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Impressum 21
Bellinzona, 30th July 2019,

As customary every year, the EOC Scientific Report will provide an overview of the published scientific work and the ongoing research activities carried out at EOC. This year a new reporting format was chosen, which we hope will provide a better clarity and a more structured account of the effort of our research teams.

The first part provides a brief description of the main research lines pursued by EOC Institutes and Departments in 2018 to convey the effort and value of their research activities and to highlight that many of the EOC staff not only provide first-rate patient care, but also perform high quality clinical and translational research. Indeed, research is becoming a fundamental part of the activities of health professionals within EOC, contributing to improve the quality of patient care, following the principle of the best scientific evidence, and to promote innovation and progress in the medical-health field.

The second part of the report presents the overall EOC research output in terms of peer-reviewed publications listed in PubMed/MEDLINE database, including analyses on number and type of publications, the journal impact factor and quartiles. The high level of achievement in scientific productivity is documented quantitatively (373 peer-reviewed articles, of which 302 as original or review articles) and qualitatively (almost 50% on the highest ranked journals). Furthermore, the level of scientific collaboration (local, national or international) and the contribution of EOC researchers (as first or last author) are evaluated and further demonstrate the high quality of the EOC scientific production in 2018.

The third part shows the overall analysis of the citation $h$-index of the EOC academic staff (professors and associate professors) for the previous 5 years (2014-2018) and 10 years (2009-2018), evaluated using the Web of Science platform. The $h$-index provides the citation frequency of the EOC publications. The median EOC 5-years $h$-index is 7, whereas the median EOC 10-years $h$-index is 11. Overall, throughout 2018, the EOC Institutes and Departments, including the research laboratories, produced high-quality research attaining broad recognition at national and international level. Together with patient care and education, research is an integral part of our organization. Bringing research closer to practice helps to facilitate ongoing studies and monitoring of the relative effectiveness of clinical interventions and care processes, to guarantee the quality and safety of services provided to our patients and to ensure that our patients benefit from innovative diagnostic methods and therapies.

Furthermore, the steady growth in quantity and quality of research activities at EOC is fundamental for the upcoming Medