible partner as Agat S.A.

Major General Prof. Dr Grzegorz Gielerak
Director of Military Institute of Medicine
– National Research Institute

One of the most important experiences in the 30-year history of Agat S.A. is our cooperation with the Military Institute of Medicine – National Research Institute in Warsaw. 25 years ago, we signed a pioneering public-private partnership agreement. For us, MIM – NRI serves as a kind of lightning rod in our daily activities across the country.

The hospital on Szaserów Street in Warsaw is an exceptional facility. Perfectly organised, equipped with unique world-class medical equipment. Here, top specialists in the field treat patients, conduct research, educate others and – drawing on wartime experience – improve civilian healthcare. We are fortunate to call these exceptional people our Friends, who have never let us down.

Our heartfelt thanks for these 25 years.

Zbigniew Winkiel
Chairman of the Board, Chief Executive Officer
Agat S.A.

Contents


WIM

MILITARY INSTITUTE OF MEDICINE – NATIONAL RESEARCH INSTITUTE

PIONEER, LEADER AND INITIATOR OF SCIENTIFIC RESEARCH AND MEDICAL SERVICES

The Military Institute of Medicine – National Research Institute – Central Clinical Hospital of the Ministry of Defence, is one of the largest, multi-profile, highest reference level, accredited healthcare institutions in Poland. It is the central clinical, teaching, consulting and research centre of the military health service. Accredited by the Minister of Health, the Institute implements ISO and AQAP quality management systems.

The Military Institute of Medicine – National Research Institute conducts scientific, research, expert and teaching activities, including postgraduate education of doctors and nurses. It is authorised to confer doctoral and post-doctoral degrees in medical and health sciences. The Institute runs doctoral programmes and postgraduate programmes related to medical sciences and healthcare management. Since 2013, MIM – NRI has been operating under academic category A in terms of the quality of scientific activity in the classification of the Ministry of Science and Higher Education.

For years, the Military Institute of Medicine – National Research Institute has been expanding its structure through further investments. These have helped to improve the comprehensiveness of the medical services provided, in line with our mission *Patient-centred approach. Treatment and care made modern and safe*.

A military hospital in Legionowo – a branch of the Military Institute of Medicine – National Research Institute – is scheduled to open in the first quarter of 2022. The hospital will consist of an operating theatre and six wards, including surgery and cardiology, with the emergency room open 24 hours a day. The Legionowo hospital will perform advanced diagnostics, including cancer. The facility will also provide emergency support for patients with acute coronary syndromes. At the beginning of 2022, patients will see the opening of two brand new buildings – an ophthalmology building and a specialist outpatient clinic. The Institute continuously modernises the existing clinics and departments as well as successively upgrades the equipment.

We are proud to develop a modern, multi-profile research and treatment unit, providing excellent quality in all areas of activity, with development horizons far exceeding the limits of the present.

1 MIM – NRI branch in Legionowo.

2 MIM – NRI building complex in Warsaw on Szaserów Street.

2

3 State-of-the-art Radiotherapy Facility with modernised Department of Oncology commissioned in 2017 was the largest investment in MIM – NRI history.

3

Our mission

Patient-centred approach. Treatment and care made modern and safe.

Vision

We are proud to develop a modern, multi-profile research and treatment unit, providing excellent quality in all areas of activity, with development horizons far exceeding the limits of the present.

Strategy

- Providing comprehensive, modern medical care based on the highest standards
- Implementing multi-profile research and teaching activities
- Promoting innovation and creativity in employees and undertaking multidirectional measures to support their personal development

Military Institute of Medicine – National Research Institute in numbers:

- 22.63 hectares of land area
- 36 buildings with a total area of 120,000 m^2
- PLN 553 million annual contract value with the National Health Fund
- A range of 307 medical services
- 41 clinics and wards, 37 outpatient clinics, 6 facilities
- 3,450 employees
- 1 – the only hospital in Warsaw with a helipad for all types of helicopters

1 MIM – NRI building complex, the only hospital in Warsaw with a helipad for all types of helicopters.

2 We provide a wide range of training and teaching activities, including a postgraduate course entitled *Managing and leading a medical facility of the Ministry of National Defence*, during which candidates acquire the knowledge and practical managerial skills necessary for managerial positions in the military health service (photo: Andrzej Kosater/MIM – NRI).

3 We continually invest in cutting-edge medical equipment. In 2020, we opened the MIM – NRI Centre for Robotic Surgery equipped with the latest generation of the Da Vinci Xi surgical robot.

The history of the Military Institute of Medicine – National Research Institute is inextricably linked with the Ujazdowski Hospital in Warsaw – one of the largest and oldest medical institutions in Poland. Its origins date from 1784 and are linked to the activities of King Stanislaus Augustus, who donated Ujazdowski Castle as a military barracks.

Ten years later, the first lazarette was located there, while 1818 saw the opening of the Main Military Hospital by order of Prince Konstantin Romanov. It offered 1,000 beds and was later named the Ujazdowski Hospital. The hospital cared for wounded and sick soldiers, training medical staff until 1945, when it was closed down.

The first months of 1945 marked the founding of the 180-bed polyclinic Hospital of the Ministry of National Defence located in the building of the former Nursing School in Warsaw, at Koszykowa 78 Street. In 1958, it was incorporated into the structure of the Military Medical Academy (WAM), established in the same year, and renamed the 2nd WAM Central Clinical Hospital (2 CSK WAM). Numerous organisational changes, including the reorganisation of higher military education, led to the establishment of the Military Institute of Medicine – National Research Institute on the basis of the CSK WAM in 2002.

In 2019, MIM – NRI Director Grzegorz Gielerak and the President of the Former Ujazdowski Hospital Association Krzysztof Królikowski initiated the Ujazdowski Hospital Pro Publico Bono Prize. The award was established to commemorate the first and largest military medical facility in the reborn Poland. Granted for special achievements in social activities and commitment to humanity, it is dedicated to

1 Main building of the Ujazdowski Castle Hospital (photo from the collection of the Former Ujazdowski Hospital Association).

2 Model of the Ujazdowski Castle Hospital – the Ujazdowski Hospital Pro Publico Bono Prize.

3 Gate of the Ujazdowski Castle Hospital, view from Górnośląska 45 Street in Warsaw (photo from the collection of the Former Ujazdowski Hospital Association).

4 5 Preparing and performing operations at Ward VII B (photo: January 1941, from the collection of the Former Ujazdowski Hospital Association).

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The Military Institute of Medicine – National Research Institute stands for:

- Science
- Education
- Innovation
- Modernity
- Quality
- Information technology
- Experience
- Brand
- People
- Development
- Prospect for the future

people whose passions reach beyond medicine, who devote their time to those in need or who combine medicine with other fields of science and art in their *pro publico bono* activity. This award honours the act and commitment of helping people, in the shining example of the doctors of the Ujazdowski Hospital, who have done this for centuries past.

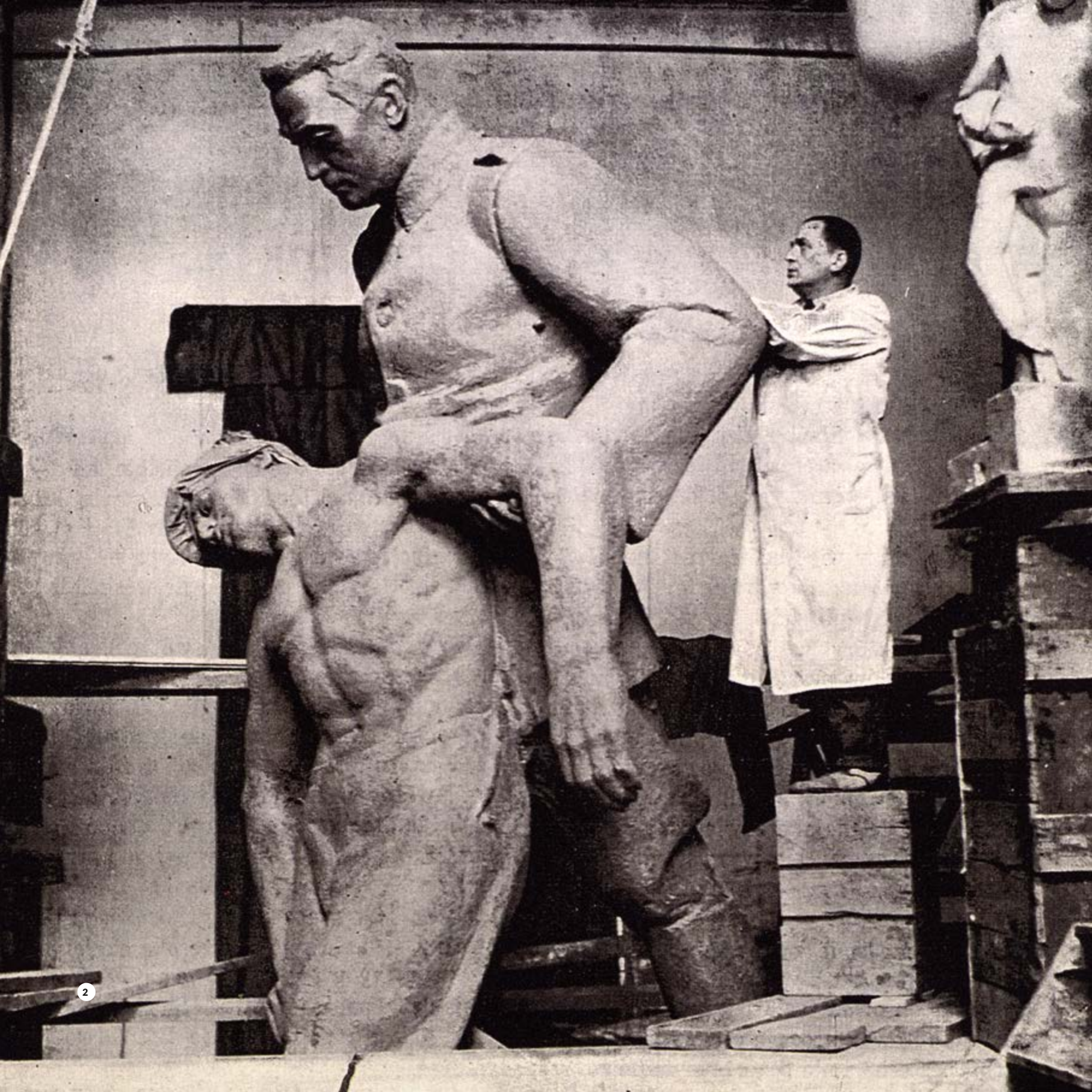
Since 2018, the MIM – NRI Director has been awarding the prestigious and cross-departmental Animus Fortis (Brave Spirit) award. It refers to the best traditions of the medical services and is presented to individuals and institutions who have had a particular impact on positive change and shaping the image of the emergency services. The winners in the individual and institutional categories are selected by the Animus Fortis Award Jury, which includes the Director of MIM – NRI as well as representatives of the Prime Minister of the Republic of Poland, the Minister of National Defence, the Minister of the Interior and Administration, the Minister of Health and MIM – NRI. The award is held under the patronage of the Prime Minister of the Republic of Poland.

The laureates receive an award in the form of a miniature statue of the Orderly. Before the Second World War, this monument, commemorating medics who fought for Polish independence, was planned to be erected in Warsaw. Its originators were Brigadier General Dr Stefan Hubicki, commander of the Officers' Sanitary School operating on the premises of the Ujazdowski Castle in Warsaw, and Brigadier General Dr Stanisław Roupert, chief of the Health Service Department of the Ministry of Military Affairs.

1 The Animus Fortis Award, which is presented by the Director of MIM – NRI to individuals and institutions who have had a particular impact on positive change and the image of the emergency services.

2 Edward Wittig in his studio, working on a design for a statue of the Orderly. It served as the inspiration behind the Animus Fortis statue (photo from the collection of the former Ujazdowski Hospital Association).

The design of the monument was commissioned from one of the most eminent sculptors of the time – Edward Wittig, professor at the Academy of Fine Arts in Kraków. His work includes the Warsaw Aviator Monument. The sculptor designed a monument depicting an orderly in military uniform supporting a wounded soldier by the shoulders. Funds for the monument were collected all around Poland through voluntary contributions from civilian and military medics. A plaster model of the obelisk was created, and 1937 marked casting it in bronze. Unfortunately, work on the monument was interrupted by the Second World War and the monument has not been built.



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WIM

SAFETY

OF MEDICS AND PATIENTS IN THE COVID-19 ERA

The SARS-CoV-2 pandemic necessitated a number of organisational and technical changes in the work of MIM – NRI Hospital Emergency Department. For the purposes of diagnosis and initial treatment of patients infected with coronavirus and suspected of coronavirus infection, we set up an external container-based isolation area.

This area includes a staff room with a storage for clean personal protective equipment connected by an airlock to the initial intensive care room. This is where the emergency medical teams transport patients. The room features an efficient ventilation, heating and lighting systems, with access to medical gases and vacuum. We monitor the patient's vital signs, administer fluids and compensatory medication as well as verify cardiovascular stability. Doctors are provided with complete equipment in line with resuscitation room standards. Nasopharyngeal cavity swabs are taken for rapid antigen testing and PCR testing for coronavirus.

COVID-19 patients requiring chest imaging are transported to a container next door, where they undergo a CT scan. This arrangement eliminates the possibility of infecting other patients, as the entire process of initial patient assessment and diagnosis takes place outside the hospital building.

Patients who do not need monitoring await test results in another container with four single rooms equipped with oxygen and independent entrances. In contrast, patients requiring intensive supervision are transported with high safety measures to isolation rooms located in the red area of the Hospital Emergency Department.


1

2

1 Specialised medical equipment saving the lives of COVID-19 patients.

2 The hospital, which was built on the site of an airport hangar in Warsaw's Okęcie district, was able to treat several hundred patients.

3 Core hospital module designed for patients with COVID-19.


SZPITAL
MODUŁOWY
WOJSKOWY INSTYTUT
MEDYCZNY

As part of adapting the ED to deal with patients suspected of having infectious diseases, an isolation room was built in the reception area that meets all epidemiological requirements and was designed to treat acute patients. The room features a proper ventilation system, a bathroom with an isolated sewage outlet, and a macerator – a device for disposing single-use containers with patient secretions.

All barrier rooms are used for observation and treatment of patients pending viral results. As a multispeciality hospital, MIM – NRI features its own analytical and microbiological facilities. Swabs collected in the infectious area of the ED are carried in sealed multi-layer containers. We have two independent laboratories at our disposal. The first, the Laboratory Diagnostics Unit, performs rapid tests to detect SARS-CoV-2 virus antigen. With a priority status, these tests are dedicated exclusively to patients in the ED. The waiting time for the result is only 15-20 minutes.

In addition, the container area was upgraded with the ability to detect 23 different respiratory pathogens, including influenza, SARS-CoV-2 and other types of coronavirus, whooping cough, chlamydia and mycoplasm. All thanks to the use of genetic methods. This especially helps patients in a very severe condition. The waiting time for a respiratory panel result is less than an hour.

In turn, the detection of SARS-CoV-2 virus RNA is carried out by Real Time PCR in the Genetic Laboratory of the Department of Clinical Transfusiology at the MIM – NRI. We use four analysers with a total daily throughput of over 650 samples. Testing is performed 24 hours a day, 7 days a week.


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1 Patient with suspected COVID-19 in the initial medical assessment area – triage ED-COVID.

2 A staff member prepares medication for the patient by nebulisation – the best antidote for dyspnoea caused by SARS-CoV-2 infection.

3 A patient with dyspnoea requires constant monitoring of basic vital functions.

Since the beginning of March 2021, COVID-19 patients from the ED have been transferred to a new modular hospital built on the Institute's premises. It was inspired by the experience of medical missions in Lombardy and the United States, in which MIM medics took part last spring during the first wave of the epidemic.

The hospital consists of five large room modules. Two modules are dedicated to patients in critical condition, requiring intensive care treatment. They need respiratory support with a ventilator, invasive monitoring of multiple vital signs with medical equipment. The most severely ill patients are treated with extracorporeal veno-venous oxygenation (VV-ECMO). The other three room modules house patients with severe forms of COVID-19 but who do not require ventilators. They often require delivery of several tens of litres of oxygen per minute using a high-flow intranasal cannula system. If necessary, all stations can be converted into intensive care stations to treat all patients in a personally dedicated manner. Access to the patient modules is via several airlocks connecting the clean and contaminated areas.

This is the first hospital of its kind in Poland and, thanks to the technologies and organisational solutions used here, it will be able to successfully carry out medical and training tasks long after the epidemic has ended, contributing to the security of the state and its citizens.

1 Computed tomography as an essential diagnostic tool – the medical team during the evaluation of the COVID-19 patient study.

At the height of the pandemic, military doctors and rescuers from MIM carried out three overseas medical missions. The nature of each was different, requiring far-reaching flexibility in terms of staff competence and specialist equipment. Our staff assisted in Lombardy, Italy, Slovenia and Illinois, USA. The experience gained allowed Poland to be better prepared to counter the epidemic.

Lombardy mission

Carried out at the peak of the outbreak, it was a typical medical humanitarian mission aimed at two objectives: to learn about the organisation of the health system during a pandemic and to identify the conditions and delivery of medical care in patients with COVID-19. The experience of the Italians was invaluable in this respect. The practice of organising outpatient and inpatient treatment, as well as the directions of transformation of primary and specialised medical care, proved to be a unique and valuable experience in maintaining the capacity of the health system.

The medical procedures used proved a similar point. In the first three weeks of the epidemic, the Italians, on the basis of the experience gained, developed a number of management methods, including the assessment of the prognosis of COVID-19 patients based on the result of chest radiography, as well as Europe's first comprehensive guidelines for the treatment of COVID-19 patients. These recommendations, while the mission was still underway, were implemented at MIM – NRI. As a result, the moment the first COVID-19 patients arrived in Poland, we were ready to treat them according to the state-of-the-art, clinically proven standards.

Illinois mission

Thanks to the knowledge gained in Lombardy, Italy, the mission to the USA had an expert character based on the mutual exchange of information and experience. During meetings with representatives of the Illinois state authorities, the National Guard and hospital medical staff, the MIM – NRI team shared their European experience in the fight against the epidemic and learned about the US coronavirus management model.

Slovenia mission

The mission in Slovenia covered issues related to epidemic management at a strategic level and, above all, an assessment of the preparedness of the state's structures for emergency response.

The key issues discussed during the mission included the coordination of state institutions, the cooperation and organisation of local government as well as methods of monitoring the spread of coronavirus in the population and organising medical care, especially in the highest risk groups.

2

1 Joint press conference between the doctors of the Military Institute of Medicine – National Research Institute and the Illinois National Guard Command with the participation of the Defence Attaché and the Consul of the Republic of Poland in Chicago.

2 Illinois Coordination and Emergency Management Centre. Representatives of the MIM – NRI medical mission take an active part in an operational briefing on optimising the use of forces and resources in combating the SARS-CoV-2 pandemic.

3 A working visit by a team from the Military Institute of Medicine – National Research Institute to the McCormick Center – Chicago's largest temporary patient isolation facility in the first stage of the COVID-19 pandemic.


WIM

BREAKTHROUGH IN SURGICAL TREATMENT

CENTRE FOR ROBOTIC SURGERY

The Centre for Robotic Surgery, launched at MIM – NRI in 2020, performs surgical procedures using the da Vinci surgical robot. The da Vinci robot enables performing extremely complex surgical procedures employing minimally invasive techniques. With the robot, the operator's field of vision is improved, natural hand muscle tremor is eliminated and the area of surgical intervention is significantly narrowed. As a result, the procedure involves less strain on patients.

Two procedures a day are performed at the MIM – NRI Centre for Robotic Surgery. From the very beginning, the block has been used for the following surgeries: the large intestine, radical hysterectomy, prostatectomy, excision of severe deep endometriosis, ENT surgery (removal of middle and lower throat tumours) and cardiac surgery.

The da Vinci system consists of three components. The first and most important of these is a system of surgically equipped robotic arms linked together by a large body. Because of its shape, the phrase 'surgical robot' is associated with this component.

Another part of the system is the console that controls the robot. The operator, located in the console, sees a three-dimensional image of the area being operated on through a viewfinder, while the robot's arms are controlled by manipulators. Without the operator at the console, the robot is unable to perform any operation on its own. Such a system offers the advantage of the console with the operator being located in another room outside the operating theatre, or even at a considerable distance from the operating theatre.

1 The da Vinci system with a trainer for performing procedures.

2 Working with the robotic system is an immersive experience.

2

At the heart of the system is a control unit with a monitor where the instructor can draw notes and directions visible to the operator during operations or training.

Complementary equipment at the Centre includes a state-of-the-art operating table integrated into the robot. Changing the position of the table automatically changes the position of the robotic arms.

In the future, within the Centre for Robotic Surgery we intend to create a unit with nationwide and Eastern European coverage dedicated to train new personnel for robotic platforms. Cooperation with the Ministry of Defence will allow us to use our experience in the telemedical properties of the robot to applications in the event of armed conflict. Contacts with NATO and the US Army (which already uses over 100 da Vinci robots, with another 100 planned for purchasing) will enable us to improve the quality of training by means of telemedical communication with robot-assisted centres during online surgeries.

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1 Behold the robot!

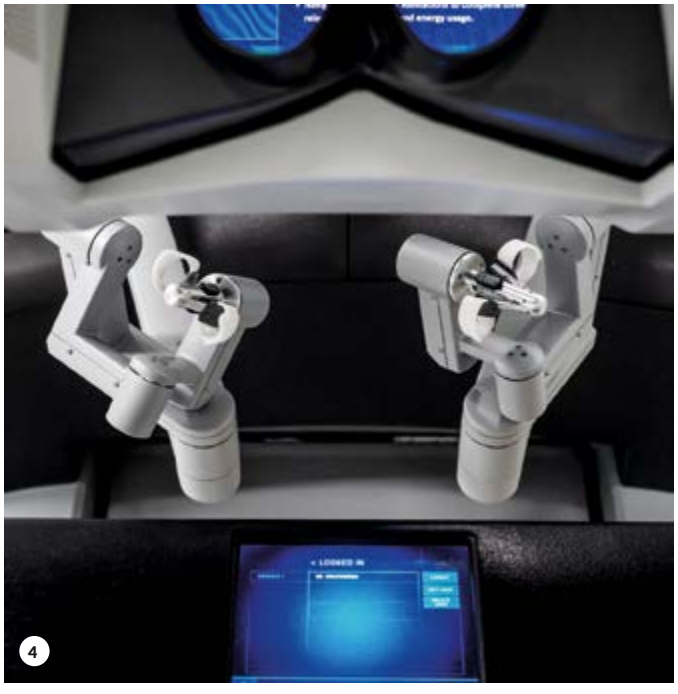
2 Training operating theatre nurses for working with precision tools.

3 Anaesthesia for robotic surgery also requires training.

4 View of the console from the operator's perspective.

5 The role of the assistant during surgery is no less important, despite using classic laparoscopic instruments.

3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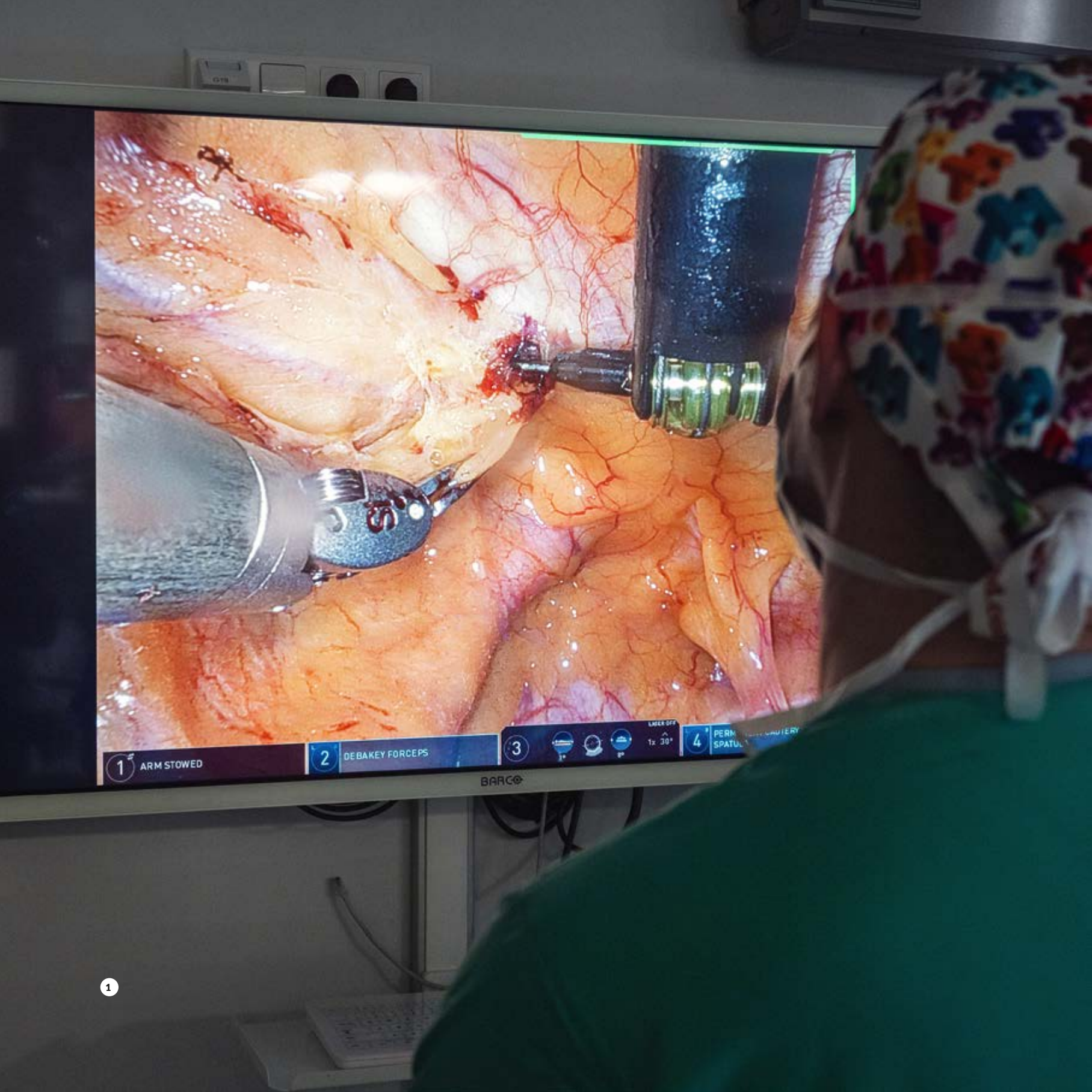

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1 Observing the procedure on additional monitors is truly fascinating.

2 The three tenors of robotic surgery at MIM – NRI – left to right: Dr Tomasz Syryło, Dr Andrzej Kwiatkowski, Dr Jacek Doniec (Head of the Centre).

3 Permanent team of the Centre for Robotic Surgery are trained to work with all types of operations.

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1 Robotic arms in the hands of the surgeon.

2 Anaesthetic nurse in action.

3 The assistance of an operating theatre nurse during the procedure is invaluable.

4 Trocars – blue lights at the arms confirming that everything is under the operator's control.

3

1 Assistants ensure proper functioning of robotic tools and endoscope during procedures.

2 Operating theatre manager stands guard.

3 Control panel for the robot arms during docking.

4 The operator can see the situation in the operating theatre at any time by tilting their head away from the console.

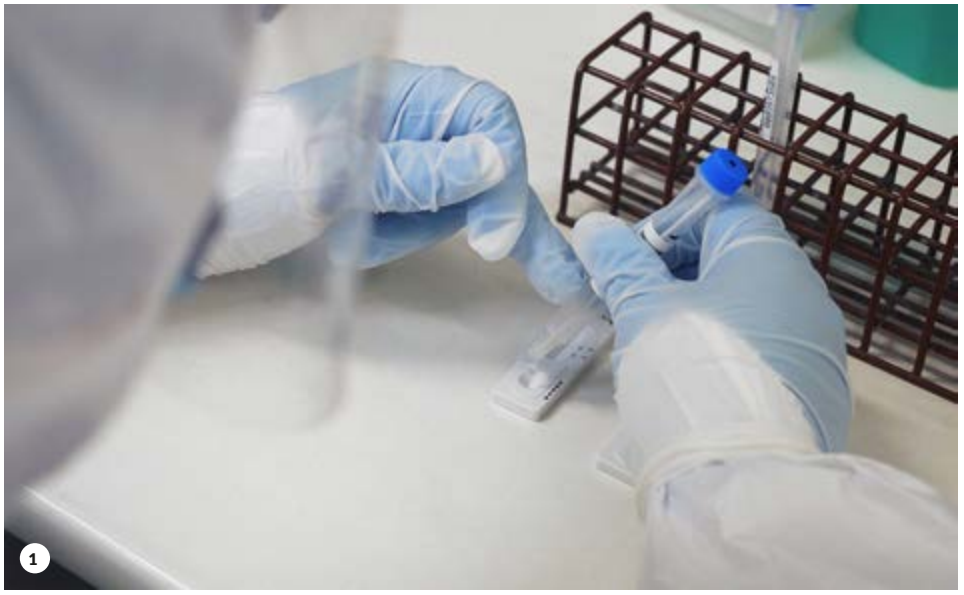

WIM

IN-HOUSE SOLUTIONS

OF THE DEPARTMENT OF LABORATORY DIAGNOSTICS

The Department of Laboratory Diagnostics is a large multi-profile laboratory within the structure of the MIM – NRI Ministry of Defense Central Clinical Hospital. According to the standards for the division of laboratories based on the type of safety level of the analytical services performed, it can be classified as Grade 2+ laboratory in terms of safety. Normally, such laboratories feature a Grade 2 status, but the COVID-19 pandemic posed new tasks, also in relation to the safety of working with material from patients suspected of being infected with SARS-CoV-2, infected with it or having contact with it. A designated area has been set up in the laboratory, where all the tests we offer are carried out under a higher sanitary regime. Care has been taken to ensure that material from COVID+ patients does not reach the general registration of the Department of Laboratory Diagnostics. Secured containers with material from such patients are delivered directly to the designated area of the laboratory via an airlocked feed window. Video surveillance has also been installed here so that the safety of the people in the special area can be monitored from the safe side of the laboratory corridor. The solutions that have been introduced in this part of the Department of Laboratory Diagnostics are also used on a daily basis in higher laboratory safety categories, i.e. in Grade 3 and even some Grade 4 laboratories.

Among our in-house solutions is the introduction of colour-coded labels on tubes and orders in the sample registration system. This optimises testing times and shortens the time needed to issue results. Samples with red-coloured labels



1 Performing an antigen test for the detection of SARS-CoV-2 virus in a nasopharyngeal swab taken from a patient. In a dedicated closed disposable cassette with reagents, prepared by specialised companies, the analyst applies the material previously taken from the patient to obtain a result indicating infection or lack thereof in less than 15 minutes. Such an analysis is particularly useful for patients waiting in the MIM – NRI Hospital Emergency Department. Also, a rapid result is crucial for initial diagnosis, sorting patients and selecting the optimal treatment method.

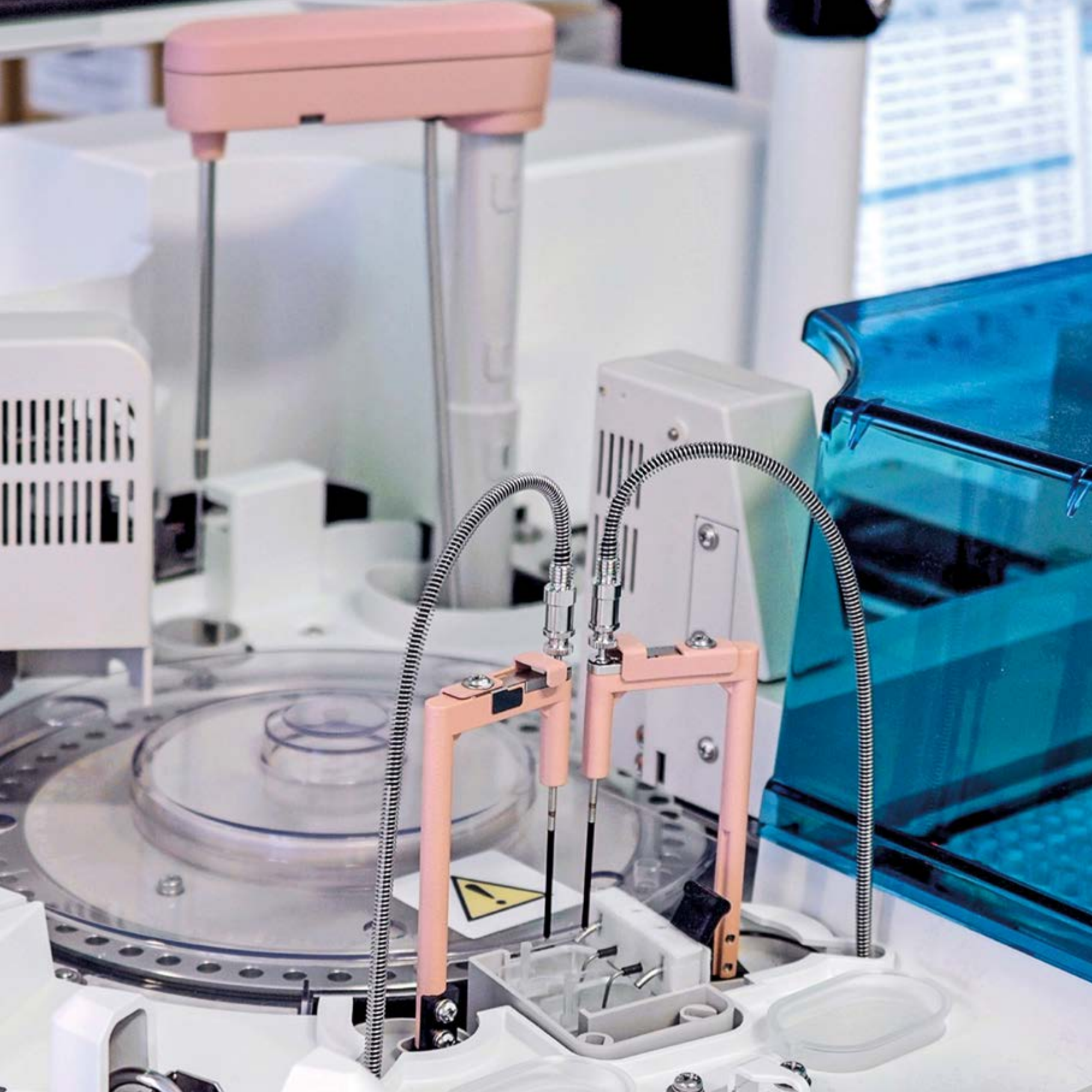
2 Working in a dedicated section of the lab designed for analysing specimens from patients suspected of being infected with SARS-CoV-2 and COVID 19 patients. All analysts working in the dedicated laboratory at the Department of Laboratory Diagnostics wear disposable TYVEK-type protective suits, double gloves, masks and shields, as well as protective footwear to ensure the safety of the testing staff.

are used for urgent tests. The ED works with such colour-coded labels, including urgent samples from the entire hospital.

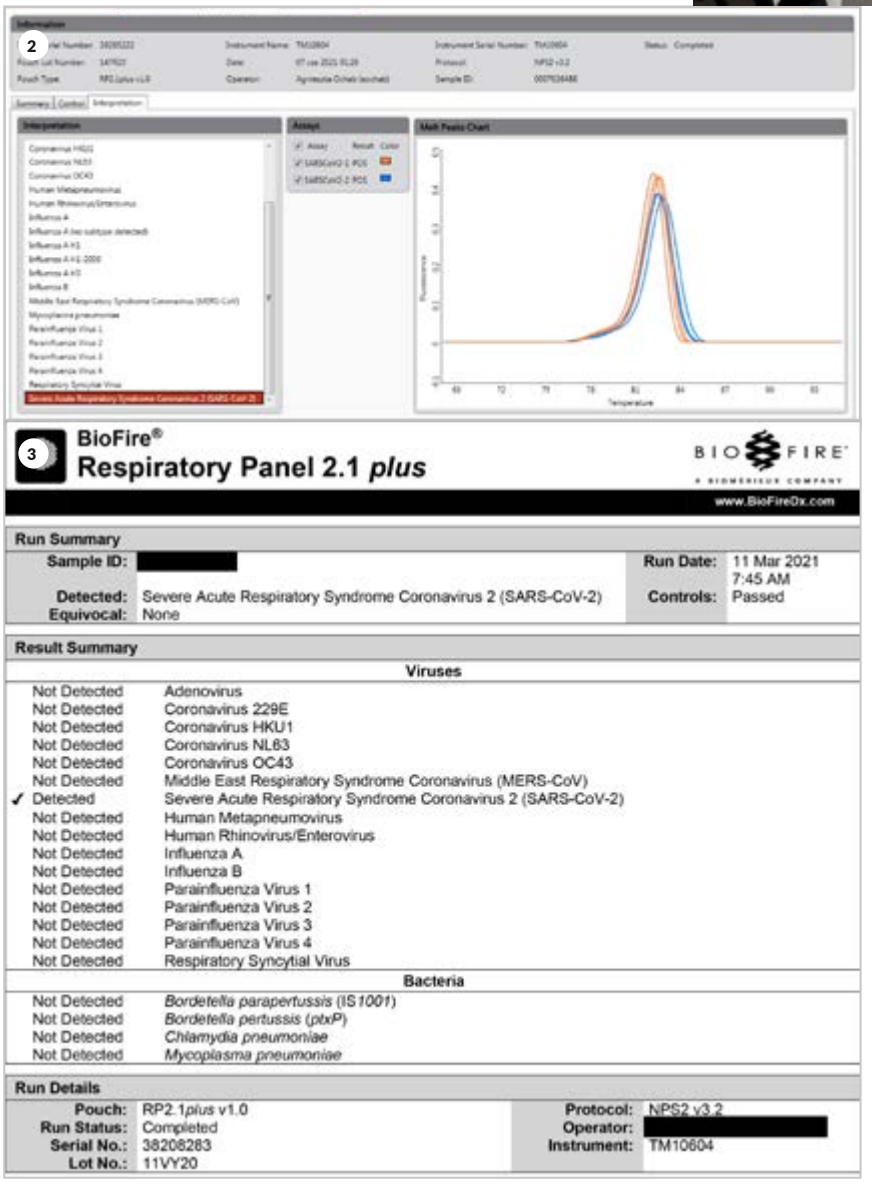
Yellow labels are reserved for oncology patients. Orange labels are added to samples earmarked for additional tests. Routine tests are labelled with black codes on a white background. This system vastly facilitates laboratory work and has found favour with doctors and nurses.

The Department comprises five laboratories. Codes of Haematology and Haemostasis, Biochemistry and Urgent Tests, Immunochemistry and Endocrinology, General Laboratory Medicine, Proteins and Allergens and the Microbiology Laboratory, where approximately 2 million parametres are performed annually, ranging from routine to highly specialised. The range of laboratory diagnostic tests includes biochemical, haematological, endocrine, cancer markers, specific proteins, allergy, serological and microbiological tests. As part of the monitoring of pharmacological treatment, certain drugs are also tested.

1 Device for biochemical and immunochemical analysis with high sample throughput for testing the blood of patients suspected of being infected with SARS-CoV-2 virus and COVID-19 patients. The apparatus is used for biochemical and immunochemical diagnosis on a continuous 24-hour basis. The picture shows the arms of the machine, which transfer the reagents and sample into an isolated, closed chamber where the analysis is performed. Also visible is the rotating platter onto which samples are automatically applied. The entire instrument is designed to minimise potential contamination of samples. This system protects the staff carrying out the analyses from possible contamination by aerosols generated during the work.



The Department of Laboratory Diagnostics at the MIM – NRI Ministry of Defense Central Clinical Hospital is not only a large laboratory area of almost 1,000 m² and a modern fleet of analysers, but above all it is staffed by almost 70 employees, including laboratory diagnosticians, specialists in medical analysis, microbiology, epidemiology, public health specialists, biologists, chemists and medical analysis technicians.



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Run Summary

Sample ID:	[redacted]	Run Date:	11 Mar 2021 7:45 AM
Detected:	Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)	Controls:	Passed
Equivocal:	None		

Result Summary

	Viruses
Not Detected	Adenovirus
Not Detected	Coronavirus 229E
Not Detected	Coronavirus HKU1
Not Detected	Coronavirus NL63
Not Detected	Coronavirus OC43
Not Detected	Middle East Respiratory Syndrome Coronavirus (MERS-CoV)
✓ Detected	Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)
Not Detected	Human Metapneumovirus
Not Detected	Human Rhinovirus/Enterovirus
Not Detected	Influenza A
Not Detected	Influenza B
Not Detected	Parainfluenza Virus 1
Not Detected	Parainfluenza Virus 2
Not Detected	Parainfluenza Virus 3
Not Detected	Parainfluenza Virus 4
Not Detected	Respiratory Syncytial Virus
	Bacteria
Not Detected	*Bordetella parapertussis* (IS*1001*)
Not Detected	*Bordetella pertussis* (*ptxP*)
Not Detected	*Chlamydia pneumoniae*
Not Detected	*Mycoplasma pneumoniae*

Run Details

Pouch:	RP2.1*plus* v1.0	Protocol:	NPS2 v3.2
Run Status:	Completed	Operator:	[redacted]
Serial No.:	38206283	Instrument:	TM10604
Lot No.:	11VY20		

1 2 3 Reading of a performed nucleic acid detection test of 20 different targets belonging to respiratory pathogens. The test enables, in less than 60 minutes, determining in a single sample taken from a patient's nasopharynx the presence of genetic material of SARS-CoV-2, influenza types A and B, other less common respiratory viral pathogens such as chlamydia, mycoplasma. This test and the device to perform it are particularly useful for patients awaiting urgent diagnosis at the MIM – NRI Hospital Emergency Department. Tests using this device in the sanitary regime are performed directly at the patient's bedside in a container outside the main building.

4 View from the video track, which allows observing the interior of the special laboratory dealing with the examination of samples of material collected from patients suspected of being infected with SARS-CoV-2 virus or COVID-19 patients. Such monitoring allows safe operation in cases where the apparatus is operated by one person. In addition, it allows safe access to this part of the laboratory during service breaks when the laboratory is empty. Entering this area involves a sanitary regime, which requires using special clothing by laboratory staff, a procedure that takes a longer period of time.

4

5

5 Maintaining environmental safety related to radiological protection in the laboratory. For this purpose, a gamma radiation monitor is used to detect and locate sources of radioactive materials in, among other things, blood samples taken from patients treated at MIM – NRI. The procedure shown in the photograph is performed every day with all material that is delivered to the Department of Laboratory Diagnostics. Specimens delivered to the laboratory from the Department of Endocrinology and Isotope Therapies of the MIM – NRI Ministry of Defense Central Clinical Hospital are analysed with particular care. Substances that may be present in the material include the samarium isotope Sm-153, the strontium isotope Sr-89, the yttrium isotope Y-90, the lutetium isotope Lu-177, the iodine isotope I-133 and the radium isotope Ra-223. If the permissible radiation level is exceeded after laboratory analyses, the biological material tubes are stored under special conditions until the radioactivity expires and only then are they disposed of as medical waste.


WIM

CARDIOVASCULAR DISEASES

MODERN AND COMPREHENSIVE CARE

A

At the Department of Cardiology and Internal Medicine at MIM – NRI, we have been implementing modern methods in the field of diagnostics and interventional treatment, intensive cardiac care and conservative treatment. We are dynamically developing procedures for percutaneous treatment of coronary vessels and structural heart defects. Thanks to cooperation with the Department of Cardiac Surgery, we perform the so-called hybrid surgeries, which often require the most sophisticated procedures of patient support, such as ECMO (extracorporeal membrane oxygenation). In terms of electrophysiology, we use state-of-the-art methods to diagnose and treat patients with atrial fibrillation or ventricular arrhythmia, as well as procedures for the implantation of innovative devices such as the subcutaneous defibrillator and the electrodeless pacemaker.

Another area of our activity is non-invasive diagnostics, where we implement new echocardiographic methods, non-invasive haemodynamic assessment by bioimpedance methods and advanced methods of assessing physical fitness. Such detailed examinations enable tailoring treatment to the individual needs of patients, especially those with hypertension or heart failure. The efficiency of diagnosis and treatment as well as the high quality of care are supported by advanced IT and telemedicine systems, an area in which our Clinic is one of Poland's leading units.

1 Arrhythmia substrate ablation procedure at the stage of transseptal puncture.

2 The procedure of stent implantation into the coronary artery.

1 Coronary artery angioplasty.

Our flagship telemedicine project is AMULET. A new model of medical care using modern methods of non-invasive clinical assessment and telemedicine in patients with heart failure. From 2017 to 2021, the project was implemented by a scientific consortium led by the Military Institute of Medicine – National Research Institute.

Heart failure is a major clinical, social and economic problem that poses a huge challenge to healthcare systems. Improving the quality of outpatient care is a prerequisite for reducing emergency hospital admissions and mortality among patients with this disease. In the AMULET project, we have developed a new model of telecare and teleconsultations at outpatient care centres. The innovative concept is based on nurse-led care and the use of modern methods for non-invasive haemodynamic assessment of the circulatory system (e.g. heart rate, blood pressure, chest and whole-body hydration status) and a telemedicine platform. In the AMULET project, we also developed a prototype of a mobile device for assessing vital signs at home.

The AMULET project opens up new possibilities for monitoring and treating patients with heart failure and optimising the use of staff resources. We expect that the innovative solutions developed in the project will improve the prognosis of patients with heart failure by increasing access to specialist care and effective detection of symptoms indicating a risk of exacerbation of the disease. As a result, this will improve patients' quality of life and reduce healthcare costs.

1

1 Simultaneous analysis of electrocardiographic and haemodynamic parameters allow for individualised planning of safe physical training in patients after myocardial infarction.

2 Preparation for endurance training on a cycle ergometer of a patient undergoing cardiac rehabilitation. The use of data-transmission equipment allows the patient's training to be monitored and controlled anywhere within range of the Internet or mobile telephony.


ergoline

Cardiac rehabilitation is an indispensable component of comprehensive care for patients after myocardial infarction, coronary angioplasty and heart failure. A patient-centred approach that combines physical activity with health education and psychological impact, has received recognition from international cardiovascular societies and has been given the highest class of recommendation (IA) in the current guidelines of the European Society of Cardiology. These standards also emphasise that participation in cardiac rehabilitation is a recognised indicator of the quality of cardiac care. Participation in comprehensive cardiac rehabilitation reduces the overall risk of death by up to 24% within one to three years. It also significantly reduces rehospitalisations by 31% per year.

Hybrid cardiac telerehabilitation, introduced in the Cardiac Rehabilitation Unit at MIM – NRI, thanks to the use of innovative telemedical solutions, allows combining the advantages of classic in house forms and rehabilitation in the home environment. In the initial hospital period, a therapeutic team consisting of a cardiologist, a medical rehabilitation specialist, a physiotherapist, a psychologist, a dietician, a nurse and an electrocardiology technician develops an individual plan for the patient's recovery after a cardiovascular incident. This is the time to assess the patient's clinical condition with optimisation of pharmacotherapy, perform necessary laboratory tests, assess physical fitness, plan and conduct training sessions, educate the patient on self-assessment of symptoms and health-seeking behaviour, and provide psychological counselling. The patient is equipped with ECG monitoring equipment, which thanks to a system of light and sound signals indicates the next stages of training. The core period takes place at the patient's residence and consists of systematic, individually planned physical training under the supervision of medical personnel using modern data transmission technologies that allow the patient's training to be monitored and controlled anywhere within the reach of the Internet or mobile telephony. Each training day, a staff member contacts the patient, assesses the clinical condition and supports the patient through the training phases. The training is carried out in line with the indications of the device, with simultaneous recording and transmission of ECGs. Hybrid cardiac telerehabilitation concludes with a follow-up visit aiming to assess the effectiveness of the rehabilitation and provide recommendations on lifestyle and pharmacological treatment. According to current knowledge, the clinical effectiveness of rehabilitation models using modern telemedicine techniques are comparable to classic rehabilitation models.


1

1 Assessment of physical performance in a patient undergoing cardiac rehabilitation using ergospirometric testing (Cardiopulmonary exercise testing – CPET). This examination combines electrocardiographic assessment with non-invasive evaluation of gas exchange during progressively increased exercise.

2 3 Impedance cardiography, a non-invasive method of assessing haemodynamic cardiovascular parameters, in the monitoring of the cardiovascular system to support the treatment of patients with heart failure.

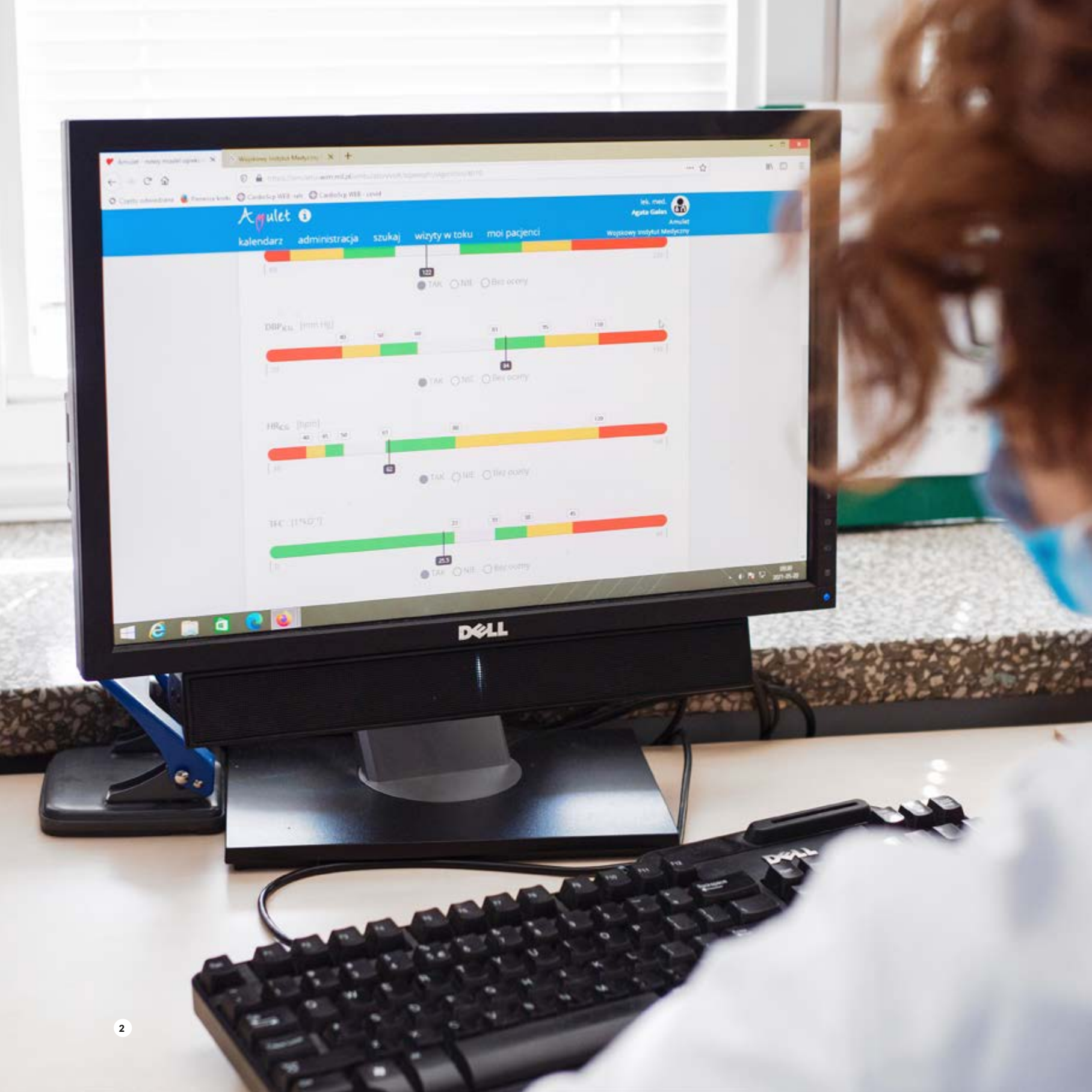
The implementation of cardiac hybrid telerehabilitation, in line with clinical indications, has allowed us to optimise hospitalisation time and increase the number of patients receiving rehabilitation treatment. The innovation of our method enables utilising the advantages of inpatient rehabilitation with optimal management of the time the patient spends in hospital (we then carry out the necessary training in the modification of cardiovascular risk factors, psychological counselling, dietary advice, lifestyle modification) and the principles of safe outpatient training to consolidate the positive effects of physical exercise on the cardiovascular system. Long-term monitoring also contributes to improved patient compliance. The use of modern equipment and innovative telemedicine technologies meets the modern challenges of the healthcare system, allowing the optimisation of comprehensive care for patients after myocardial infarction treated at MIM – NRI. The procedure, in accordance with the regulation of the Minister of Health, is financed by the National Health Fund.

The particular value of the implemented hybrid model of cardiac telerehabilitation became apparent during the SARS-CoV-2 pandemic, when we observed an increased redirection of the work of the healthcare system towards telemedicine techniques. This period is also characterised by a reduction in the availability of telerehabilitation centres for patients providing cardiac rehabilitation after myocardial infarction. In this way, the implemented telerehabilitation model is an important element in counteracting the remote health effects of the SARS-CoV-2 pandemic.

The implementation of the new technologies was made possible thanks to the implementation of a project within the framework of the Clinical Grant competition of the Ministry of National Defence called *Improvement of the quality of health services in the field of cardiac rehabilitation through implementation of modern methods of exercise monitoring and electrocardiological telemonitoring*.

1 Point of ambulatory care for heart failure patients in the AMULET project.

2 Specialist teleconsultation using the telemedical decision support module developed as part of the AMULET project.


Amulet
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TAK
NIE
Bez oceny
DELL


WIM

BREAST UNIT AT MIM – NRI

HIGHEST STANDARDS IN BREAST CANCER TREATMENT

The Breast Unit, or the Centre for the Diagnosis and Treatment of Breast Diseases at MIM – NRI, is the first centre in Mazovia to be certified by SIS, Senologic International Society. It has been operating at MIM – NRI since 2018. The SIS accreditation is a great prestige for the Institute, and at the same time a guarantee of the highest standards of patient treatment.

Patients diagnosed with breast cancer at the MIM – NRI Breast Unit are provided with modular care. A team of specialists in the field of radiology, pathomorphology, oncological surgery, clinical oncology, radiotherapy, rehabilitation and psychology work together in the diagnostic and treatment process.

The Breast Unit at MIM – NRI also uses modern and complete organisational and technical facilities enabling comprehensive management of all stages of diagnosis, treatment and rehabilitation of breast cancer patients. The Radiotherapy Department is equipped with a therapeutic line with three state-of-the-art irradiation devices. This enables applying the latest radiotherapy techniques in a precise and safe manner.

In line with global trends, the Oncology Clinic of the Military Institute of Medicine – National Research Institute treats patients mainly on an outpatient basis. The Day Chemotherapy Centre uses modern facilities, and thanks to the introduction of portable pumps, chemotherapy infusions can be administered over many hours without the need for hospitalisation. In addition, patients undergoing therapy can benefit from a hair loss prevention system.

1 The MIM – NRI Breast Unit Centre features modern, high-quality equipment for breast screening and diagnostic examinations. Siemens MAMMOMAT 3000 NOVA, an analogue digital mammograph.

2 The clinic, taking care of the safety and comfort of patients (immunocompromised during chemotherapy), allows nasopharyngeal swabbing for SARS-CoV-2 diagnosis. A swab collection point for SARS-CoV-2 virus has been organised within the Day Centre of the MIM – NRI Oncology Clinic.

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1 Thanks to a grant from the Ministry of Defence, the MIM – NRI BCU Oncology Clinic utilises the highest quality equipment for cooling the scalp during chemotherapy to reduce hair loss. Hair loss, leading to alopecia, is one of the more visible side effects of chemotherapy. Hair loss during chemotherapy causes patients additional stress and negatively affects quality of life, especially for women.

2 Prevention of hair loss through using a scalp cooling system (caps) improves patients' quality of life, their self-esteem and mental attitude towards chemotherapy, which markedly facilitates the treatment process. The Paxman system regulates the cooling temperature so as to locally shrink the capillaries of the scalp and achieve a temporary reduction in blood flow to the surface of blood at its surface, thereby reducing the dose of chemotherapeutic agent reaching the sensitive capillary follicles.

3 The cap worn on the head is filled with a fluid circulating at a temperature of -5°C. The effectiveness in reducing the balding process ranges from 50% to 90%, depending on the correct choice of cap, the condition of the hair and the type of chemotherapy used. The system is safe and does not impair treatment results.

4 5 In patients undergoing surgical treatment, the SentiMac system enables locating the 'sentinel' lymph nodes and deciding whether axillary lymph node removal is advisable.

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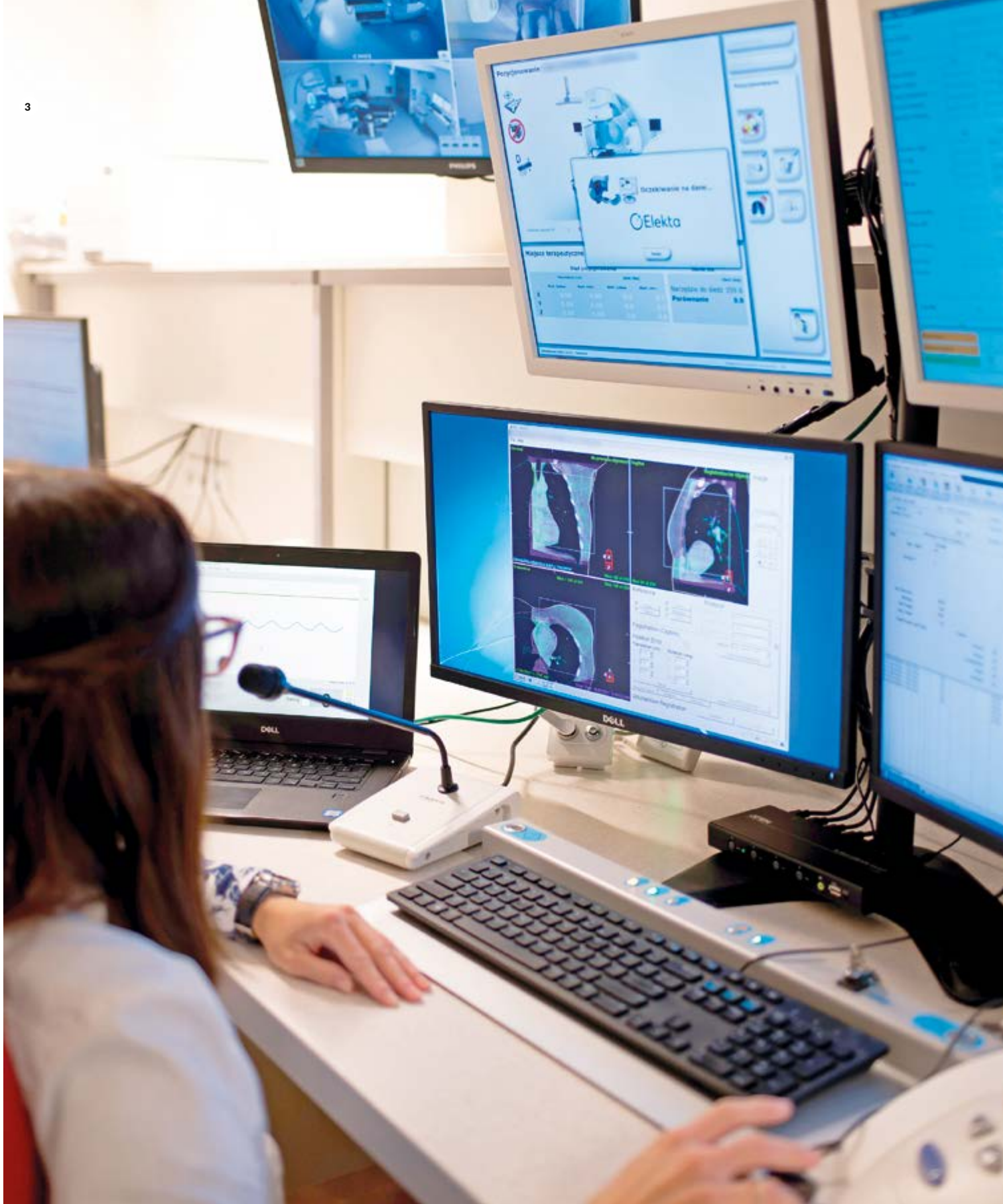
1 Deep Inspiratory Breath Hold (DIBH), a state-of-the-art radiotherapy method using Elekta's Active Breathing Coordinator (ABC) system was implemented at the MIM – NRI Radiotherapy Department.

2 With the improvement of breast cancer treatment outcomes, minimising the adverse effects of therapy gains importance.

3 Thanks to modern radiotherapy technology DIBH-ABC it is possible to reduce the dose received by the heart in patients with left breast cancer, which is associated with a reduced risk of future cardiac complications.

2

3



1 The Central Laboratory for the Preparation of Cytotoxic Drugs uses world-class equipment. Production is organised in accordance with the requirements of Polish law, the latest standards of the Polish Pharmaceutical Society and in accordance with the principles of GMP (Good Manufacturing Practice).

1

1 The Central Cytotoxic Drug Laboratory uses a computerised system to manage the preparation of cytostatic drugs (Cato®), and production is carried out using a gravimetric method to ensure the safety of patients and staff.

2 3 In modern oncology, fewer and fewer treatment and diagnostic procedures require hospitalisation, so most services are performed on an outpatient basis, which is much more convenient, safer for patients and cheaper. We have taken care to create the best possible environment for our patients during the difficult period that is the treatment process.


WIM

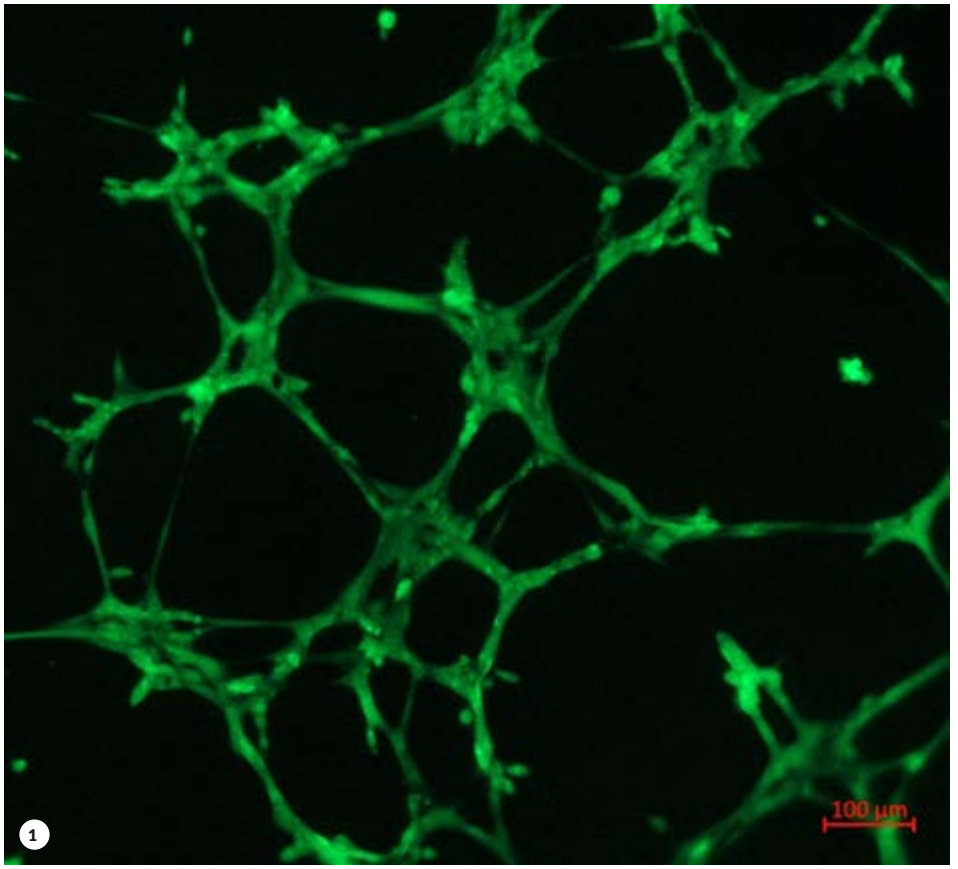
LOMTI

INNOVATIVE RESEARCH ON LIFESTYLE DISEASES

In the Laboratory of Molecular Oncology and Innovative Therapies (LOMTI), young scientists, using molecular and cell biology techniques, carry out innovative research projects. They seek to understand the biological basis of various diseases, which can help to develop new therapeutic strategies.

One of the phenomena under study is hypoxia and its impact on the course of lifestyle diseases, in particular cancer, heart disease and diabetes. The oxygen level in the atmospheric air, in which most laboratories conduct experiments (so-called normoxia), reaches around 19%, while in a cancerous tumour it drops even below 1%. It is therefore important to mirror these oxygen conditions in experimental models.

Research into the role of hypoxia in disease processes has been awarded a Nobel Prize in 2019, further emphasising the value of the research conducted at LOMTI. By using special chambers to grow cells under controlled oxygen conditions, including normoxia and hypoxia, it is possible to study biological phenomena under conditions that are as close to physiological as possible. Thanks to this approach, the results obtained at LOMTI are much more applicable to clinical reality than standard analyses conducted to date.



1 Mouse brain endothelial cells forming pseudovessels in the Tube formation assay stained with fluorescent dye.

2 3 4 5 In the course of their daily work at LOMTI, scientists use molecular biology methods. By elucidating the biological basis of various diseases, they can develop new and innovative therapeutic strategies.

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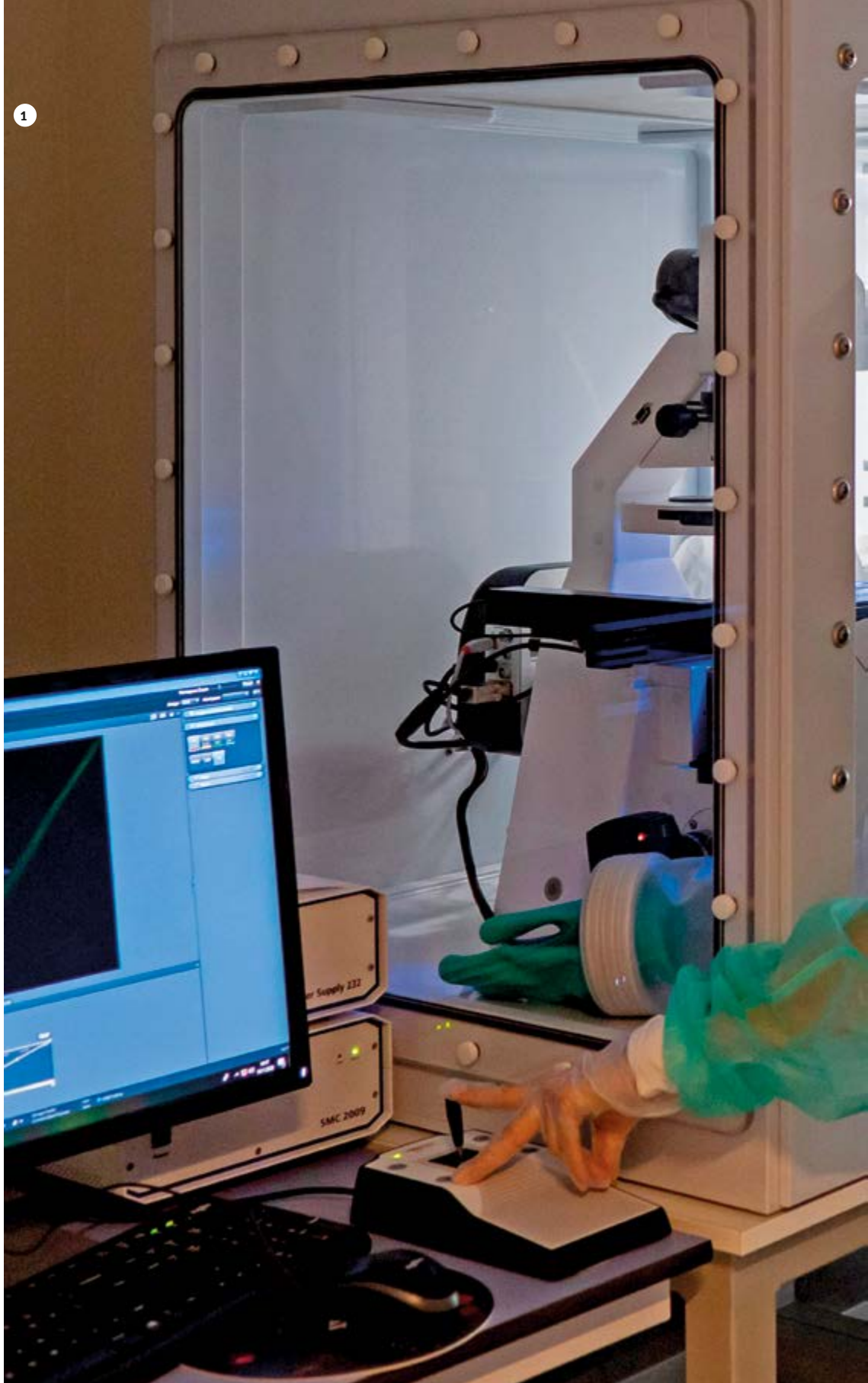

1 System for the preparation and in vitro culture of cells under controlled O_2 conditions.

One of the main pieces of equipment used in LOMTI research is an automatically controlled hypoxia chamber for the sterile processing and cultivation of cells at different O_2 pressure conditions. The chamber is used for simultaneous experiments in three different oxygen conditions corresponding to different body tissues or disease states (e.g. hypoxic tumour).

Cells cultured under different oxygen conditions, reflecting the tissue microenvironment, are analysed at a functional and molecular level. Changes in cells are determined at the level of gene expression, proteins, secreted factors and metabolism. Molecular biology methods – such as fluorescence microscopy, PCR, protein analysis (Western blot, ELISA) and flow cytometry – are used to investigate biological phenomena such as apoptosis, autophagy, cell ageing, oxidative stress, immune response, angiogenesis and drug sensitivity. Understanding the molecular basis of various diseases can explain their clinical course and contribute to the development of new, innovative therapies.

The methods and apparatus available at LOMTI are used to conduct research in collaboration with various clinical centres of the Military Institute of Medicine – National Research Institute.


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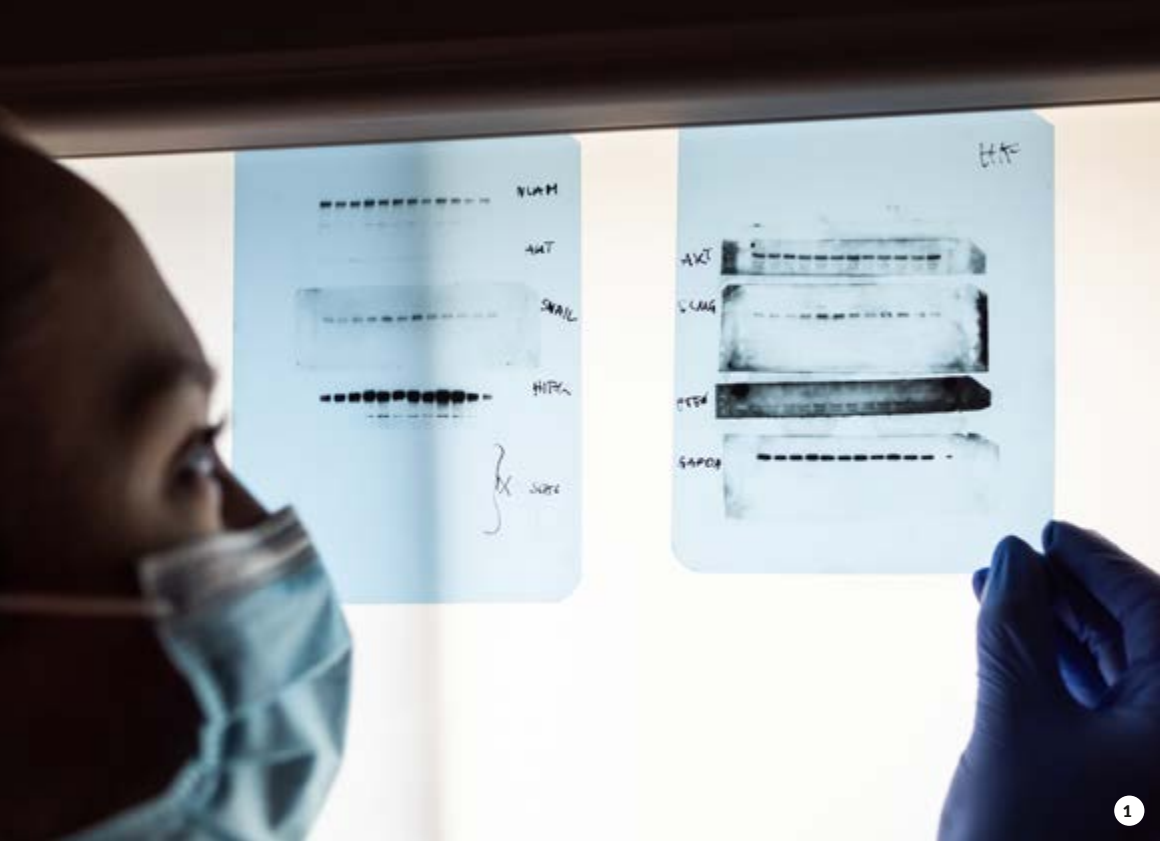
1 LOMTI uses a number of human and mouse cell lines as in vitro models of various diseases, e.g. cancer cells (kidney cancer, ovarian cancer and others) and from various tissues (e.g. endothelial cells, skin cells, liver cells, leukocytes and others). These are stored in liquid nitrogen and used in experiments.

2 Cell cultures are established aseptically in a laminar chamber under atmospheric oxygen pressure and then cultured in a CO_2 incubator at 37°C.

3 In parallel, to correctly reflect the oxygen conditions in the body (e.g. the physiological oxygen level in the skin equals 1%), experiments are also carried out in a hypoxia chamber.

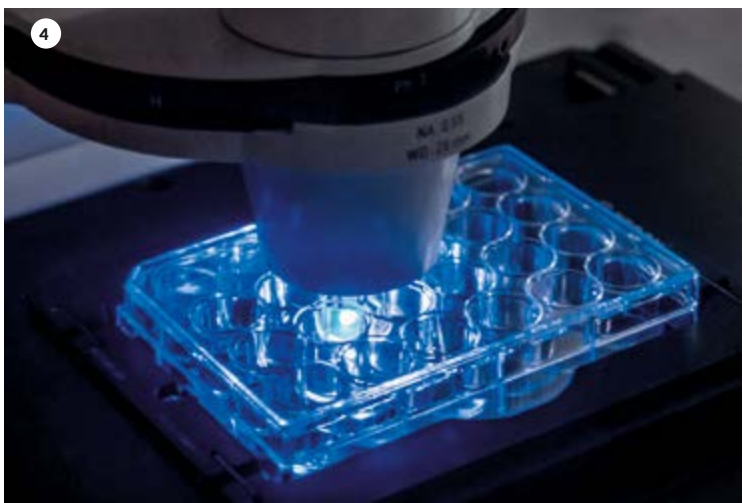
4 Cells are cultured in vitro in special dishes and media. Agents that alter cell activity and metabolism (e.g. cytostatics, growth factors, new molecules with therapeutic potential) are added in order to study the molecular mechanisms of disease and drug action. This enables determining the potential efficacy of new therapies in simplified in vitro models.



1 Changes in protein levels in cells are assessed by Western Blot, among other methods.

3

2 3 4 By using fluorescence microscopy, we can observe changes in cell morphology. Using 3D models and so-called co-cultures of different cell types, more complex in vitro models of tissues are created that better reflect the intercellular interactions taking place in the body.



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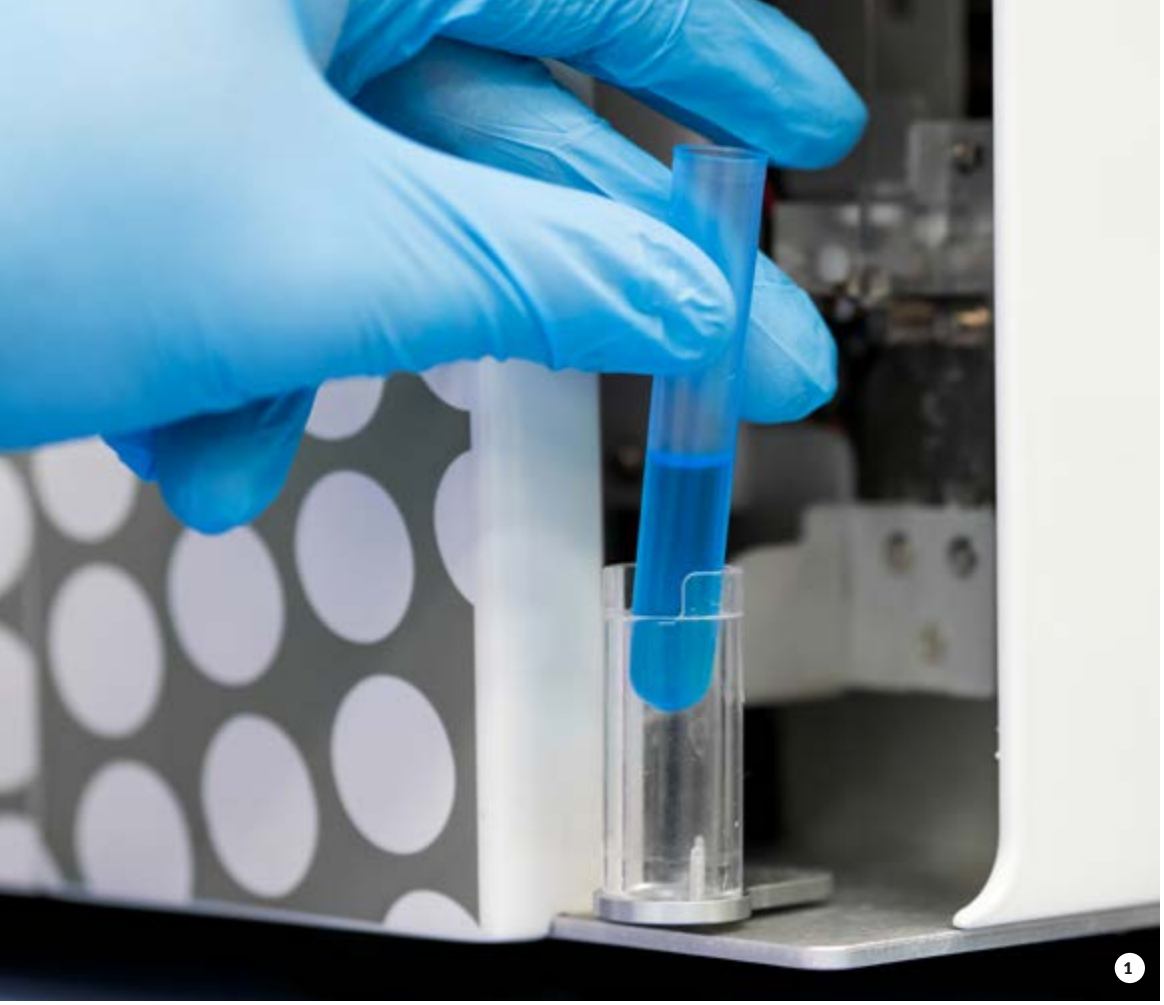
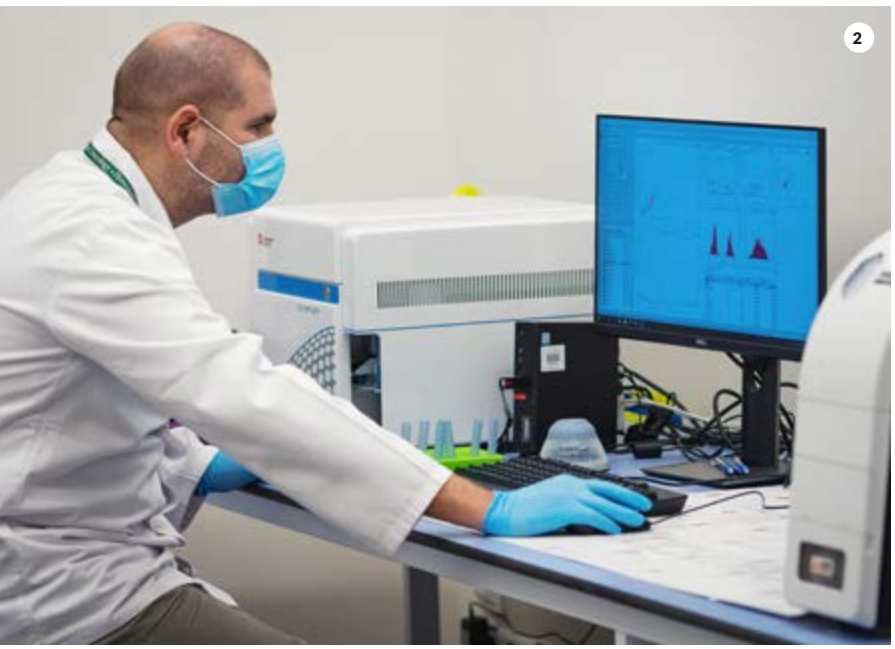


1 2 Flow cytometry is used to characterise, among other things, the course of the immune response, including in COVID-19 patients. Individual cells can also be analysed, e.g. their viability or oxidative stress levels.

3 4 Real-time PCR is used to determine changes in gene expression levels under the influence of the active substances being tested.




WIM

LATEST TECHNOLOGICAL DEVELOPMENTS IN THE LABORATORY OF SURGICAL RADIOLOGY

The Laboratory of Procedural Radiology is a highly specialised clinical centre performing percutaneous minimally invasive endovascular procedures, supporting the work of many clinics and facilities at the Military Institute of Medicine – National Research Institute.

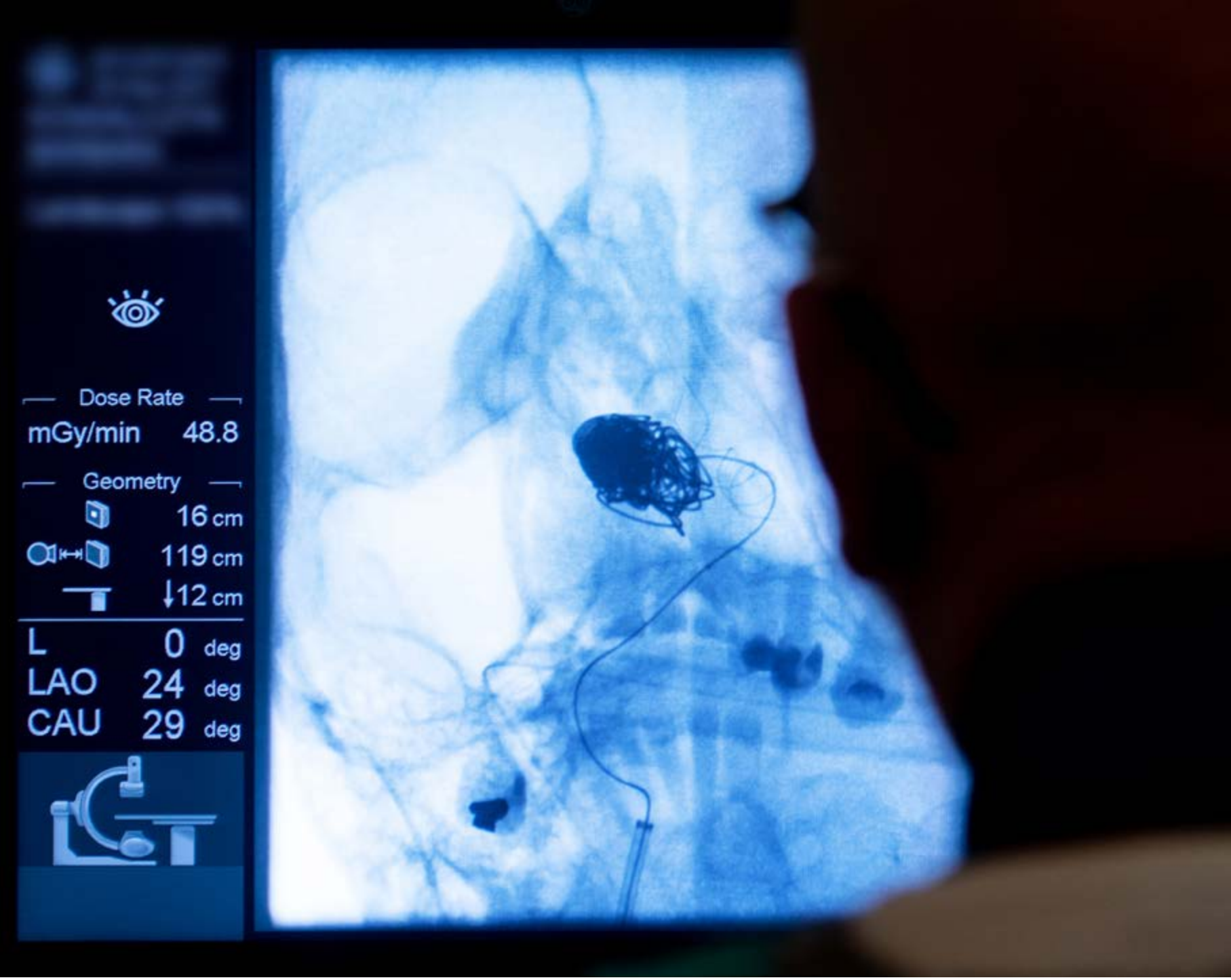
In this way, we treat vascular diseases of the nervous system, such as cerebral aneurysms, brain and spinal cord hemangiomas, meningeal fistulas of the brain and spinal cord. During the procedures, we use the latest technological solutions. We embolise cerebral aneurysms using special platinum spirals, cerebral balloons and advanced cerebral stents, including those that modify blood flow in the artery – the so-called Flowdiverter. As a result, we are able to effectively and safely treat patients with aneurysms of the most complex geometry. Special miniature catheters and state-of-the-art embolisation materials allow us to effectively 'close' life-threatening cerebral aneurysms and fistulas, often in remote and deep locations where classic surgery would be difficult.

Regularly since 2015, we have been the first in the country to perform invasive inferior scalene sinus catheterisation in adults and children referred to us from the Department of Neurosurgery and the Department of Endocrinology at MIM – NRI. In this way, we assist in the differential diagnosis of ACTH-dependent hypercortisolemia and in planning successful surgery for pituitary tumours.

1 Through a keyhole – an incision about 3 mm long allows multiple instruments to be inserted into the vascular system.

2 Platinum hair – brain spirals woven from platinum thread are used to fill the aneurysm sac from the inside, without having to open the skull.

3 By thread to the ball – coaxial insertion of instruments with increasingly smaller diameters allows us to reach the most distant regions.



1 Operating field – for the surgical radiologist, the operating field is presented on specialised screens where they can see everything at a glance.

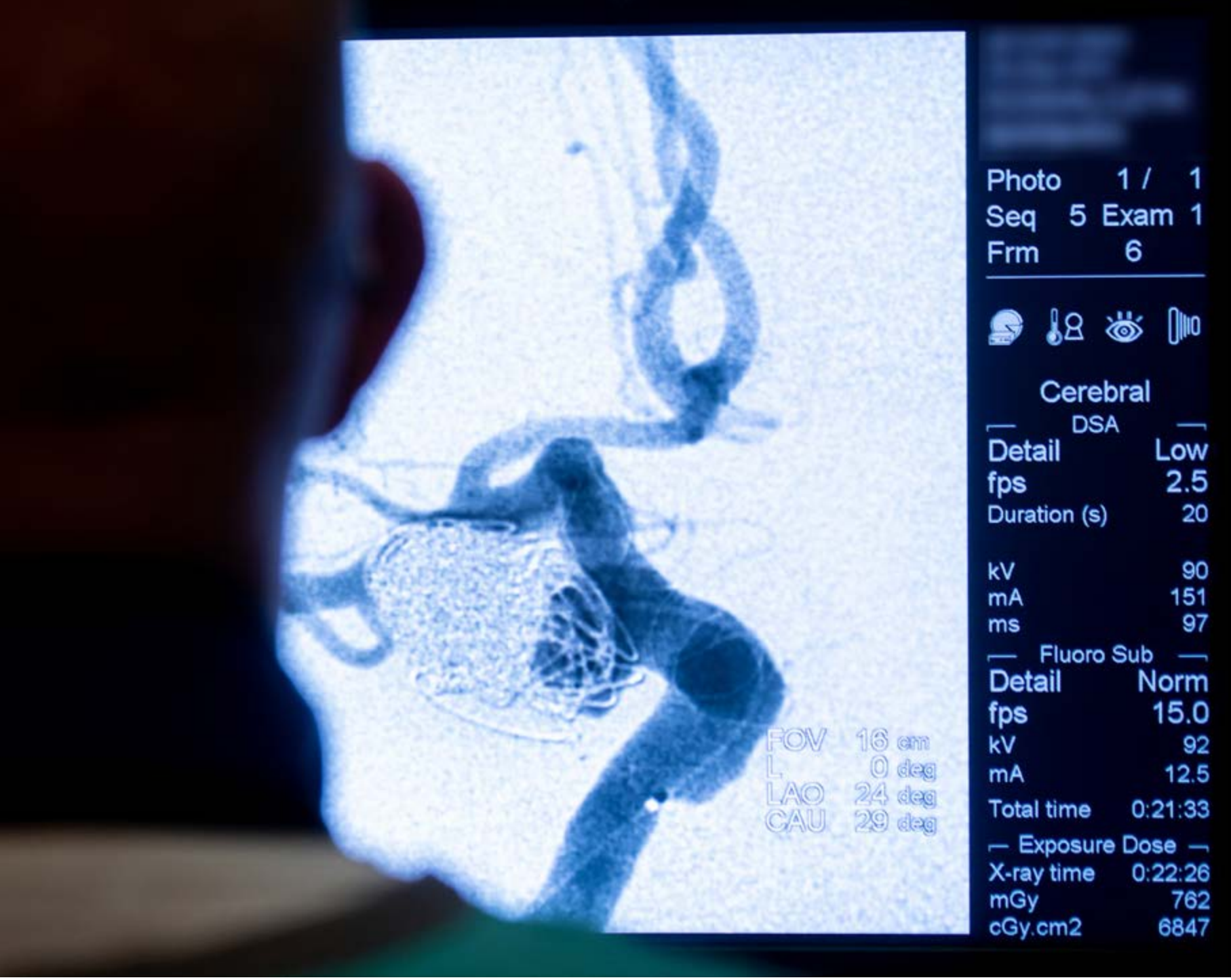


Photo 1 / 1
Seq 5 Exam 1
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Cerebral
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kV 90
mA 151
ms 97
Fluoro Sub
Detail Norm
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kV 92
mA 12.5
Total time 0:21:33
Exposure Dose
X-ray time 0:22:26
mGy 762
cGy.cm2 6847
FOV 16 cm
L 0 deg
LAO 24 deg
CAU 29 deg

Since 2011, we have regularly performed mechanical thrombectomy of the cerebral vessels in patients with acute cerebral ischaemic stroke, which is why we were invited by the Minister of Health to take part in a nationwide pilot programme for the surgical treatment of stroke. The effectiveness of our treatments and the results of the work of our neurological colleagues resulted in the MIM – NRI Department of Neurology receiving the prestigious European Stroke Organisation certificate.

Our experience allows us to be actively involved in the work of international expert groups formulating guidelines for endovascular treatment of stroke involving distal cerebral arteries. We have also been invited to participate in international multicentre clinical trials on the surgical treatment of stroke.

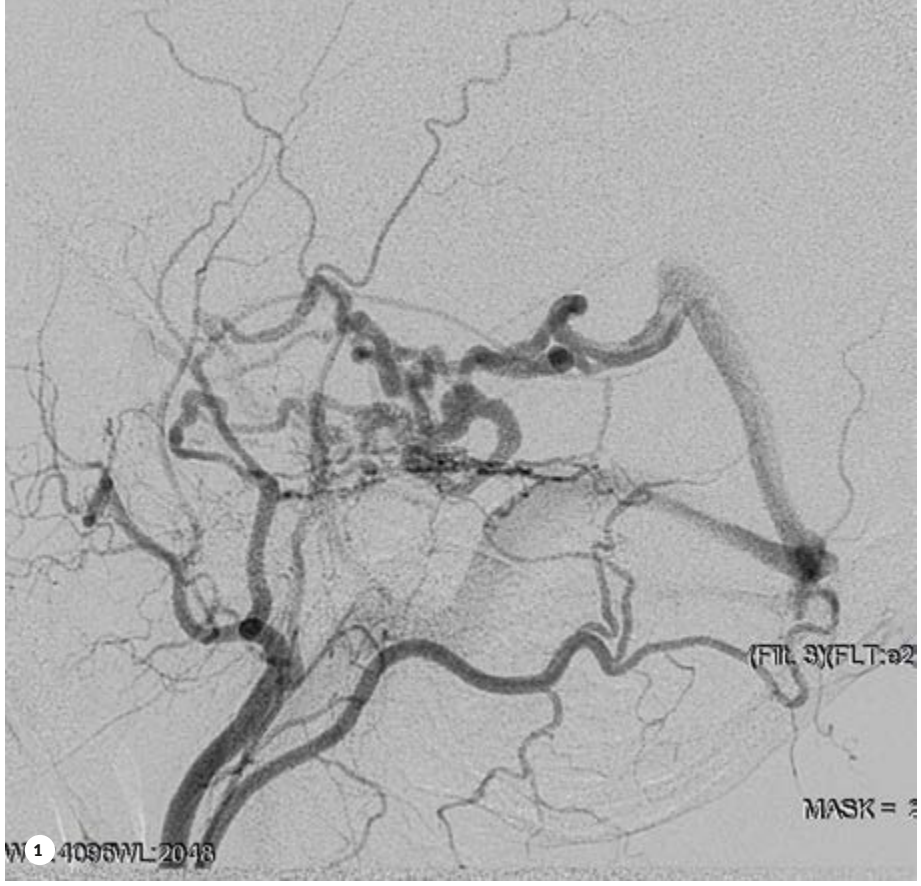
1 Preparation for surgery – any surgery requires thorough preparation, often using highly specialised imaging modalities such as perfusion imaging prior to stroke treatment.

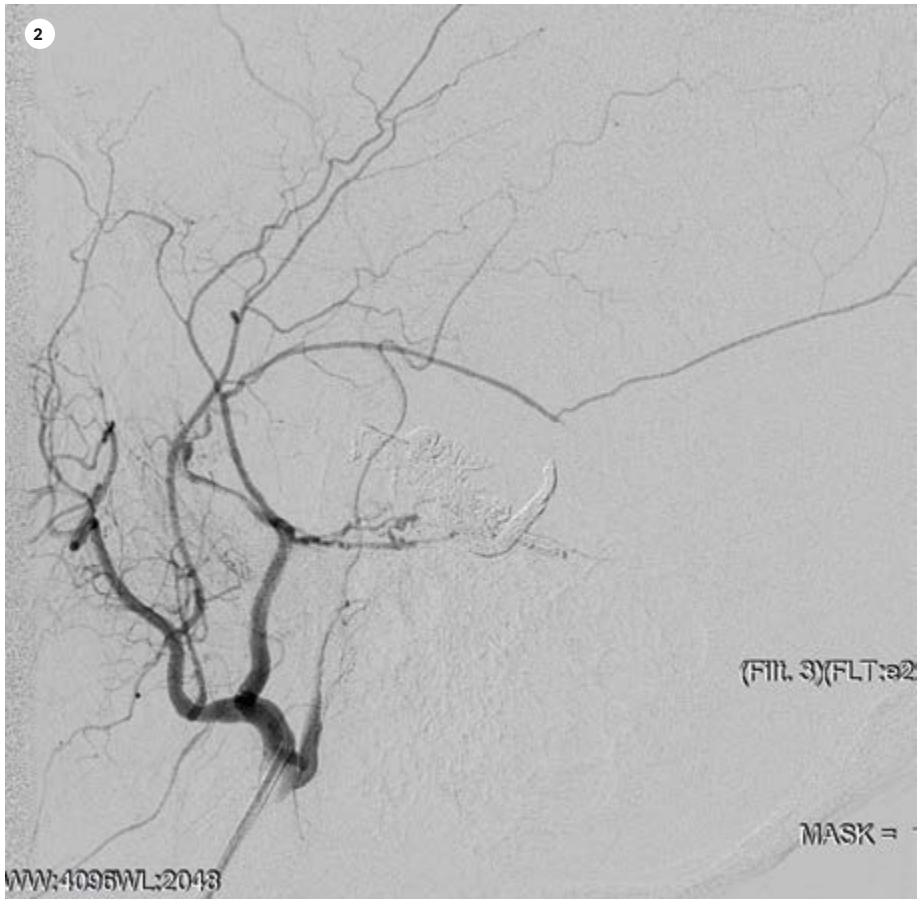
2 Angiography during inferior scalene sinus catheterisation for the diagnosis of hypercortisolaemia prior to pituitary tumour surgery.

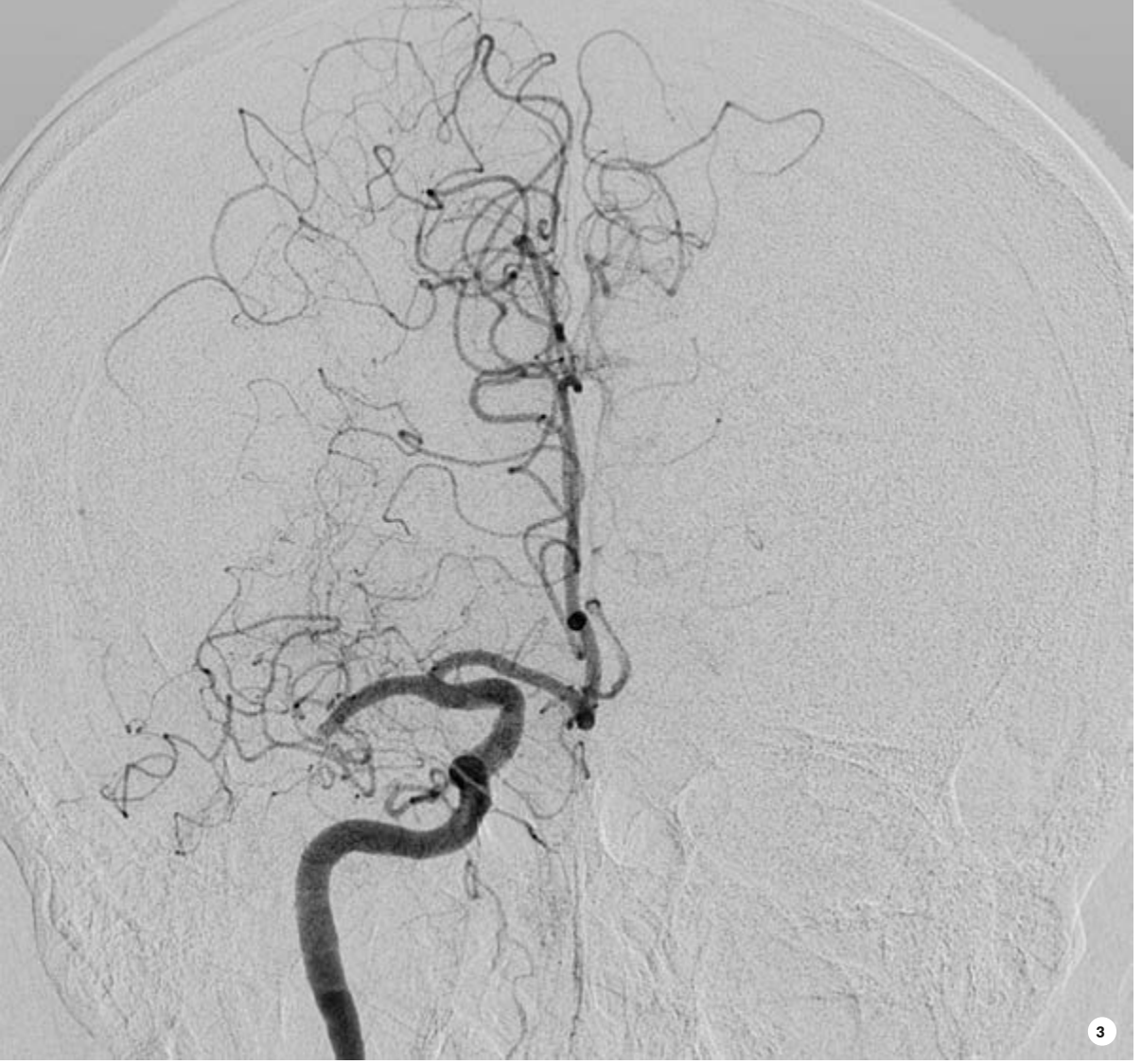
3 4 Embolisation of a highly vascularised tumour in the pterygopalatine fossa before ENT surgery significantly reduces the risk of bleeding.

In 2009, we were the first in Poland to start performing radio-embolisation procedures of primary and metastatic liver tumours using radio-isotopes, including ITR-90. As part of our comprehensive approach to loco-regional liver treatment, we co-operate with the MIM – NRI Oncology Clinic and numerous oncology centres from all over the country, as well as with a leading international centre – the Department of Radiology and Nuclear Medicine at the Medical University of Magdeburg. Our achievements in this field have been recognised by the international community and have resulted in participation in further international clinical trials on radioembolisation of liver tumours.

We effectively combine clinical activities with innovative research in basic science, forming an interdisciplinary team together with the Laboratory of Molecular Oncology and Innovation Therapies of the MIM – NRI and the National Centre for Nuclear Research in Świerk. We are working to understand the effect of radiation on liver cancer cells and are trying to develop Polish beta-emitting microspheres. For many years, we have been providing emergency care not only for the needs of patients of the Military Institute of Medicine – National Research Institute in Warsaw, but also other hospitals in Warsaw and neighbouring provinces. What sets us apart from other vascular centres in Poland is that we are on stationary duty 24 hours a day, 7 days a week. As a result, we are able to quickly and effectively provide assistance to patients in a life-threatening condition.







3

1 2 Complex meningeal fistula of the tent was closed using a specialised embolisation fluid with micronised tantalum, administered through a <0.2 mm lumen myroceiver.

3 4 Stroke of the right cerebral hemisphere – the thrombus closing the cerebral artery was completely removed, restoring blood flow to the brain, giving the patient a chance to recover.

4


WIM

NUCLEAR MEDICINE

THE FUTURE OF DIAGNOSTIC IMAGING

1 Preparation of radiolabels is carried out under sterile conditions using special shielding in dedicated equipment.


EC

Lifestyle diseases, such as cancer and coronary heart disease, account for approximately 80% of all deaths. Diagnostic tests using radioactive elements enable detecting diseases at an early stage, as well as assessing the effectiveness of the treatment already being given. The Department of Nuclear Medicine of the Military Institute of Medicine – National Research Institute offers a full range of isotope-based examinations (e.g. cardiac scintigraphy in coronary heart disease, bone scintigraphy in cancer, scintigraphy of the kidneys and brain, thyroid scintigraphy in hyperthyroidism and tumours, somatostatin receptor imaging in neuroendocrine tumours, imaging of dopamine receptors in the diagnosis of Parkinson's disease, perfusion and ventilation scintigraphy of the lungs in the diagnosis of dyspnoea).

Every morning, radiotechnicians make preparations (so-called radio markers) for each patient, which are placed in a separate syringe labelled with the patient's name. Before the preparations are used, they are verified in the Control Room for the Quality of Radiopharmaceuticals. Usually, the radiolabel is administered intravenously, but other routes can be used, e.g. inhalation or orally.

The accumulation of radiolabel in the patient's body allows us to detect and determine the location of lesions. We use special equipment, known as gammacameras, to localise them. Purchasing modern and highly sensitive gammacameras has allowed more precise diagnosis and a reduction in the dose of radioactive isotope received by the patient.

1 Radiolabel in a shield to protect personnel from ionising radiation.

2 Procedure for retrieving patient-specific cardiac radiolabel from a parent vial. The vial is placed in a lead shield to protect it from radiation.

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3 Before administering the radiolabel to the patient, we perform a quality control of the administered preparation. We take a sample of the radiolabel and place it on a special blotting paper (TLC method), then a specialised scanner assesses the presence of mpurities in the sample.

4 Administration of the radioisotope to the patient by means of a syringe placed in a special tungsten sheath. The radiolabel is usually administered intravenously, but other routes (oral, inhalation) can also be used, depending on the purpose of the study.

We have equipped MIM – NRI with a new gammacamera – a hybrid scanner with a diagnostic SPECT/CT CT scanner purchased in 2021 thanks to funding from the Ministry of Health. In addition, we were the first institution in Poland and the only one in the Mazovia region to purchase the latest gammacamera with so-called CZT detectors, thanks to which we perform cardiac vascularisation examinations using isotope doses that are half the size of those used previously, while the diagnostic time has been reduced from 20 to 5 minutes.

1 A gammacamera is a device used to examine patients in the Department of Nuclear Medicine usually coupled to a multi-row CT scanner. The entire imaging process is supervised by a specialised electroradiology technician.

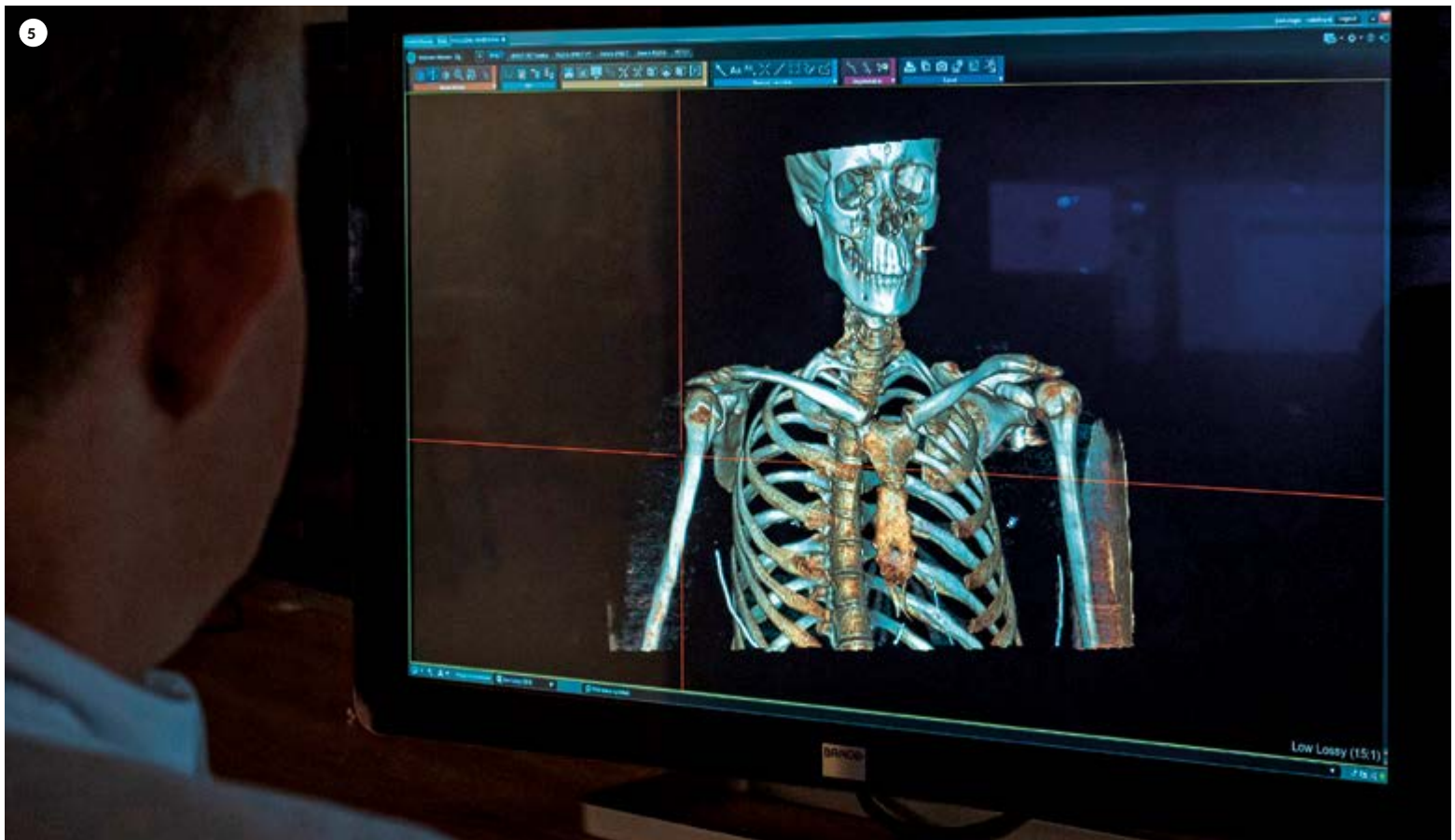
2 The examination is usually performed in the supine position. During the examination, it is important that the patient does not move, in order to obtain images without artefacts (interference) that provide good material for the doctor describing the examination.

3 The technician continuously observes the examination and the patient's condition during the scan. If necessary, appropriate adjustments are made to the examination procedure.

4 The nuclear medicine specialist evaluates the examination and makes a diagnosis, answering the questions of the doctor ordering the examination. The most common indications are the diagnosis of ischaemic heart disease, thyroid disease, cancer and kidney disease.

5 When assessing a radioisotope examination, different types of image reconstructions are available to look deeply into the patient's body in a non-invasive manner.

4



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WIM

WORLD-CLASS

NEUROSURGERY

The MIM – NRI Neurosurgery Clinic is a surgical department where we provide full-spectrum treatment and invasive diagnosis of cancerous and non-cancerous conditions of the nervous system. The aim of the Clinic is the comprehensive treatment of diseases of the brain, spinal cord, spine and peripheral nerves.

At the Clinic, we treat primary brain tumours such as gliomas, anaplastic tumours, diffuse tumours, stromal tumours, hairy cell tumours and other rare tumours of the central nervous system. The team of neurosurgeons performs surgery in awake craniotomy for brain tumours located in the so-called eloquent regions. In this respect, the neurosurgical team collaborates with a team consisting of a neuropsychologist and a neurologist-neurophysiologist.

During surgery for tumours of the base of the middle and posterior cranial fossa (nerve sheaths, meningiomas, striae), we use continuous EMG monitoring of cranial nerve function (facial nerve, cranial nerves and the glossopharyngeal nerve).

For many years, our team has specialised in the surgical treatment of tumours with a so-called deep location. This includes tumours located in the ventricular system of the brain and tumours of the pineal gland. If necessary, we use neuronavigation.

1 Admission to the operating theatre requires strict procedures. Mandatory hand washing. From left: paramedic Grzegorz Woźniak, Head of Clinic Prof. Andrzej Koziarski, Dr Andrzej Styk, Dr Kamil Bryła.

2 In his professional element – during surgery for lumbar discopathy, Prof. Jan Krzysztof Podgórski and Dr Piotr Juszkiewicz.


INTEGRA

The MIM – NRI Neurosurgery Clinic, we were the first in the country in 2015 to start performing standard inferior scalene sinus catheterisation in adults. We perform this procedure as standard in children in the differential diagnosis of ACTH-dependent hypercortisolemia and the diagnosis of Cushing's disease. Since 1974, we have been treating cases of tumours of the optic chiasm region, using craniofacial (nasal and wedge sinus) and various transcranial accesses. Since 2003, we have also used endoscopic technique in the treatment of pituitary diseases, using endoscopes from Storz and Aesculap. Every year, we treat approximately 300 patients with various tumours of the pituitary gland and its surroundings.

In addition, our team surgically treats tumours of the spinal canal and spinal cord.

Since the early 1970s, we have been providing so-called ultra early surgical treatment of ruptured (bleeding) brain aneurysms. Since the 1990s, we have been endovascularly treating brain aneurysms and hemangiomas in collaboration with a team of interventional radiologists.

We have a multi-bed, well-equipped post-operative ward, in which the patient is transferred to immediately following surgery in our Clinic.

1 Neurosurgeon with a student – Dr Sławomir Skrzyński, Paweł Mielniczek MD.

2 The power of calm and composure. Surgery within the posterior cranial cavity – Prof. Grzegorz Zieliński, Dr Emir Sajjad, Dr Andrzej Podgórski.

3 In the spotlight. The fight for human life goes on every day, no matter the circumstances – Dr Andrzej Styk, Dr Piotr Juszkiewicz.

1

1 (Previous page) The third eye of the surgeon. Microsurgery requires precision and proper illumination of the operating field – Dr Sławomir Skrzyński.

2 (Previous page) Two actors and a patient. Theatre without an audience, the remaining staff in the shadows, with the show happening in silence – Dr Andrzej Podgórski, Dr Miłosz Chwiałkowski.

1 The operating theatre nurse is always in the shadow, but she is the most important person in the team responsible for the smooth running of the procedure – Monika Puk MN.

2 Fire and smoke. A craniotome, bipolar tweezers and a suction machine are the attributes of every neurosurgeon – Dr Emir Sajjad, Dr Piotr Juszkiewicz.

3 Prelude. Preparation for the removal of a cerebellar tumour. Planning the positioning of the patient is a vital part of any operation. In a moment, the artist will begin his concert – Prof. Andrzej Koziarski.

3


WIM

FULL PROFILE RANGE OF

HEAD AND NECK SURGERIES

The combination of two specialities (otolaryngology and maxillofacial surgery) in one clinic allows for a full-profile range of head and neck operations. This, in turn, gives us greater opportunities to help our patients.

At the clinic, we perform minimally invasive sinus surgery using vision tracks, navigation and 3D optics. The use of navigation allows the surgeon to observe the position of surgical instruments during the operation, and the use of 3D optics allows us to operate in three-dimensional conditions. We are one of the few in Poland to perform balloon sinuplasty of the sinus orifices.

In many procedures, we use high-tech equipment such as a piezoelectric knife, harmonic knife or automatic shaver knife, which allow precise cutting and limit bleeding during surgery.

We perform a full range of head and neck oncological procedures using the latest surgical techniques, including orbital tumours, skull base tumours or tumours of the retro- and parapharyngeal space. We utilise an NBI (narrow band imaging) system that uses a narrow band of light, which significantly improves the early diagnosis of head and neck tumours. This method enables detecting even small tumour lesions that are elusive to a normal endoscope. For surgical treatment, we use CO_2, KTP and diode lasers.

1 Neck lymph node surgery. Removal of cancer metastases to the lymph nodes of the neck.

2 Accuracy coupled with exceptional precision during surgery.

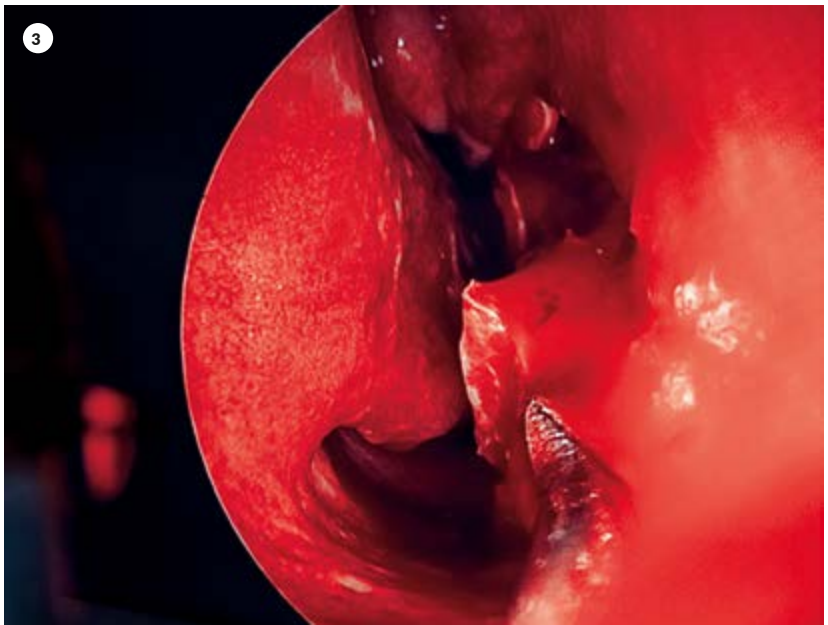
We have the possibility to perform oncological procedures using the da Vinci robot, which allows radical removal of the neoplastic lesion with minimally invasive surgery. With this technique, the function of the larynx and pharynx can be preserved without worsening oncological results and reducing the intensity of follow-up treatment. In the field of oncology, we strive to employ organ preservation surgery. This includes partial organ surgery and complementary radiochemotherapy. The standard is the primary implantation of vocal prostheses after radical laryngeal surgery, which allows the patient to learn oesophageal speech in a very short time. In addition, we use reconstruction plates, remodelling the continuity of the mandibular bone, and implant a mandibular bone prosthesis, giving oncological patients the chance to return to full quality life.

We specialise in reconstructions after oncological procedures using a variety of flaps, including free flaps on microvascular dissections, and in reconstructions of bone defects as well as atrophy in the alveolar region of the mandible and the alveolar process of the maxilla. We supply these with grafts using individual models and templates. We help post-cleft-lip-and-palate patients by performing bone grafts to the alveolar process and using bone blocks from the tissue bank, autogenous bone from the hip, fibula and others.

1 Endoscopic sinus surgery. The use of the endoscope has changed the nature of the operation – from an external approach to an intranasal approach. The patient gains less surgical trauma and there are no skin and mucosal cuts.

2 Medical team performing endoscopic removal of inflammatory sinus lesions. The use of intraoperative navigation allows very precise delineation of the operated area.

3 The intraoperative image is the core of endoscopic surgery. View of the right nasal cavity during surgery.



We work with orthodontists from across the country to treat complex malocclusions that require surgical treatment. We perform a full range of orthognathic procedures, including single and double jaw procedures, partial osteotomies, surgical support for orthodontic treatment. Planning for orthognathic and reconstructive procedures is carried out using the latest techniques and computer programmes with the use of an intraoral scanner and 3D printer.

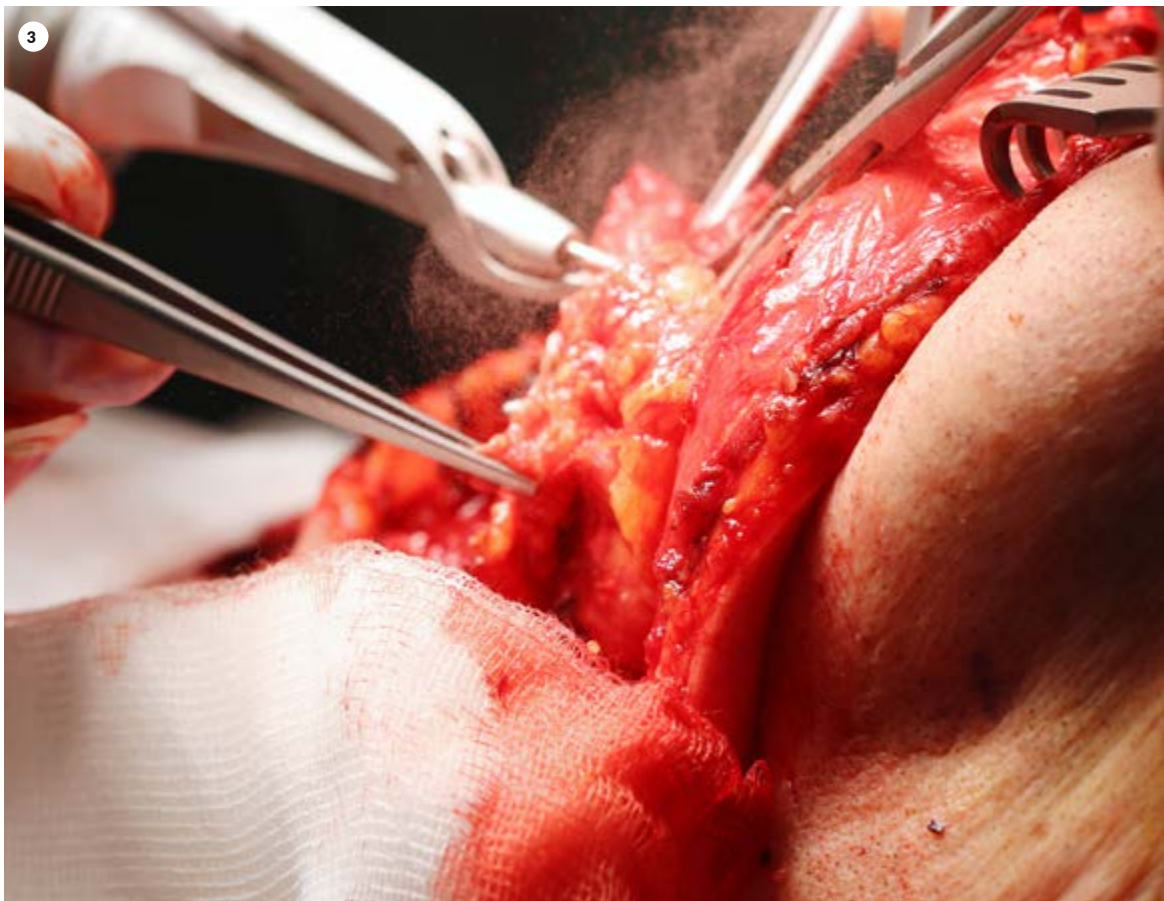
We treat all injuries to the facial part of the skull and injuries to the anterior cranial fossa. We reconstruct the bone base using customised titanium plates and meshes. Based on CT scans and other scans, we are able to fit these on previously made models. We also carry out endoscopic procedures for the treatment of fractures of the facial bones. When treating orbital fractures, we use transconjunctival accesses, thus avoiding scarring of the skin. We perform a full range of orbital surgery, including orbital decompression, biopsies of orbital tumours, enucleation of the eyeball and orbital exenteration.

In the treatment of salivary gland diseases, we use endoscopic techniques (sialendoscopy) and a facial nerve monitoring system to avoid damage to the facial nerve during surgery.

We surgically assist patients struggling with Eagle's syndrome, bone and soft tissue cysts of the face and neck, and dentoalveolar sinusitis. We promote healing with platelet-rich plasma. In collaboration with dermatologists, we remove all skin lesions of the head and neck. It is through the cooperation of a highly qualified team of doctors from many specialities that we are able to provide our patients with the highest level of care.

1 Oncology staff remove the entire lesion during surgery. The radicality of such a procedure gives the patient a better chance of survival.

2 One of the most important parts of oncological surgery is tissue reconstruction after tumour removal. Here we can see the preparation of a flap – used to reconstruct the tissues of the oral cavity – based on the pectoralis major muscle.



3 Tissue preparation using the harmonic knife allows us to reduce blood loss during procedures.

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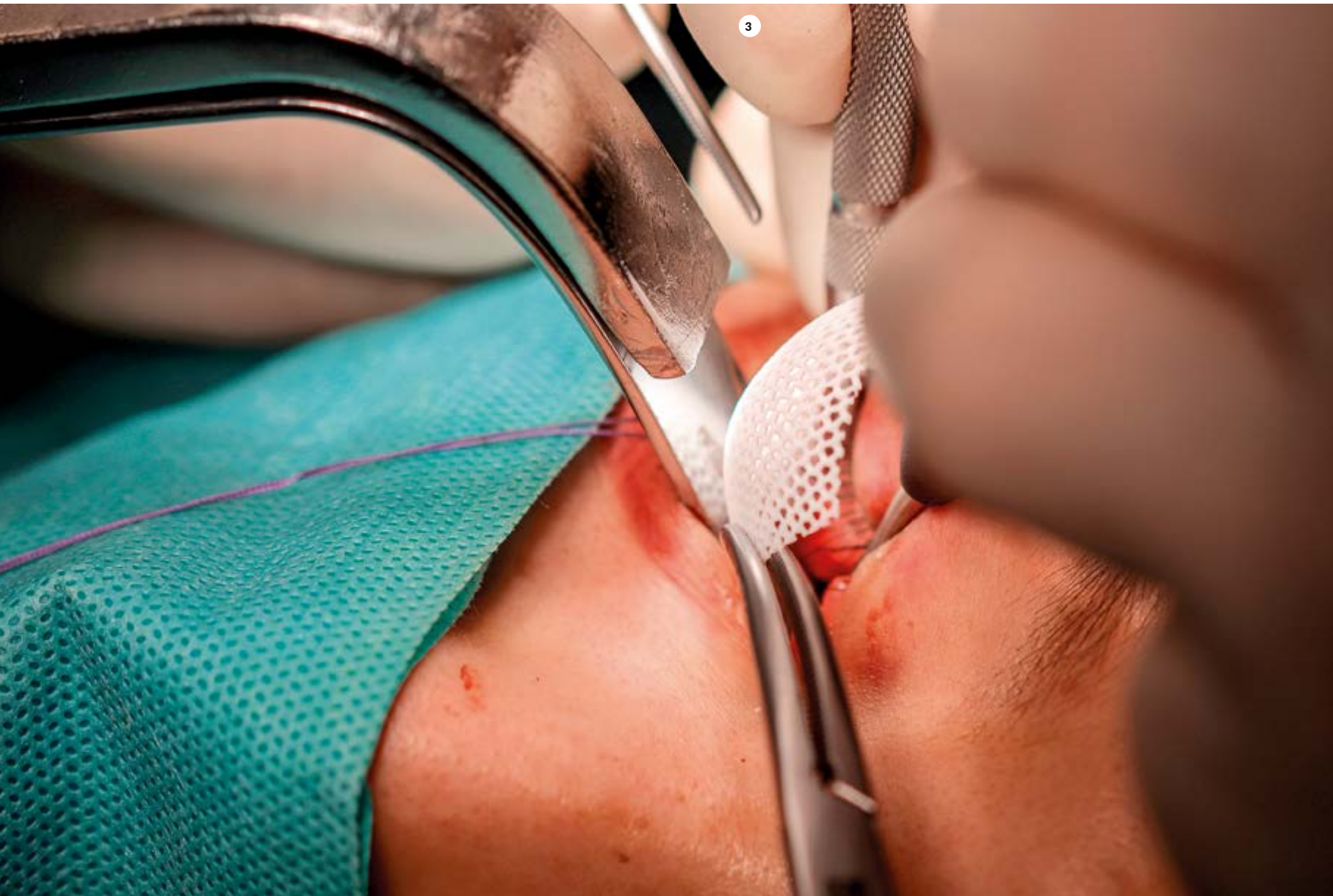

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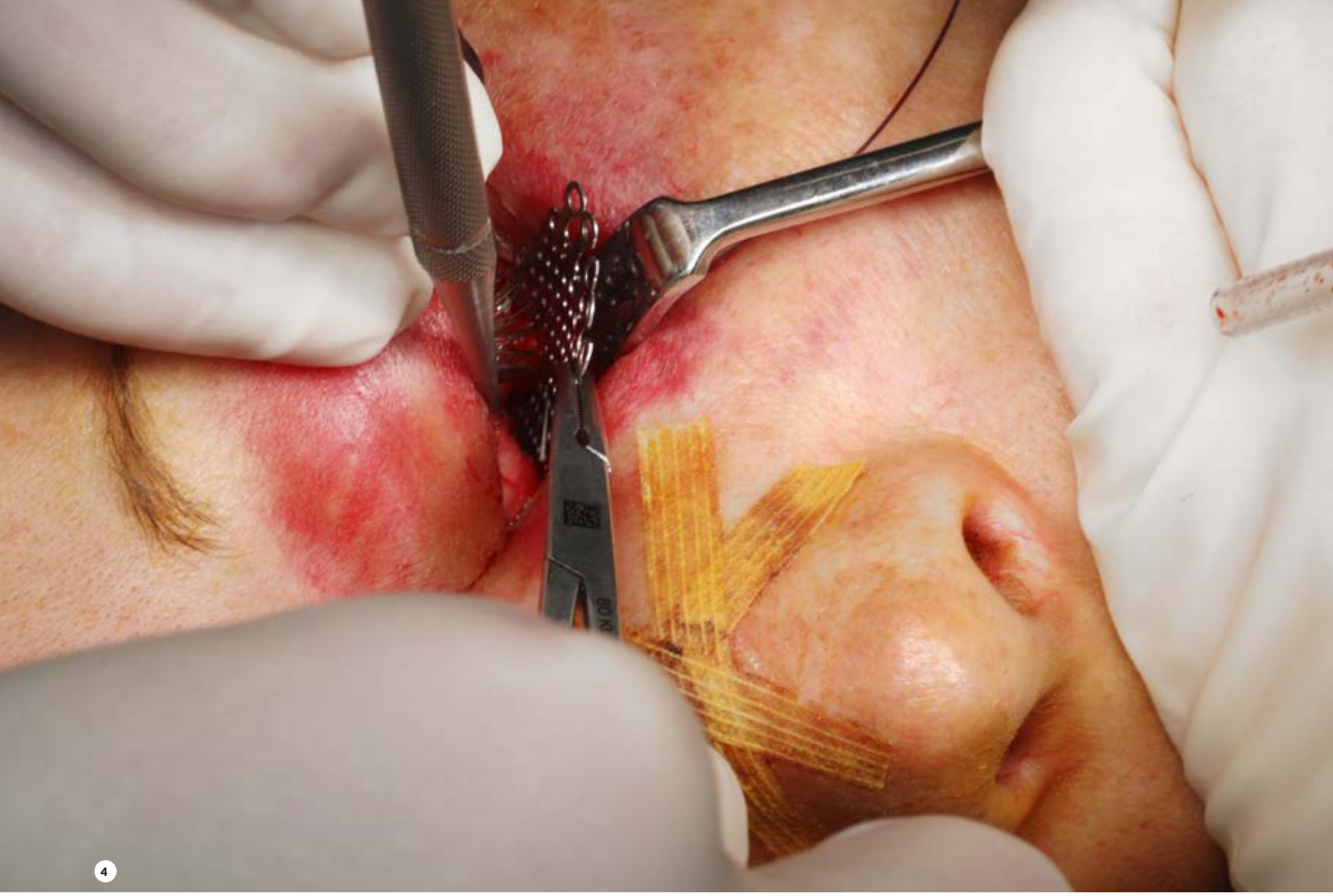


4

1 Our 3D studio (or rather its part).

2 To accurately plan the procedure, we support our work with 3D tools. The more work we do at the planning stage, the faster, simpler and less invasive the procedure is for the patient. The 3D printer allows us to individualise our work to the needs of a specific patient with a specific medical problem. Pictured is a plate reconstructing the lower orbital wall bent on an individual model printed from CT images.

3 We use various methods to reconstruct fractures after trauma to the facial part of the skull.

4 Direct application of a flexible plate in a patient with transconjunctival access.

1 2 Modern equipment in the operating theatres is not everything. We have also taken care of the comfort of doctors and patients with a calming and pleasant design.

3 Maximum focus during each procedure.

2

3


WIM

INNOVATIVE

OPHTHALMIC PROCEDURES AT MIM – NRI

The MIM – NRI Ophthalmology Clinic, which is among the top ophthalmology clinics in Poland, is distinguished by its excellent staff facilities, equipment providing comprehensive diagnostic and therapeutic possibilities, as well as its well-established scientific position on the national and international arena.

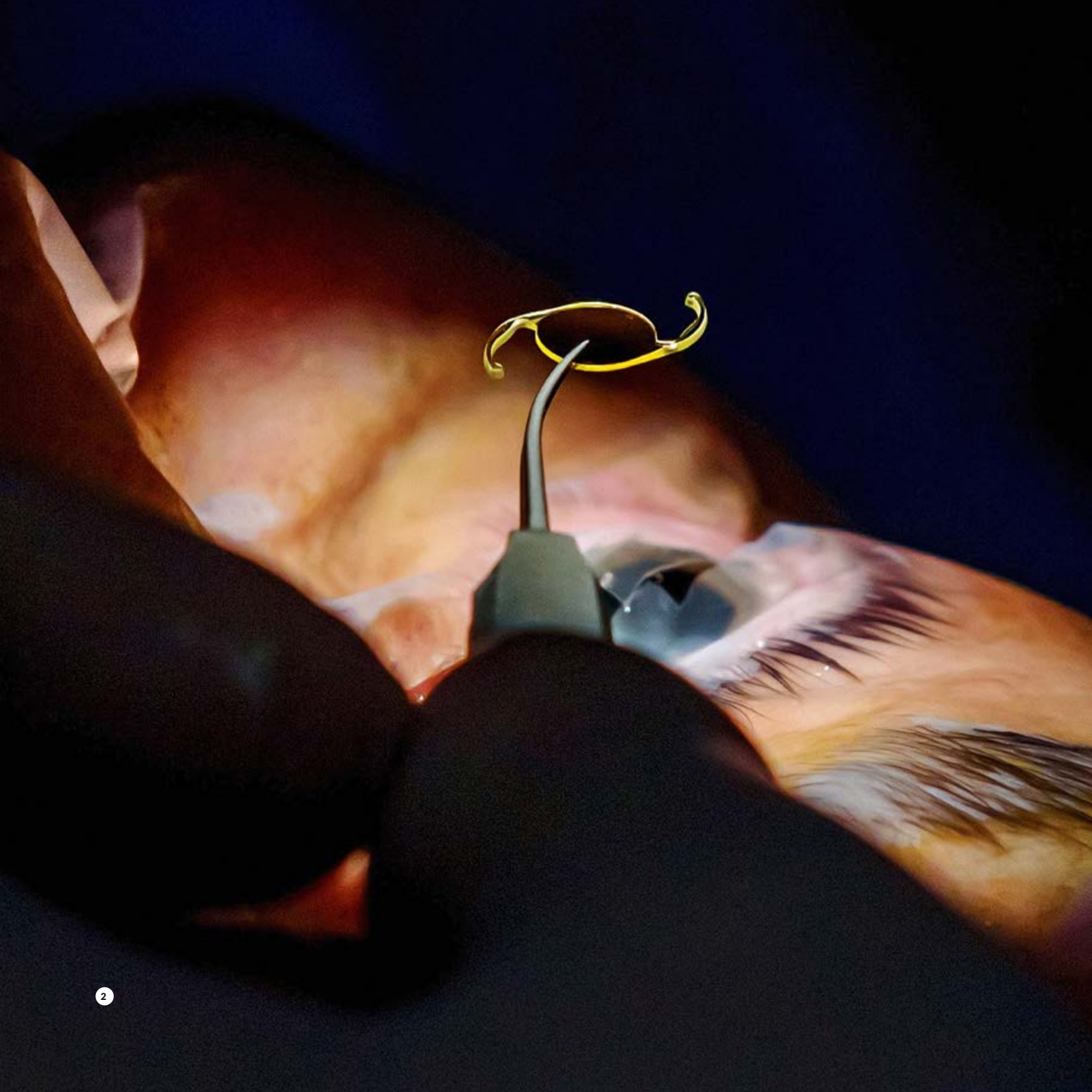
Each year, we hospitalise approximately 7,000 patients and provide outpatient care to 34,000 patients. We perform major procedures on approximately 4,600 patients. In addition, we perform about 2,700 small procedures and about 4,000 aVEGF injections into the eyeball.

We are known internationally primarily for our innovations in the surgical treatment of glaucoma, thanks to the many years of effort and vast experience of the clinic's head, Prof. Marek Rękas. We perform all state-of-the-art procedures, mainly in the field of micro-invasive glaucoma surgery with the use of various implants. The glaucoma team is involved in a number of scientific projects and is constantly reviewing new treatment methods clinically and publishing the results in recognised journals.

The clinic has undergone long-standing continuous development. Since 2020, we have introduced the treatment of lacrimal duct obstructions using endoscopic access through the nose, and this method is now used for the majority of patients with pathological epiphora. Endoscopic access is characterised by very good clinical results, as the surgeon can modify the course of the procedure adequately to the anatomical relations under full visual control. After surgery, the patient has no scar as access to the operated structures is through the nose.

1 At the microscope, the head of the department, Col. Prof. Dr Marek Rękas. Despite many duties, including his role as national consultant for ophthalmology and MIM – NRI deputy director for scientific affairs, he always finds time to operate on the most difficult patients.

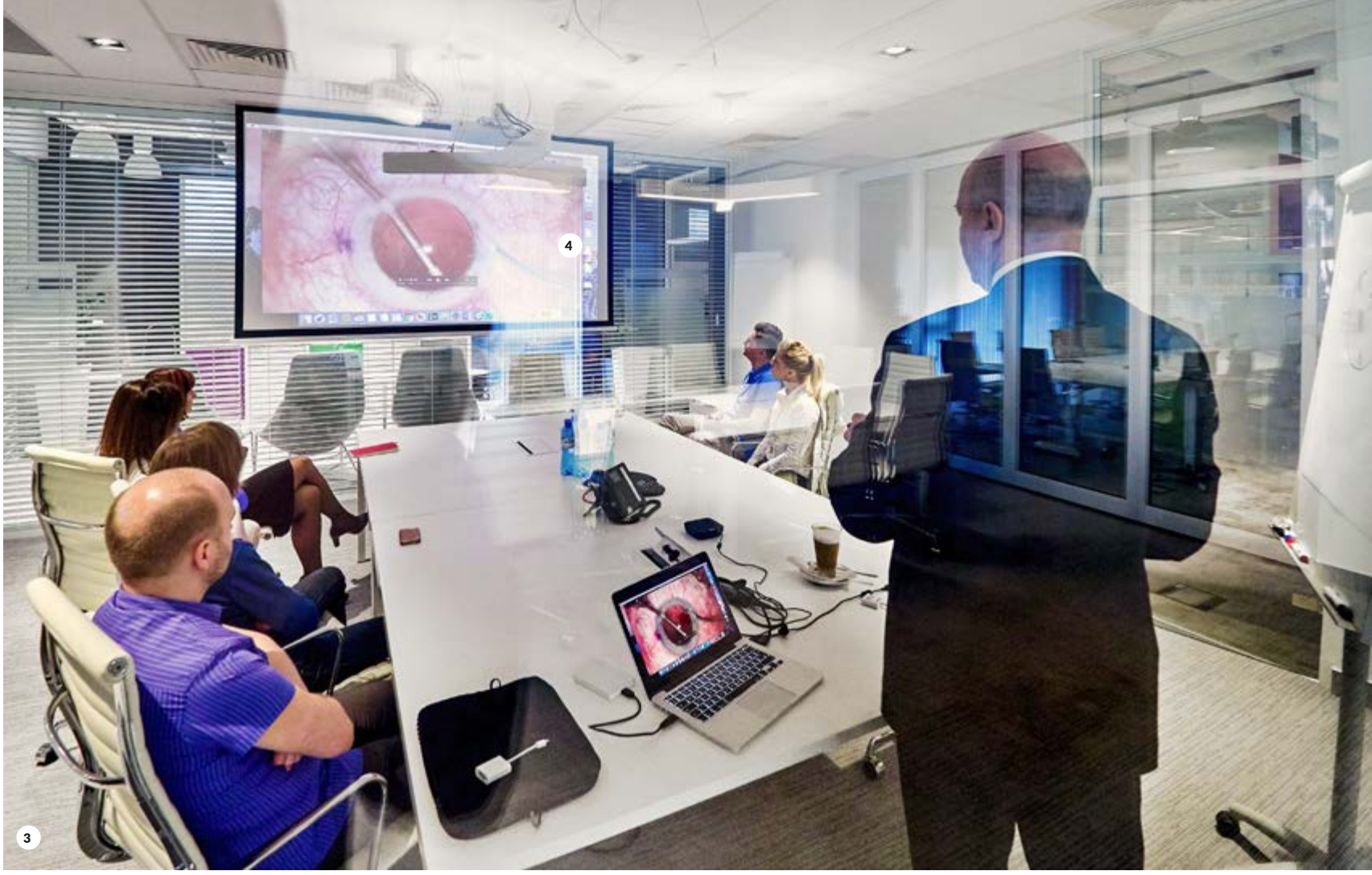
2 Posterior chamber intraocular lens just before implantation in the patient.



In addition, we specialise in the treatment of ocular injuries. Often, the treatment of trauma is multi-stage. The team has extensive experience not only in acute injuries, but also in subsequent, often complex reconstructions of the anterior segment of the eye. In the treatment of aphakia, we use several methods to suspend the artificial intraocular lens, depending on the clinical situation. Sometimes patients require the implantation of an artificial iris, a procedure we also carry out. At the clinic, we also surgically supply patients with failed corneas. Our team collects corneas from deceased donors thanks to a tissue bank set up at the MIM – NRI hospital. If the tissues meet the standards, the corneas are transplanted to recipients. Depending on the clinical situation, we perform hollow transplants, anterior and posterior.

In 2020, we purchased 3D surgery equipment. With this equipment, the surgeon operates by viewing the surgical area not under a microscope, but on a large screen. Using the 3D system, we perform cataract, glaucoma and vitrectomy surgeries. Since 2019, we have been carrying out strabismus surgery, and starting from 2022, we will be developing other areas of ophthalmology. We are planning to purchase a femtosecond laser for refractive surgery and brachytherapy equipment for the treatment of eye tumours. The development of both areas will be a priority for the MIM – NRI Ophthalmology Clinic.

1 Oculoplastic team during the performance of bag-nasal anastomosis in lacrimal duct obstruction with an endoscope. This is a modern, effective and safe alternative to classic ab externo methods. Our facility is introducing innovative surgical methods for the lacrimal ducts thanks, among other things, to its collaboration with Prof. Mohammad Javed Ali, an internationally renowned oculoplastic surgeon specialising in the treatment of lacrimal duct obstruction. He is a leader in research work on disorders of the lacrimal apparatus. At MIM – NRI, through scientific and teaching collaborations, he shares his experience in implementing state-of-the-art diagnostic and therapeutic methods to provide the highest quality of care for patients with disorders of the lacrimal ducts and the protective apparatus of the eye.



2 Placement of a gold implant in the upper eyelid in the treatment of eyelid regurgitation in n. VII paralysis. Thanks to the commitment of the clinic's staff, the procedure was appropriately priced and introduced into the catalogue of ophthalmoplastic procedures financed under the National Health Fund.

3 The MIM – NRI Ophthalmology Clinic conducts periodic training courses in the various surgical methods practised at MIM – NRI for both novice clinicians and chief surgeons.

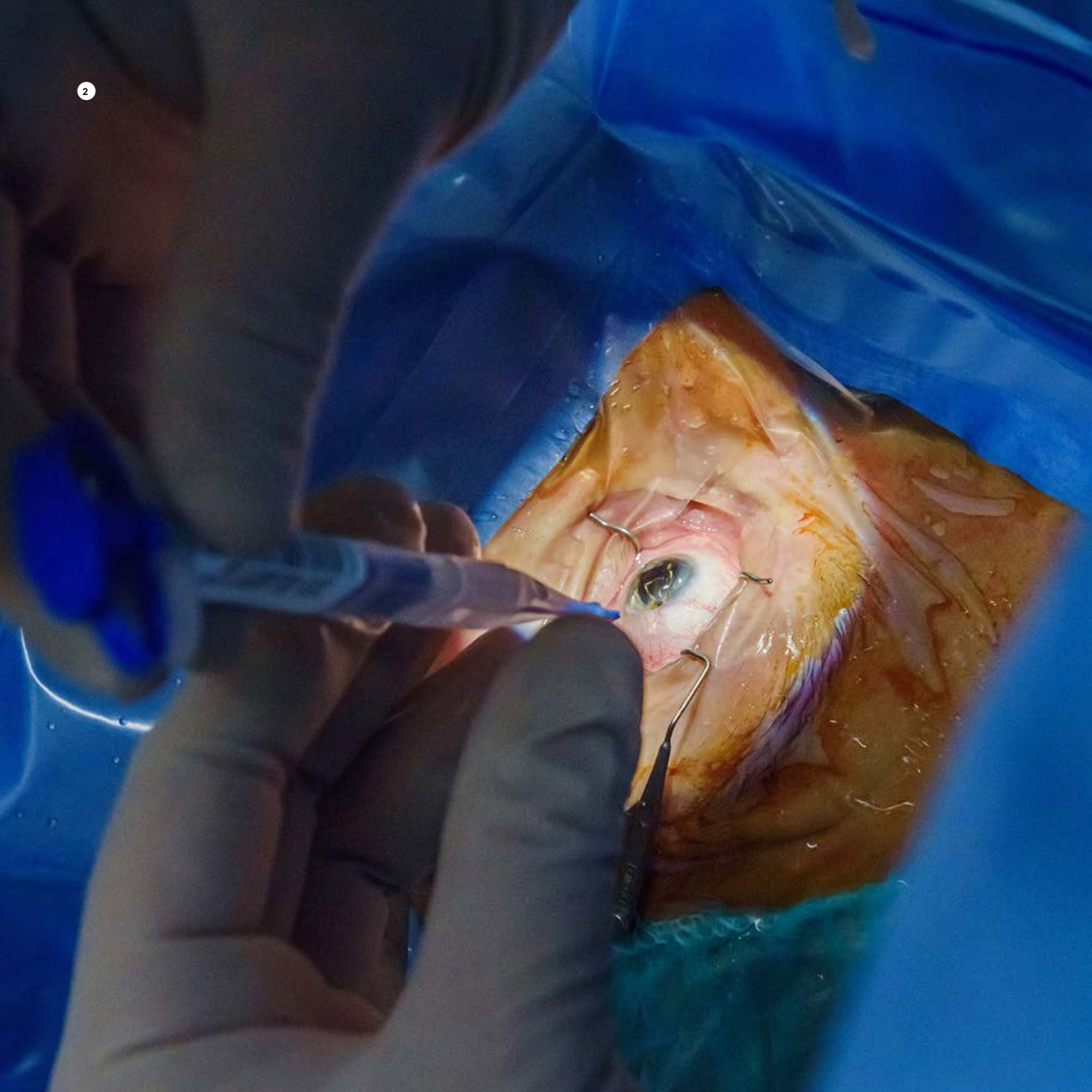
4 Pterygium surgery with lamellar-epithelial graft. We can see a dissected thin flap of conjunctiva to cover the lodge after the removed pterygium.

The head of the department, Prof. Marek Rękas, and his team have prepared and implemented the following drug programmes: AMD treatment, a drug programme for the treatment of non-infectious uveitis and a programme for the treatment of diabetic macular oedema.

We regularly organise scientific conferences (Autumn Ophthalmology Workshops) and train ophthalmologists from all over the country in theoretical and practical classes. All training events are popular and appreciated by the participants.

1 Photo from the operating theatre during the practical part of the training course in surgical methods of cataract treatment. The trainee doctors watch the procedure on a large screen, listen to the operator's comments and ask questions in real time.

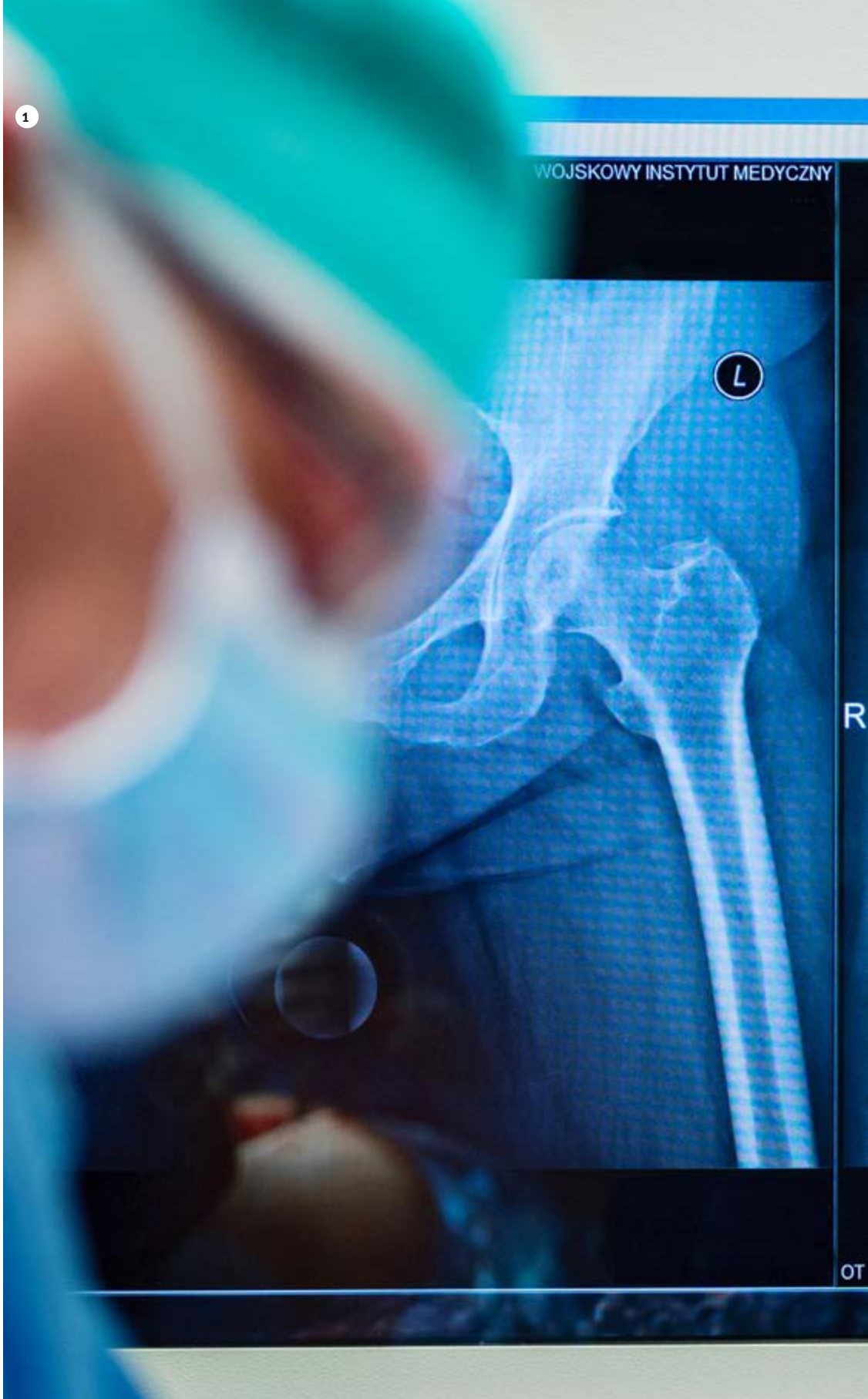
2 Implantation of a posterior chamber artificial lens using a disposable cartridge.




WIM

LATEST DEVELOPMENTS IN PROSTHETICS

AT THE MIM – NRI TRAUMATOLOGY AND ORTHOPAEDICS CLINIC



1 Surgical treatment of hip replacement is based on pre-planned computerised implant selection.


WOJSKOW
PL

For over a decade, innovation has been a very important area of work at the Traumatology and Orthopaedics Clinic. Over the past five years, we have successfully applied many innovative diagnostic and treatment methods based on the latest medical advances. Annually, we carry out more than 2,500 highly specialised surgical procedures. The clinic boasts a highly qualified team of 22 specialists in orthopaedics and traumatology of the musculoskeletal system working under the direction of Lt. Col. Dr. Piotr Cieślik, who have gained many years of experience in the field of hip and knee replacement, joint replacement and reconstructive surgery at home and abroad.

The Traumatology and Orthopaedics Clinic has recently been refurbished and adapted in order to ensure the utmost comfort and safety for patients during treatment. We utilise state-of-the-art operating theatres and the latest rehabilitation facilities.

At the clinic, we primarily develop: minimally invasive surgeries, corrective osteotomies, hip and knee prosthetics, including unicompartmental knee prosthetics.

Patient treatment materials are manufactured from cutting-edge metal alloys available on the market to ensure safe and effective treatment. The growing market for surgical materials enables the team to improve surgical techniques and develop new ones.

1 2 The clinic uses the latest generation of joint implants made of hypoallergenic materials that allow the patient to return to their previous physical activity.

3 The clinic performs operations on the most complex degenerative deformities.


3

Thanks to advances, the team carries out multi-tissue reconstructive surgery, for example early treatment of damage to the ligamentous apparatus of the knee (so-called internal bracing), treatment of cartilage defects with collagen membranes, and the use of skin grafts. A significant advance in the clinic's work are minimally invasive percutaneous spinal stabilisation procedures.

We have a full portfolio of prosthetic implants from the world's leading manufacturers, including modern technical solutions such as modular systems and custom-made implants used in particularly advanced degenerative changes with extensive bone loss.

Thanks to the efficient cooperation of the entire team and the introduction of the fast track, the waiting time for prosthetic procedures has been significantly reduced – joint prosthetic procedures are performed 3-5 months after the qualifying visit. Our efficiently functioning rehabilitation sub-department ensures continuity of treatment for our patients. In addition, the clinic's scientific activities guarantee the ongoing development of its staff and the clinic itself.


1


2

1 In cases of the most complex joint deformities, we prepare customised implants for a given procedure.

2 The operating theatre is equipped with state-of-the-art, highly specialised equipment, which enables any type of surgery to be carried out safely.

3 The clinic's team is constantly upgrading their qualifications at leading medical centres, resulting in high quality surgical procedures.


3


WIM

BEYOND BLOOD TRANSFUSION

AT THE DEPARTMENT OF CLINICAL TRANSFUSION MEDICINE

The modern and extensive diagnostic facilities of the Department of Clinical Transfusion Medicine allow us to co-participate in the treatment of MIM – NRI patients at the highest reference level. With a view to the future, we have used the knowledge and professional experience of staff and state-of-the-art equipment to introduce genetic tests enabling precise identification of a specific pathogen and hereditary pathologies or genetic predispositions to contract specific diseases. The tests are targeted at patient-specific therapies.

As with the detection of the genetic material of pathogens, genetic diagnosis for various diseases aims to verify whether our genetic material correctly encodes information or whether there is a change in some fragment that may contribute to a disease. One type of genetic testing is new-genome sequencing performed using an NGS instrument.

Genetic testing currently marks one of the most promising developments in biomedicine. Available at the Military Institute of Medicine – National Research Institute, they allow not only disease identification at its early stages of development, but offer the possibility of future gene and personalised therapies.

1 Genetic pathogen identification, e.g. tuberculosis, viruses, require BSL2 rooms. The material to be tested (swabs, blood samples) is delivered through special airlocked feed windows...

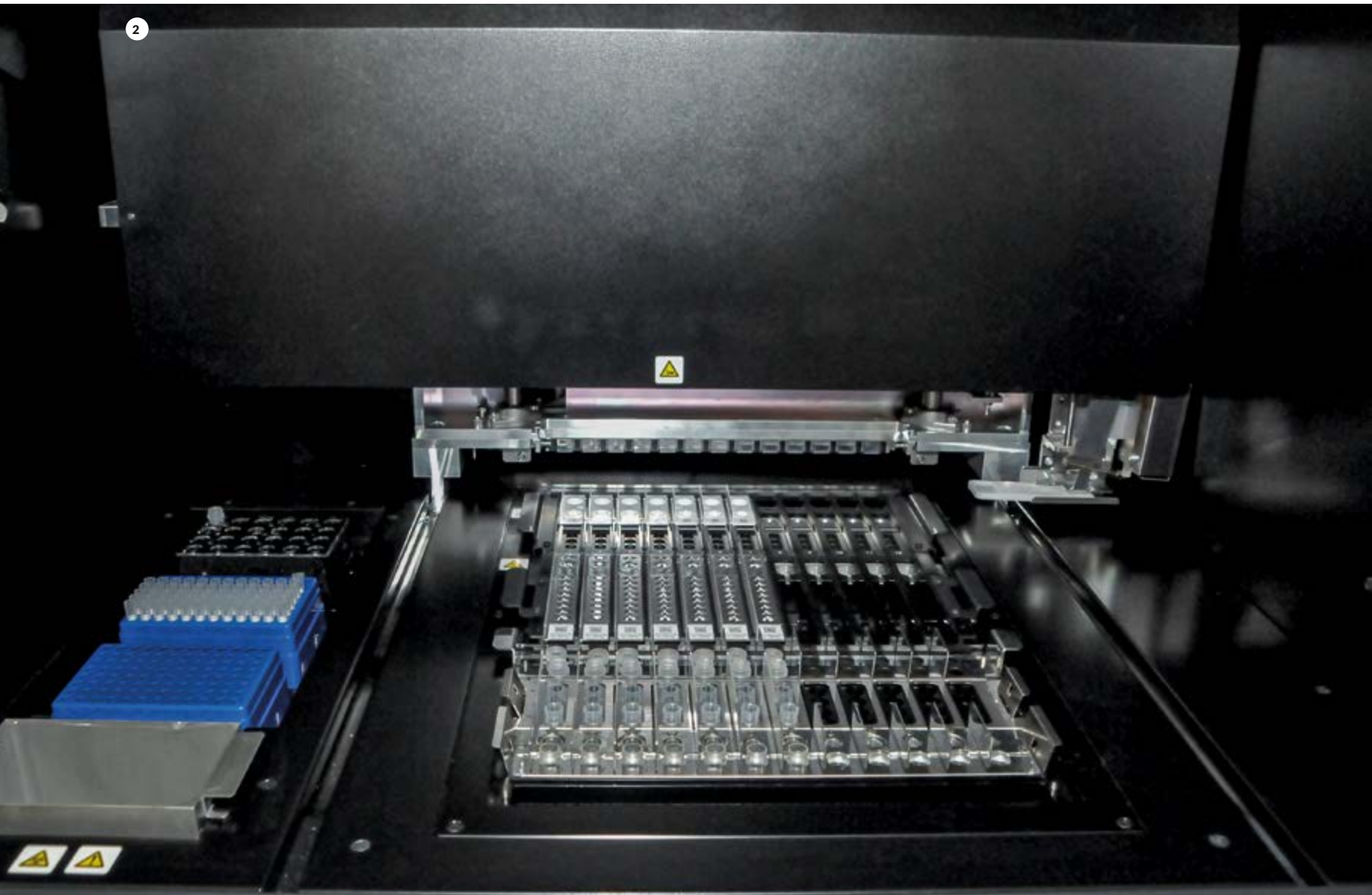
2 ... followed by isolating the genetic material of the pathogen.

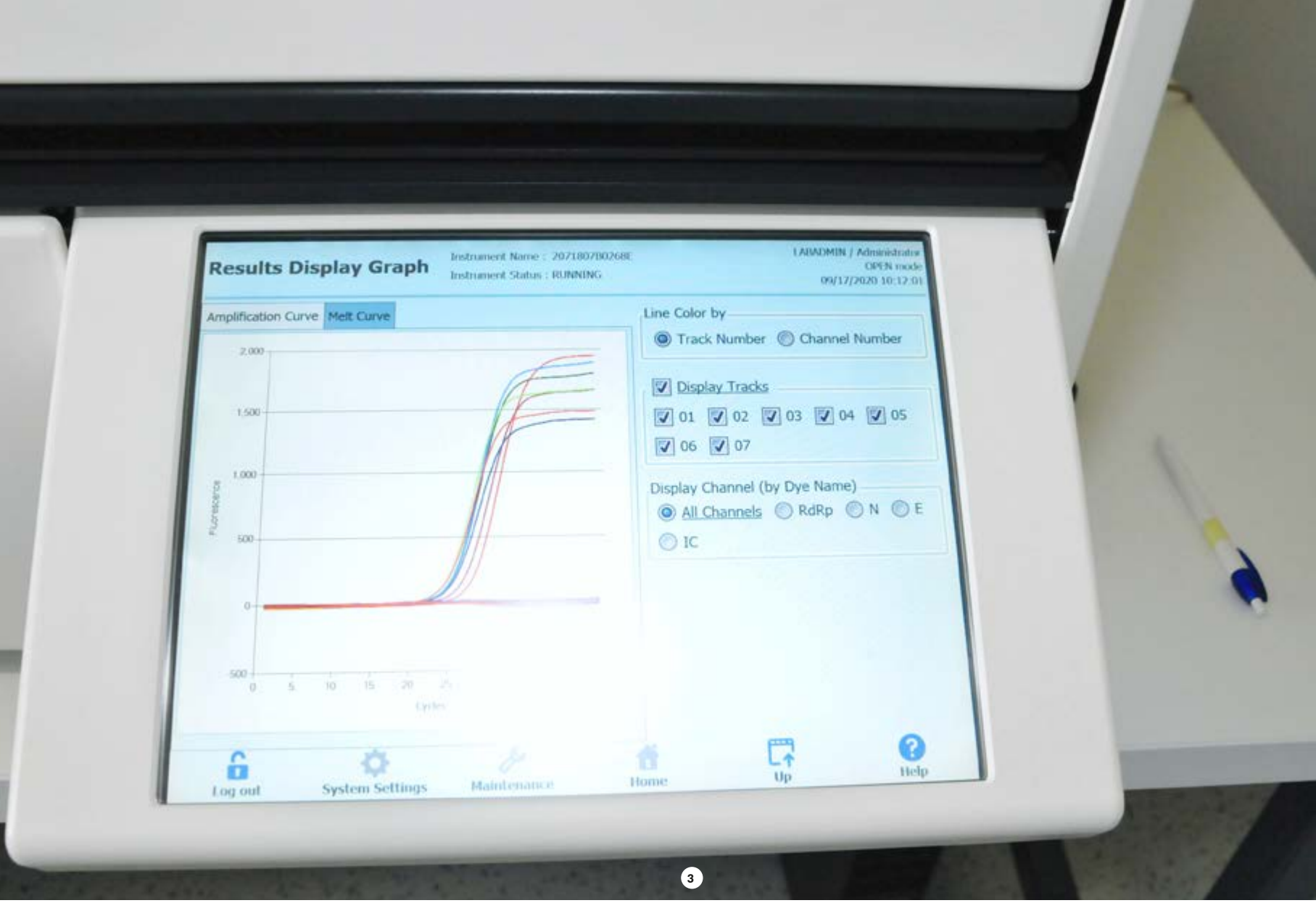
2

1 In a closed system of the InGenus unit, the right reaction identifies the pathogen gene...

2 ... and the result is presented in a graphic format.

3 The result of the test for the detection of genetic material of the SARS-CoV-2 virus.





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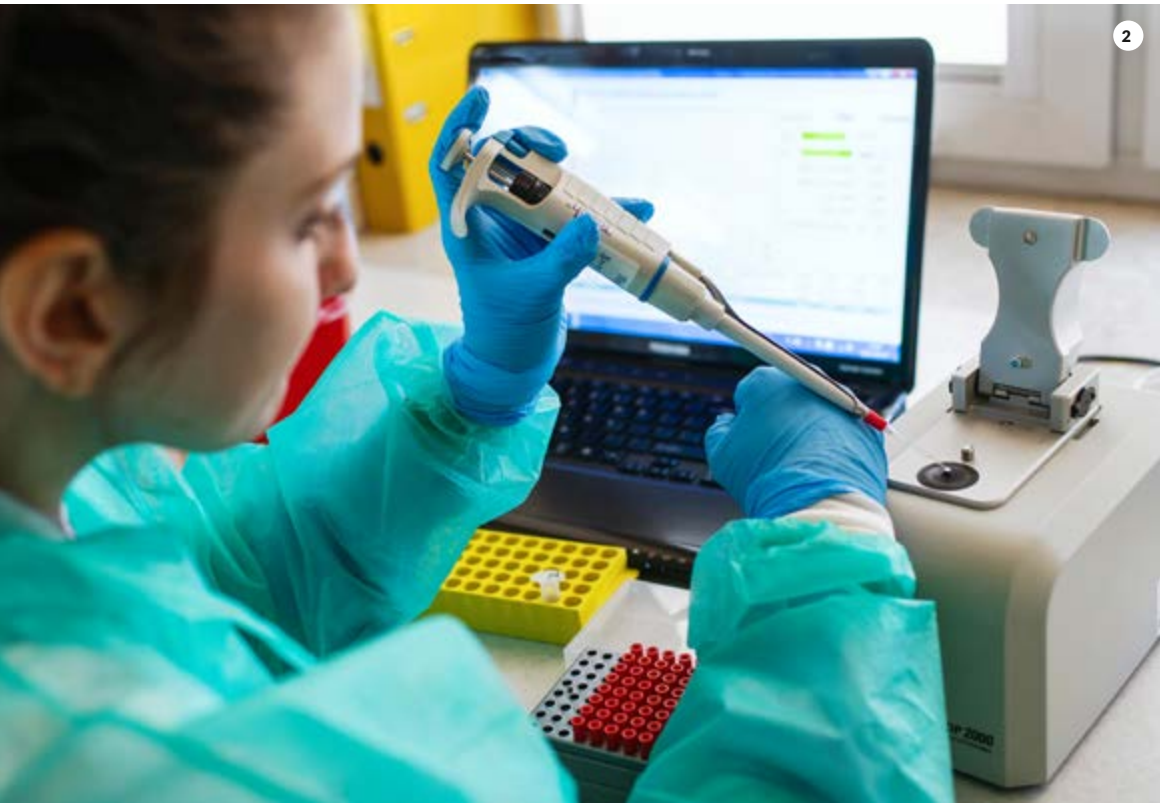
4 NGS-Next Generation Sequencing apparatus. NGS allows many or even all genes to be examined. Next-generation sequencing is used in a disease with a difficult-to-find genetic background or when different disease syndromes are characterised by similar symptoms.

4



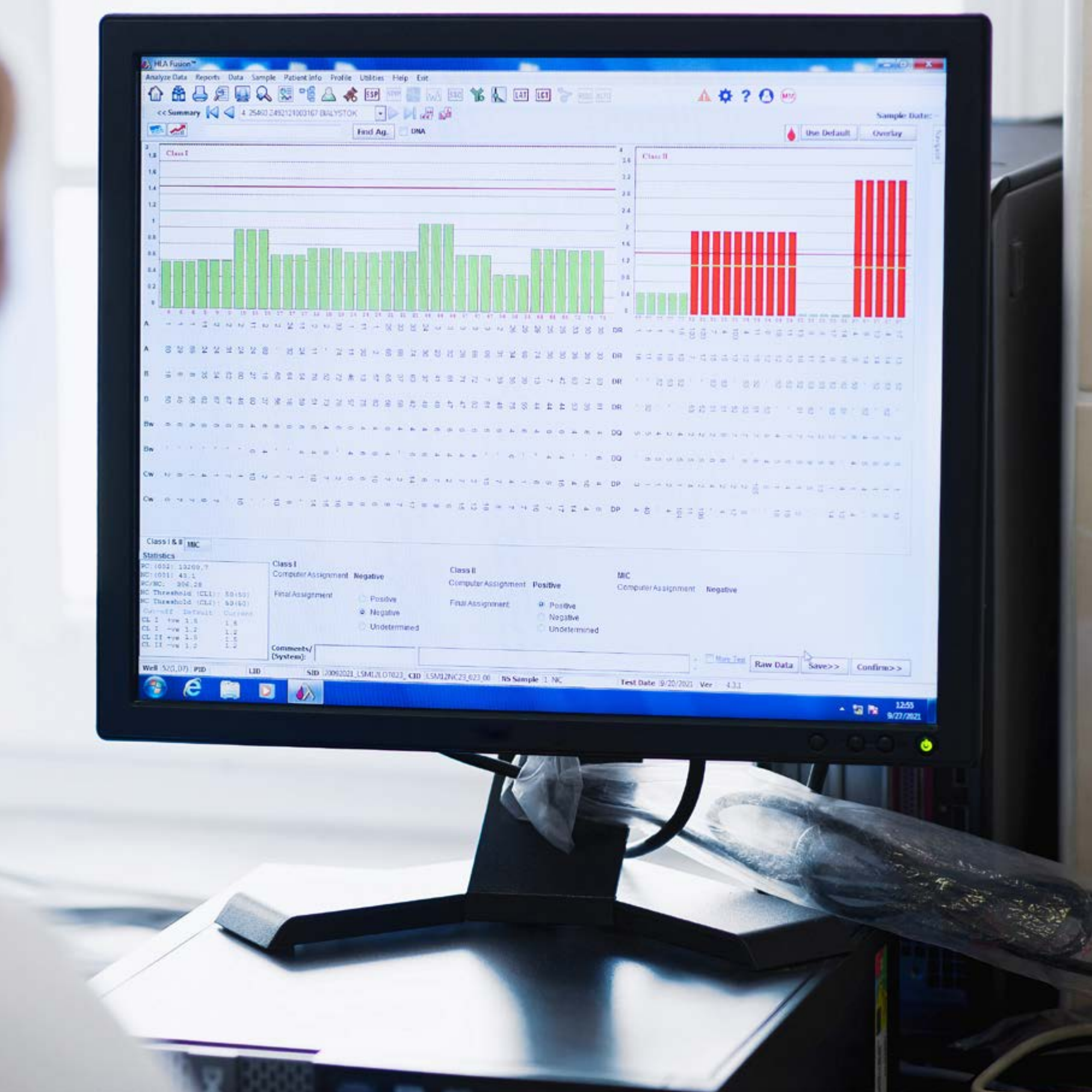
1 2 Deoxyribonucleic acid (DNA) is isolated from the blood sample, the quality and quantity of which are determined by spectrophotometric analysis.

3

3 4 After mechanical or enzymatic fragmentation, the DNA is used to create a library, which is sequenced on a next-generation sequencer.


4

1 The obtained results are then subjected to bioinformatics analysis and clinical interpretation.


HLA Fusion™
Analyze Data Reports Data Sample Patient Info Profile Utilities Help Exit
Class I
Class II
Class I & II MIC
Statistics
Class I
Computer Assignment Negative
Final Assignment
Positive
Negative
Undetermined
Class II
Computer Assignment Positive
Final Assignment
Positive
Negative
Undetermined
MIC
Computer Assignment Negative
Comments/ (System):
Raw Data
Save>>
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WIM

MODERN AND
FAMILY-FRIENDLY
PAEDIATRICS

In 2019 – following a major refurbishment in the Paediatrics, Nephrology and Paediatric Allergology Clinic – we created conditions for parents and children to be in hospital 24 hours a day. We created single and double rooms and equipped the ward with state-of-the-art equipment. As a result, it has become one of the most advanced wards of its kind in Poland.

Our clinic deals with general paediatric, nephrological and allergological problems in children. We are one of the leading centres treating children with urinary stones and urinary disorders. We have full diagnostic facilities (uroflowmetry, cystometry, ultrasonography) allowing a comprehensive assessment of the patient's health problem.

At the clinic, we also carry out diagnostics for children with inhalant allergies, hypersensitivity to drugs and children after shock caused by food allergens. We also offer molecular diagnostics in allergology.

The clinic's team consists of a young, thriving group of specialists formed over the past few years. Our specialists have doctoral degrees and apply their skills on a daily basis using state-of-the-art ultrasound equipment.

1 Room designed for older children. Equipped with cardiac panels and monitors.

2 Radiological examination room designed for children, with the possibility of performing planigraphy examinations.


SIEMENS
Healthineers
Ysio Max
RENTGEN
PRZYJAZNY
DZIECIOM

2

1 Room designed for infants, equipped with access to medical gas panels, fully monitored.

2 Computed tomography examination in infants on a device designed for children, in the presence of the anaesthesia team.

3 View of the corridor of the clinic decorated with fairy tale characters.

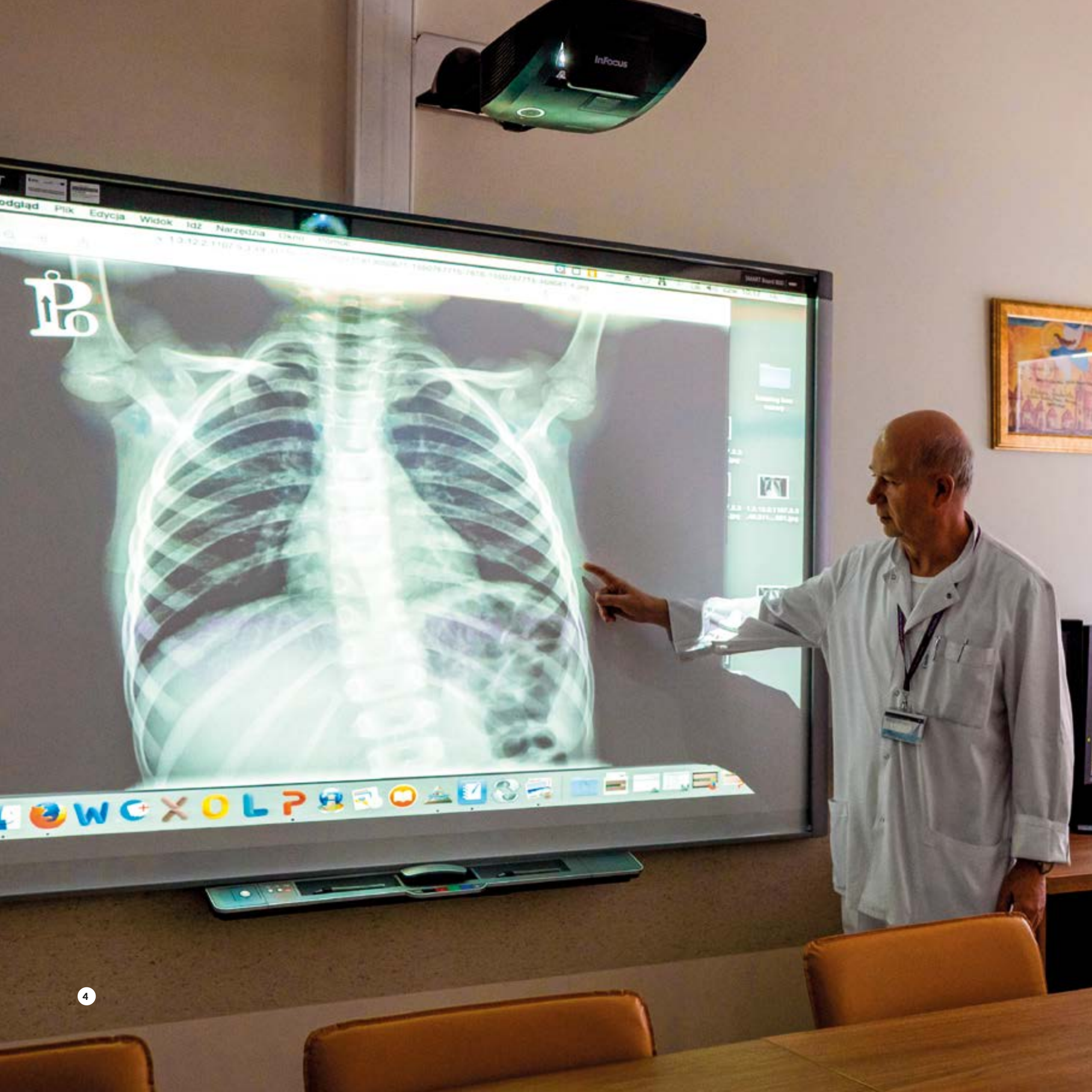
1 Ultrasound examination room equipped with state-of-the-art apparatus.

1 Briefing room at the clinic equipped with monitors to evaluate imaging results.

2 Triage office located in the Hospital Emergency Department at the Paediatrics, Nephrology and Paediatric Allergology Clinic.

3 One of the two procedure rooms in the Paediatrics, Nephrology and Paediatric Allergology Clinic.

4 Briefing room equipped with an interactive whiteboard to evaluate imaging results and provide teaching activities.



4


WIM

ADVANCED

HYPERBARIC THERAPIES

One of the MIM – NRI's latest investments is a hyperbaric chamber for several patients. Thanks to multi-profile cooperation with the Hospital Emergency Department and the MIM – NRI Department of Cardiac Surgery, we implemented the world's first effective life-sustaining treatment using extracorporeal circulation and hyperbaric therapy in severe forms of high-altitude decompression sickness.

In addition to providing healthcare services to the civilian population under contract with the National Health Service in cases such as emergency treatment of carbon monoxide poisoning, burns or planned treatment of hard-to-heal wounds, the Clinical Department of Hyperbaric Medicine can act as a Hyperbaric Security Centre for the Armed Forces in decompression accidents. This includes: soldiers performing underwater combat operations, aircraft crews and special forces operators performing jumps from high altitude.

Using military specific activities for the benefit of civilian patients often enables MIM – NRI to implement state-of-the-art therapies not available in other clinical centres


1


2

1 Hyperbaric chamber operator managing a procedure at 2.5 absolute atmospheres.

2 Respiratory failure patient being treated in intensive care in a hyperbaric chamber during preparation of a medical procedure according to U.S. Navy Table 5.

3 Outpatients of the Hyperbaric Medicine Clinic during treatment under artificially created positive pressure.

1

1 Individualised respiratory systems and strict adherence to the EUBS epidemic recommendations enables providing safe therapy even in times of the SARS-CoV-2 pandemic.


WIM

PSYCHOTRAUMATOLOGY

HOW WE HELP PATIENTS WITH PSYCHOLOGICAL TRAUMAS

In the Psychiatry, Combat Stress and Psychotraumatology Clinic we deal with the diagnosis, treatment and psychotherapy of mental disorders in adults. The main area of our clinical, scientific and research activity is stress-related disorders, including post-traumatic stress disorder (PTSD).

Depending on the nature of mental health problems, patients can be treated in a 24-hour psychiatric unit, a 24-hour addiction treatment unit, a day psychiatric unit, a day addiction treatment unit, a community treatment team and a mental health outpatient clinic.

The location of the clinic within the structure of a multi-profile hospital creates the possibility of using modern equipment at the disposal of the Military Institute of Medicine – National Research Institute and specialised consultations in the diagnostic and therapeutic process.

In addition to modern and air-conditioned rooms for diagnosis and therapy, the clinic offers its own garden, a multi-purpose sports field, places for organising campfire and barbecue meetings, which are used for occupational therapy and social skills training.

Events particularly cherished by the patients are outings to the theatre, cinema, concerts by young musicians from the Juliusz Zarębski State Music School No. 3 in Warsaw and the traditional annual Christmas and Easter meetings.

1 Using virtual reality in the treatment of patients with PTSD.

2 Group therapy for patients of the MIM – NRI Psychiatry, Combat Stress and Psychotraumatology Clinic.

1 Concert of young musicians from the Juliusz Zarębski State Music School No. 3 in Warsaw.

2 Telemedical psychiatric and psychological laboratory.

3 Sports activities on our multi-purpose field.

4 Patient meeting around a campfire in our garden.


WIM

IMPROVING THE COMPETENCE
OF MEDICAL STAFF
AND SOLDIERS

W

We created the MIM – NRI Postgraduate Training Centre to improve the professional qualifications of medical experts. For years we have been organising, conducting and administering specialisation training and courses for doctors as well as dentists, physiotherapists, paramedics, nurses and midwives. In addition to fulfilling the basic role for which it was established, the Postgraduate Training Centre additionally actively participates in the implementation of various projects and events concerning the broadly understood improvement of soldier safety on the battlefield and strategic aspects of national defence.

The Postgraduate Training Centre features a medical simulation laboratory, which enables the training of medical personnel in a variety of scopes and conditions. Medical simulation is still a new section in medical education. It uses virtually created reality and advanced ICT technologies to conduct training under conditions as close to real life as possible. According to the current state of knowledge, it is – apart from clinical practice – the most perfect method of education, as it enables simulating realistic treatment methods without endangering the real patient.

During training, instructors use the most modern patient simulators on the Polish market (Human Patient Simulator). These allow for multiple procedures to be performed in emergency medicine, such as instrumental and surgical airway patency management, decompression of tension pneumothorax, placement of a chest drain, thoracotomy, laparotomy and electrotherapy of cardiac arrhythmia.

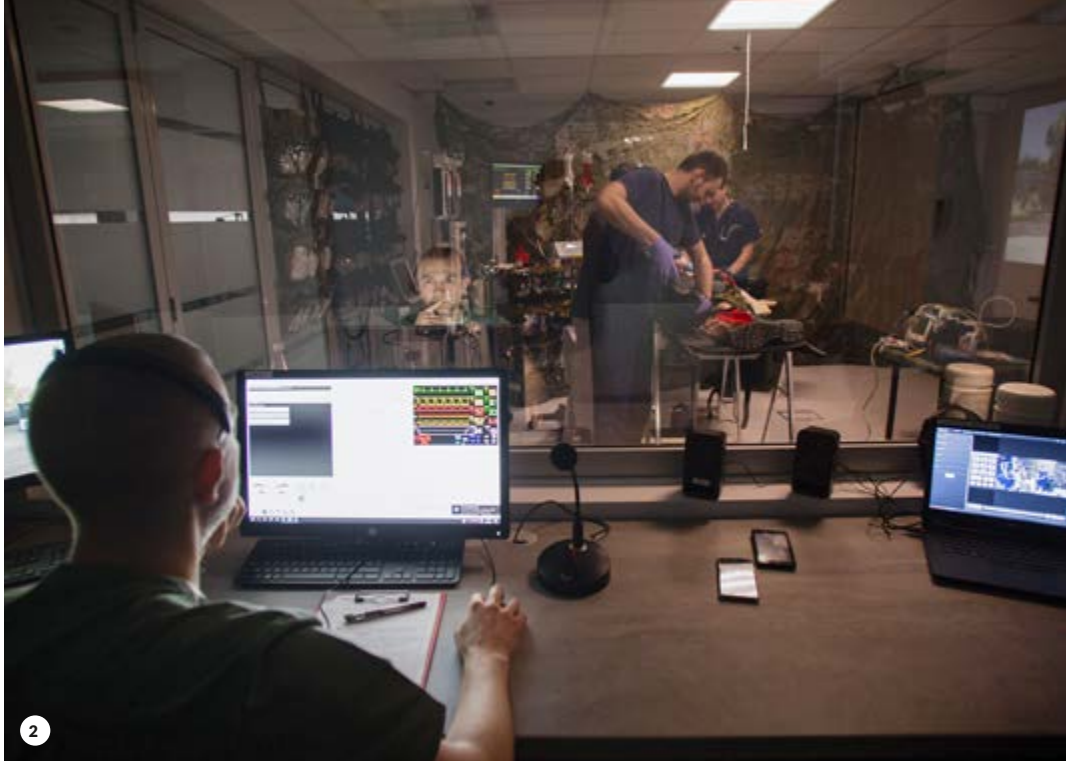
The course is monitored by a computer and instructors hidden behind a one-way mirror. The equipment used in the laboratory can be easily moved so that training can be carried out on the training ground or in a military unit.

1 Simulated covid patient care during one of the courses in the Simulation Laboratory.

2 Instructor's station in the Simulation Laboratory allowing close supervision and control of the activities carried out by the course participants.

Projects

In 2021, we started three research and development projects at MIM – NRI to support medical evacuation from the battlefield. They are the result of a competition announced by the National Centre for Research and Development as part of the programme *Development of modern breakthrough technologies serving national security and defence* aka SAPPHIRE. The projects implemented in the consortium focus on the subject of medical evacuation from the battlefield, and the MIM – NRI, as one of the team members, is responsible for the medical component. The projects will include aircraft acquiring information on the condition of battlefield casualties, delivering medical equipment to the scene of an incident and enabling the evacuation of casualties, as well as a system of sensors placed on a soldier's equipment to acquire data on their condition and injuries.



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3 A high-fidelity simulator is a high-tech, computer-controlled device replicating the appearance of the human body, whose design and software provide the ability to reflect the physiological reactions caused by undertaking a specific medical intervention.

AFGHAN

This is an interdisciplinary project carried out between 2013 and 2020. It was focused on researching the increase of the resistance of wheeled armoured personnel carriers to mines and improvised explosive devices (IEDs). The project was co-financed by the National Centre for Research and Development and carried out by a consortium established for this purpose, which included the Military Institute of Medicine – National Research Institute.

Instructors from the MIM – NRI's Combat Field Medicine and Medical Simulation Unit conducted a number of specialised training courses as part of the AFGHAN project aimed at soldiers and medical personnel of the Polish Armed Forces.

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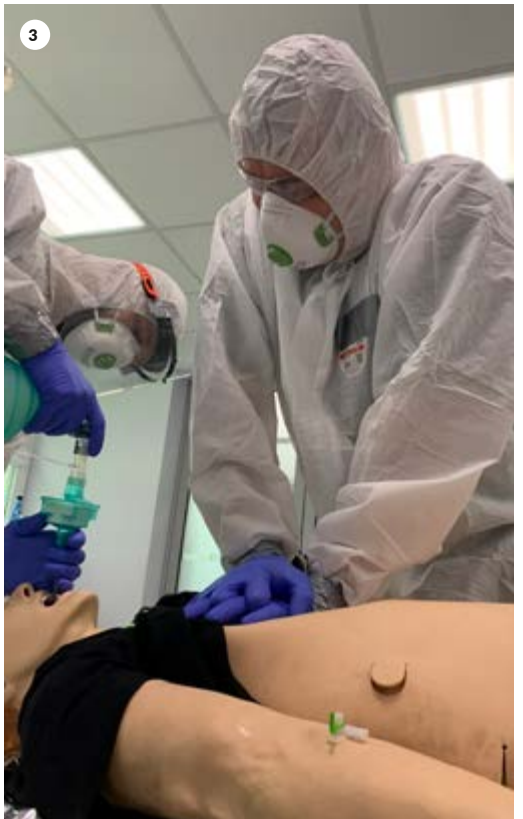
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1 Simulation during one of the courses conducted in the Simulation Laboratory.

2 Image from one of the cameras located in the Simulation Laboratory.

3 Exercising medical procedures during a pandemic.

4 Simulation of an incident in a Rosomak during an exercise for the AFGHAN project.

5 Expeditionary exercise for Polish soldiers without medical education. Practical activities, during which soldiers were taught emergency procedures, were carried out in a tactical environment.

In creating the training programme, we drew on the experiences from missions in Iraq and Afghanistan, as well as from the MIM – NRI Trauma Centre. The trainees gained knowledge and skills in the organisation and operation of the trauma team and learnt about the tasks of individual team members. Basic and advanced clinical skills necessary when treating injured victims were trained during the class.

4

5

Renegade/Sarex

2021 marked another edition of the Renegade/Sarex tactical and specialised exercise on countering terrorist air threats as well as conducting search and rescue operations in the land and sea area. The fourth stage of the exercise took place at the MIM – NRI site and involved the evacuation of casualties by air. The course of these exercises was planned and coordinated by instructors of the Department of Battlefield Medicine and Medical Simulation at the MIM – NRI Postgraduate Training Centre.


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Four Airborne Search and Rescue Crews using different aircraft (Mi-8, Mi-17, W3-Sokół and Black Hawk) as well as crews from the State Fire Service, Police and the Polish Red Cross took part in the events, operating at the scene. The role of the victims was played by experienced medics, who were able to assess the quality of the rescue procedures as well as the search and rescue operation.

Special Labs is a cyclical workshop for special forces soldiers held at MIM – NRI. So far, there have been three editions, the main focus of which has been perfecting the latest NATO medical procedures. The exercises involve both workshop work and testing skills in medical simulation conditions. The task of instructors of the Department of Battlefield Medicine and Medical Simulation, as well as medical specialists from various MIM – NRI clinics, was to ensure the highest substantive level of the training sessions conducted


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1 W3 Falcon with crew approaching for landing.

2 The Renegade/Sarex exercise was carried out using the Modular Hospital (simulating the transport of casualties) and the MIM – NRI Medical Simulation Laboratory, which played the role of a Hospital Emergency Department. Here, medical teams carried out patient admissions and rescue procedures. Everything happened under the observation of instructors from the MIM – NRI Postgraduate Training Centre, who provided direct feedback.

3 Mi-8 on the hospital airstrip during the Renegade/Sarex exercise.

4 Care of a casualty in the Simulation Laboratory acting as a Hospital Emergency Department.

5 Special forces medics during a Special Labs exercise.

MASCAL

We run courses on the subject of rescue and medical operations in the event of multiple and mass incidents. In the event of a building disaster, a natural disaster, a serious traffic accident or a terrorist attack, emergency services that normally work independently of one another very quickly appear on the scene. The effectiveness of assistance to victims then depends on swift cooperation between these services, and coordination plays a key role. The MASCAL exercise is designed to practise such skills.

We organised one such training in 2020 as part of the project *Improving access to mental health services in the community*. The project aimed to help Ukrainian specialists treat soldiers suffering from war trauma and lasted several months. It was funded by the Ministry of Foreign Affairs under the Polish Aid programme. As part of the MASCAL training, Ukrainian psychologists and psychiatrists took part in integrated medical and psychological activities during a simulation of a terrorist attack on the premises of the Świt Community Centre in Warsaw.

1 MASCAL training – cooperation of emergency services at the scene of the incident.

2 Police officers during MASCAL training.

3 Police officers during evacuation of the injured from the cinema hall where the terrorist attack simulated for MASCAL training took place.

4 Providing first aid to casualties after a mass casualty incident at the Świt Community Centre – MASCAL exercise.

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WIM

CLINICAL RESEARCH DEVELOPMENT

AT MIM – NRI

The Clinical Research Support Centre was established on 1 January 2021. It was created by the Director of the Military Institute of Medicine – National Research Institute to increase our capacity to handle and conduct commercial and non-commercial clinical trials. The project to set up the Clinical Research Support Centre has been funded by the Medical Research Agency as part of a competition to support the establishment and development of Clinical Research Support Centres (No. ABM/2020/3). MIM – NRI Clinical Research Support Centre is a member of the Polish Clinical Trials Network – a successively expanding structure created and coordinated by the Medical Research Agency, which brings together Clinical Research Support Centres being established in leading clinical centres across the country.

Within MIM – NRI Clinical Research Support Centre, we create medical facilities necessary to conduct clinical trials of all phases, including the Early Phase Centre, but also departments responsible for supporting the process of planning and preparing trials (medical and scientific department), research coordination and quality control (research coordination and quality control department) as well as legal and accounting services (economic and administrative department).

MIM – NRI Clinical Research Support Centre, which will be fully operational on 1 January 2022, will become a common point of contact for sponsors. Combined with the streamlining of administrative processes, the centre will enhance MIM – NRI's research capabilities and positively impact MIM – NRI's relationship with sponsors and clinical trial implementers.

1 Clinical Research Support Centre team meeting (from left): Bartłomiej Kisiel (manager) and Joanna Kur-Zalewska (deputy manager).

2 Clinical Research Support Centre team meeting (from left): Ewelina Kowal (senior specialist), Aleksandra Feliksiak (monitor and clinical research coordinator), Monika Zdaniecka (administrative coordinator, quality specialist).

1 (Next page) Clinical Research Support Centre staff (from left): Alicja Szczygieł-Jamińska (clinical trial monitor and coordinator), Aneta Książek (pharmacovigilance coordinator), Joanna Kur-Zalewska (deputy manager), Bartłomiej Kisiel (manager), Monika Zdaniecka (administrative coordinator, quality specialist), Ewelina Kowal (senior specialist), Aleksandra Feliksiak (clinical trial monitor and coordinator).


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agat®

WE BUILD WITH PASSION

Drilling under the forest without damaging the tree roots, building a safe landing route for civil and military aircraft, designing and constructing a training ground for tanks, and designing and constructing the power and telecommunications systems for the Southern Hospital in Warsaw. For 30 years, the specialists at Agat have been proving that they can be commissioned to carry out the most responsible projects.

The Agat company has been operating since 1990. The company's priority is to provide services at the highest level and to meet the expectations of even the most demanding contractors. The management and employees of Agat are constantly improving and expanding the range of services provided. They carefully follow the development of all technologies and the market in order to match the offer to the needs of investors. At the same time, Agat emphasises the constant professional development and training of its staff and invests in the latest machinery.

The highest quality of services forms the core philosophy of Agat, whose clients do not have to look for solutions to problems that arise at different stages of the project.

The implemented quality management systems ISO 9001:2015, ISO 14001:2015, ISO 45001:2018, AQAP 2110:2016 ensure that all processes affecting quality are properly controlled and supervised.

The cooperation with Agat starts with the design stage, through to the management and supervision of investments in the sectors of energy, industrial construction, telecommunications and teletechnology, technological automation, ecology and guided drilling.

Observation of the economic market and professional diversification of the services provided secure a significant increase in sales, as well as the company's stability and financial credibility.

For nearly 30 years, the company has cooperated with the giants of the Polish energy sector. For PKN Orlen SA, PERN SA, Lotos SA and PGNiG, the Koluszki-based company performs tasks related to the development and maintenance of the critical infrastructure of the state. On behalf of the Ministry of National Defence, Agat has carried out key investments at airports and military bases, as well as at the Port in Gdynia. These investments are among the critical ones not only for the Polish Army, but for the entire North Atlantic Treaty Organisation.

IT IS NOT QUALITY THAT COSTS MONEY BUT THE LACK OF IT

In order to provide comfortable service to its principals, Agat SA has opened several of its offices and branches. The company's executive office is the Technical Base in Zygmuntów, 4 km from Koluszki.

The Technical Base houses:

- Power Plant Construction and Automation Branch, which carries out investments related to the construction and modernisation of power facilities, telecommunications systems and technological automation.
- The Industrial Construction Branch, which builds storage depots, industrial pipelines, petrochemical installations, engineering, industrial and specialised facilities.
- Design Office, which is an important link of the company in the implementation of investment tasks.

1 2 Head office in Koluszki at Paderewskiego 1 Street.

3 Technical Base in Zygmuntów.

4 Steel construction plant at the Technical Base.

5 Storage facilities at the Technical Base.

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1 A very important link in the company is the Płock branch, which was established in 1998 near Agat's largest contractors: PKN Orlen SA and PERN SA. It has its own equipment, workshop and transport facilities. Operating as an independent entity, it carries out work related to automation, the electrical sector, as well as provides start-up, service and maintenance services.

2 In 2016, a Commercial Office was opened in Gdynia, which is responsible for coordinating investments in the petrochemical industry and the military sector.

3 4 In 2005, Agat opened a Commercial Office in the centre of Warsaw at Chałubińskiego 8 Street. This is a very important location that plays a key role in the company's dealings with its most important contractors.

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25 years of collaboration with the Military Institute of Medicine – National Research Institute

The Agat company has been cooperating with the hospital at Szaserów Street for more than two decades. In 1995, having already had experience in dealing with the defence sector, representatives of the Koluszki-based company signed a public-private partnership agreement with the authorities of the Central Clinical Hospital of the Military Institute of Medicine – National Research Institute in Warsaw. The agreement obliged the company to provide services to the facility; in return, Agat's employees were given the opportunity to receive medical care at the facility. During 25 years of cooperation, Agat has performed many construction and electrical installation works for the hospital. Agat has also refurbished the presidential, oncology, septic, endoscopy, neurosurgery, cardiology, haematology wards and the CT scanner laboratory. In 2017, Agat participated in the construction of a modern radiotherapy building for the Department of Oncology. Thanks to the company's executive support, it was possible to modernise the hospital chapel.

1 Oncology Clinic – Radiotherapy Department.

2 Oncology and Thoracic Surgery Clinic – post-operative intensive care room.

Agat milestones

August 1990	Establishment of Agat sp. z o.o.
September 1990	First contract signed.
1995	Start of cooperation with MIM – NRI.
September 1995	Staff exceeds 100 people.
September 1998	Branch office in Płock begins to operate.
February 1999	Staff exceeds 200 people.
August 2000	ISO 9001:2000 certification.
April 2001	AQAP 2110:2003 certification.
October 2002	KB POMORZE sp. z o.o. is established in Gdańsk.
June 2005	Opening of a Sales Office in Warsaw.
June 2006	Agat awarded Polish Promotional Emblem Teraz Polska for technological automation including design, execution and warranty services.
November 2006	Polish Quality Award 12th Edition. Agat laureate in the Large organisations category.
September 2007	Industrial Safety Certificate of the 2nd degree. Agat granted the ability to protect classified information according to the Secret clause.
August 2008	Conversion of a limited liability company (sp. z o.o.) into a joint stock company (SA).
August 2008	Establishment of the company Agat IT SA.
August 2009	Certificate of Physical and Technical Security Accreditation for the Service Point of Foreign Documents with the security classification NATO Secret, EU Secret.
February 2010	Establishment of Przedsiębiorstwo Budownictwa Inżynieryjnego SA in Piotrków Trybunalski.
February 2010	1st Degree Industrial Safety Certificate. Confirmation that Agat is fully capable of ensuring the protection of classified information marked with Secret, NATO Secret and EU Secret classification.
June 2010	ISO 18001:2004 quality certification.
August 2010	Purchase of Przedsiębiorstwo Inżynierii Środowiska i Melioracji Piomel SA in Piotrków Trybunalski.
November 2012	ISO 14001:2004 quality certification.
October 2015	Establishment of the company ACHAT Infrastruktur GmbH in Berlin.
March 2016	Opening of a Sales Office in Gdynia.

Military sector

An important sector of Agat's business is the execution of contracts for the military.

The company has performed works related to the modernisation and expansion of military bases in Nowy Glinnik, Leźnica Wielka, Łask, Krzesiny and the Port in Gdynia.

In recent years, important investments for the company have been the expansion of bases in Mińsk Mazowiecki and Wędrzyn, as well as the design and construction of training ground facilities at the Land Forces Training Centre in Orzysz.

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1 2 3 31st Tactical Air Base in Poznań-Krzesiny.

4 5 32nd Tactical Air Base in Łask.

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1 2 3 23rd Tactical Air Base in Mińsk Mazowiecki.

4 5 The War Port in Gdynia.

6 Brig. Gen. Stanisław Zygmunt Sochaczewski Land Forces Training Centre in Orzysz.

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Fuel sector

During 30 years of operation, Agat has participated in the modernisation and expansion of many fuel depots across Poland, executing contracts for OLPP, PERN and ORLEN.

Between 2015 and 2021, Agat built tanks with associated infrastructure with a total capacity of 602,000 m³ at the Fuel Depots in Koluszki, Nowa Wieś Wielka, Emilianów and Małaszewicze as well as at the Fuel Terminal in Gdańsk.

1 2 Fire protection system at the Fuel Depot in Koluszki.

3 Electric drives for the main fuel tank gate valves at the Fuel Depot in Koluszki.

4 5 Fuel Terminal in Gdańsk.

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1 Fuel Terminal in Gdańsk.


ODWODNIENIE
PM 3
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Railway sector

In 2004, Agat carried out electrical power and lighting works on the construction of the first metro line in Warsaw on the Plac Wilsona – Marymont section. The culmination of the works on the metro was the construction of Młociny station.

The years 2006-2008 saw Agat's major participation in the modernisation of the railway line: Skierniewice – Łódź Widzew.

Agat participated in the construction of the National Stadium in Warsaw, carrying out electrical works and modernising the Warszawa Stadion railway stop.

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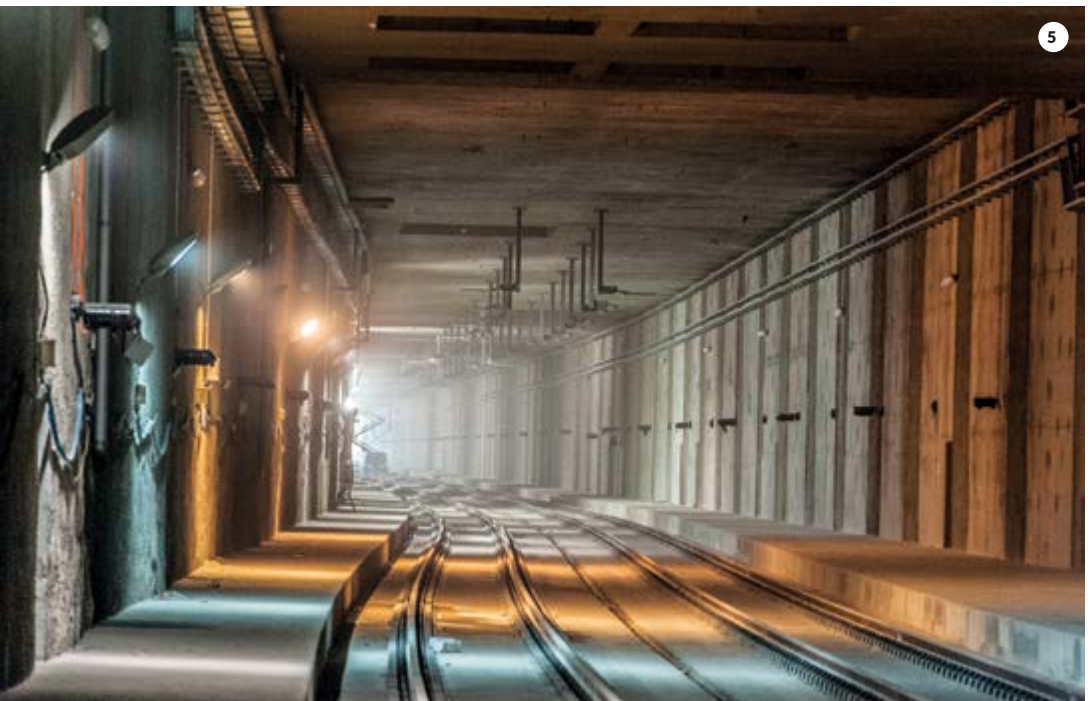
1 Warszawa Stadion railway station.

2 Railway infrastructure at the PKP Intercity Remtrak rolling stock repair facility.

3 Plac Wilsona metro station.



4 Łódź Fabryczna railway station.

5 Łódź Niciarniana – Łódź Fabryczna tunnel.

6 Railway line on the sections Skierniewice – Koluszki and Koluszki – Łódź Widzew.

Rail sector

The Agat company carries out turnkey investments in the construction of technical facilities and washing facilities for trains.

To date, it has completed technical facilities for the Łódź Metropolitan Railway, consisting of a repair hall and train washing facilities.

Another investment performed in several stages was the modernisation and expansion of technical facilities for PKP Intercity Remtrak.

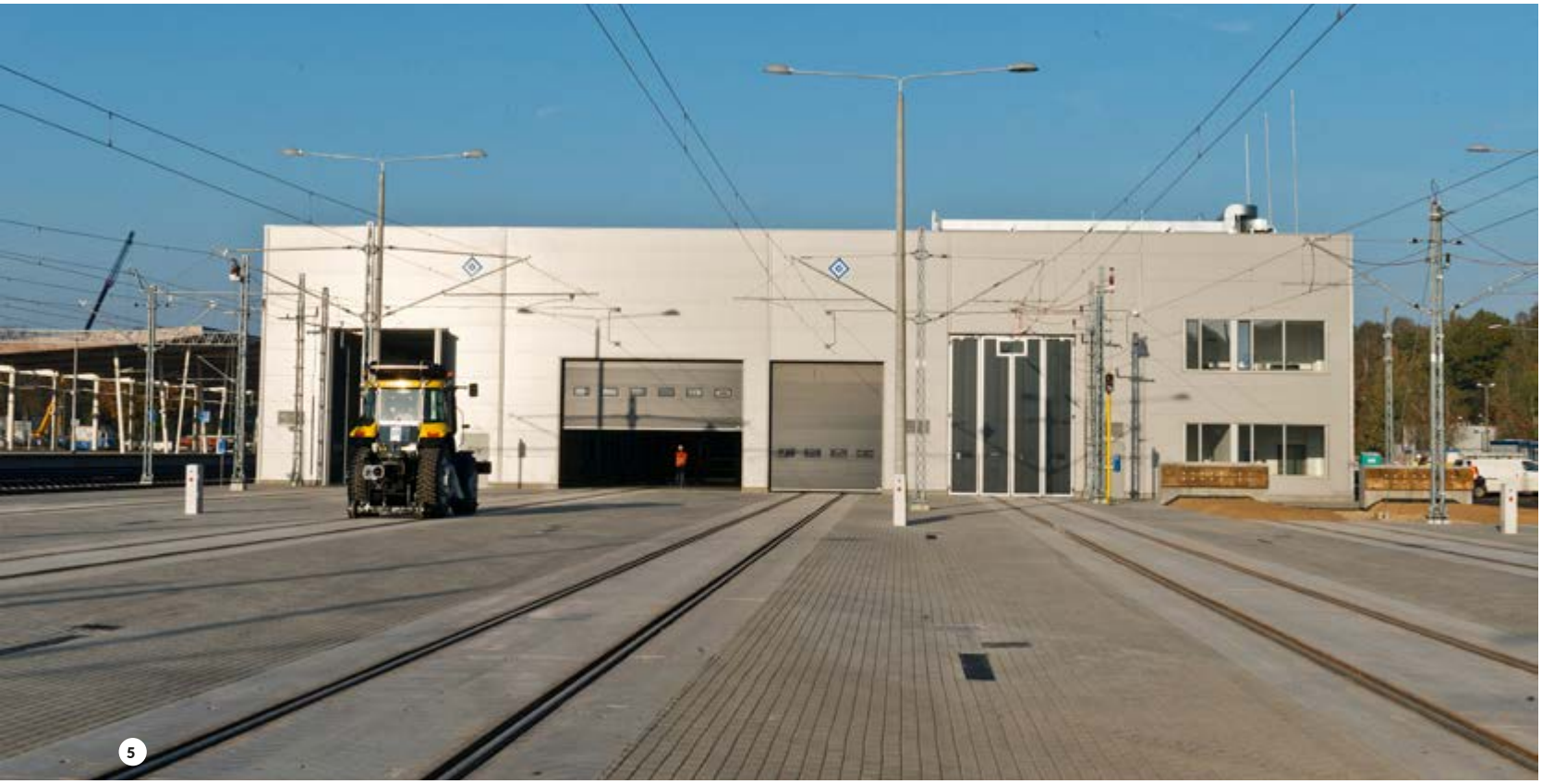
Agat, together with its German company Achat, also built two train washes in Berlin, at Friedrichsfelde and Grünau stations.

1 5 Technical facilities for the Łódź Metropolitan Railway.

2 Washing facility for S-Bahn trains in Berlin at Grünau station.

3 4 Train washing facility for S-Bahn trains in Berlin at Friedrichsfelde station.

6 Technical facilities for the repair of rolling stock for PKP Intercity Remtrak.



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Energy sector

At Agat, the energy sector is a leading industry for which we have been providing services since our inception. We have completed many power plant projects for the fuel, railway, military and other national industries.

We offer a wide range of energy services, which include the construction, repair and modernisation of:

- overhead and cable power lines,
- substations,
- cathodic protection,
- industrial automation,
- long-distance fibre optic lines,
- tele-technical systems,
- control and supervision systems.

We have highly qualified engineering and technical staff, measurement and commissioning sections as well as the technical and measurement equipment and transport facilities necessary for professional service.

1 Main power supply point.

2 110 kV high voltage line in Koluszki.

3 4 Low-voltage switchgear at the Fuel Terminal in Gdańsk.

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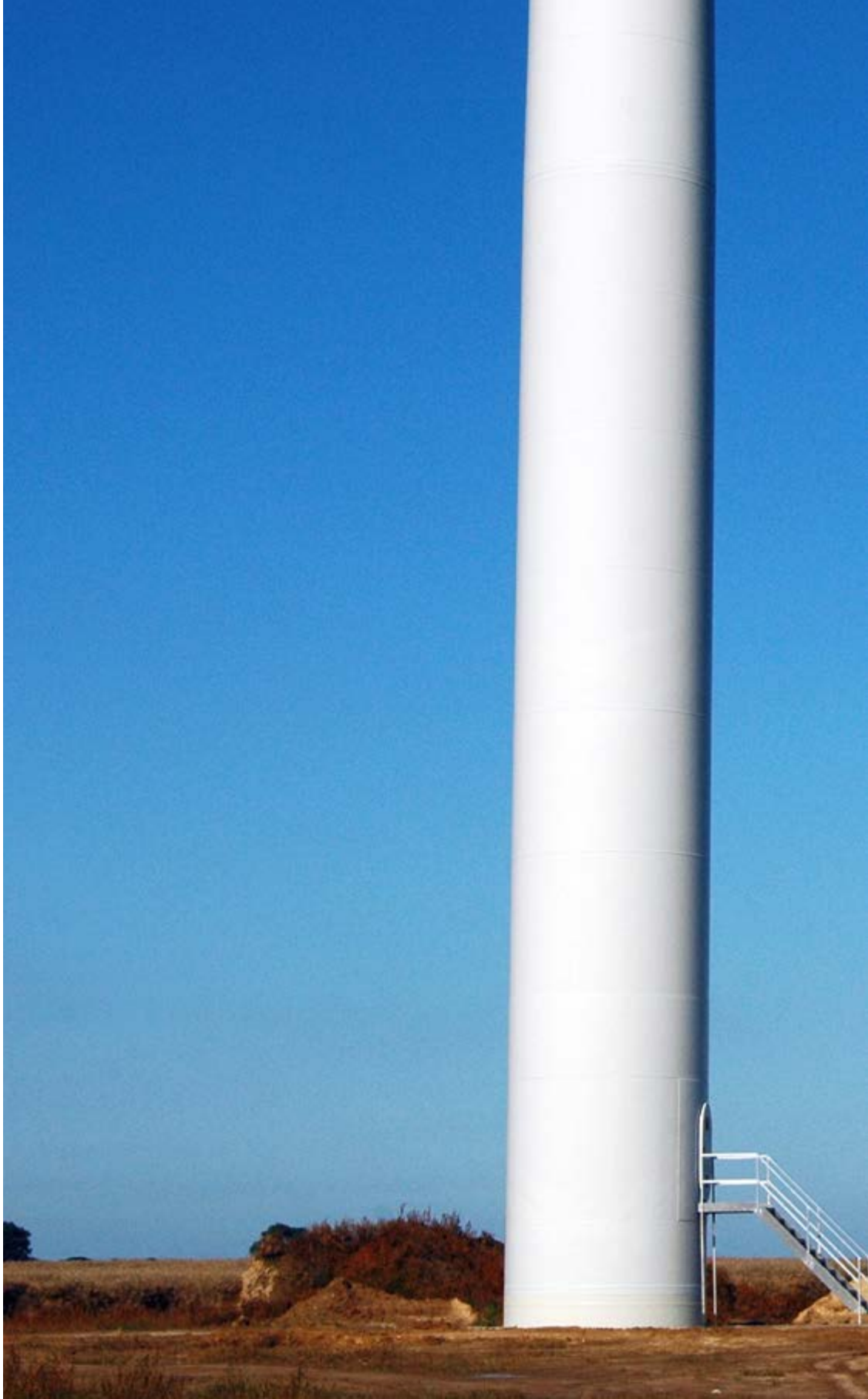


1 Wind farm in Gnieżdżewo.

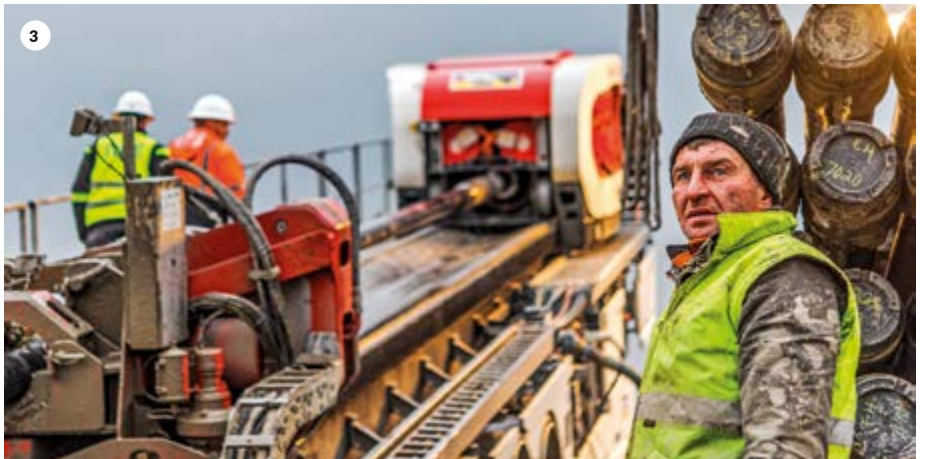
Horizontal drilling

One of Agat's specialities is horizontal directional drilling. Since 1995, Agat has performed dozens of extremely technically demanding crossings under terrain obstacles.

The most spectacular drillings include:

- under the Liwiec river – 336 m long
  – steel pipe with a diameter of 813 mm
- under the Bug River – 446 m long
  – steel pipe with a diameter of 813 mm
- under the Bogusławice marsh – 618.51 m long
  – steel pipe with a diameter of 530 mm
- under the Vistula River near Włocławek – 1,240 m long
  – steel pipe with a diameter of 324 mm

The company's market position in the field of steerable drilling has been bolstered by the contract signed in October 2019 for the design and execution of a drilling under the Vistula River in Płock. The contract comprised a drilling of 691 m in length and laying a 400 mm diameter steel pipe. The work was completed in April 2021. Over the course of 25 years, the company has completed more than 50 kilometres of various directional drillings.



1 2 3 Machine and pipes for horizontal directional drilling – under the Bogusławice marsh – 618.51 m long – 530 mm diameter steel pipe.

4 Drilling under the Rządza River. Two drillings were made – the first was 710 m long, with a PE pipe with a diameter of 180 mm; the second one was 630 m long, with a steel pipe with a diameter of 813 mm.

1 Drilling under the Vistula River near Włocławek – 1,240 m long, with a steel pipe with a diameter of 324 mm.

Agat and more

The company organises annual gatherings of employees with their families during May Day and Christmas tree parties with Agat.

Agat actively participates in the sport life of Koluszki. Agat's supports young athletes from KKS Koluszki Sports Club. For many years, the company has been cooperating with the Mariusz Wlazły Foundation, which organises trainings for primary school children in the sports hall in Koluszki.

Supporting the youth over the past 20 years, Agat has subsidised over 70,000 school lunches. The company also supports School Complex No. 1 in Koluszki, also a potential staff resource for Agat. Since 2016, it has been providing equipment for laboratories at the Electrical Technical School in Koluszki and promoting the school's best students.

For years, Agat has been cooperating with the Faculty of Electrical Engineering of the Technical University of Łódź in the organisation of various meetings, symposia and conferences. Many of the company's employees are graduates of this university.

1 2 5 May Day with Agat.

3 Christmas tree party with Agat.

4 Team-building trips for employees.

6 7 Training for children with Mariusz Wlazły.

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The history of Agat is also the history of its daughter companies. Over the course of 30 years, they following companies have been established:

ACHAT Infrastruktur GmbH provides services related to the design, construction and works in the railway, energy, fuel and telecommunications sectors, as well as engineering works and related technical and marketing consultancy.

AGAT IT S.A. offers services related to the design and construction of integrated IT and automation systems to support technological and industrial processes.

PBI S.A. has carried out a number of significant investments over recent years, both as a general contractor and as a subcontractor for renowned construction companies.

PIOMEL S.A. – Przedsiębiorstwo Inżynierii Środowiska i Melioracji PIOMEL S.A. – specialises in the construction of sewage systems, water supply systems, sewage treatment plants, land reclamation systems, and road system construction. In 2002, Agat was also a co-founder of KB Pomorze Sp. z o.o. with its registered office in Gdańsk. This is a very important partner with whom we cooperate on works in the fuel sector.

KB Pomorze Sp. z o.o. is a specialist engineering company dealing with the design and execution of works in the fuel, refinery and petrochemical markets, as well as industrial construction in the field of investment, modernisation and overhaul of industrial installations and production, processing, storage and distribution of raw materials and products.

IT IS NOT QUALITY THAT COSTS MONEY BUT THE LACK OF IT

Publisher: Military Institute of Medicine – National Research Institute (Wojskowy Instytut Medyczny - Państwowy Instytut Badawczy), ul. Szaserów 128, 04-141 Warszawa, Poland

First edition

Cover photo: Sławomir Skrzyński
Photographs in the album: Piotr Bławicki, except:
photos from the collection of the Association of the former Ujazdowski Hospital (photos 1, 3-5 pp. 14-15, photo 2 p. 17),
Leszek Szymański/PAP (photo 3 p. 21), Paweł Wiktorzak (photos 1-3 pp. 26-27),
Sławomir Skrzyński (photos 1, 2 p. 104, 2, 3 p. 107, photo 2 p. 109, photos 1-3 pp. 110-111),
Jolanta Szantiło (photo 1 p. 106, photo 1 p. 108), MIM – NRI Archives (photo 2 p. 13, photo 1 p. 62, photos 4, 5 p. 65, photo 2 p. 162, photo 1 p. 170, photos 1-3 p. 174, photos 1-5 p. 175, photo 5 p. 179), AGAT Archive (photos pp. 190-219)

Proofreading: Military Institute of Medicine – National Research Institute team
Editing: Małgorzata Złotkowska, Zuzanna Chodzeńska
Album preparation and production: Red Pepper: Iwona Zabielska-Stadnik, Lena Szczesna
Translation: Nestor Kaszycki

ISBN 978-83-961316-2-1

Warsaw 2024

ISBN 978-83-961316-2-1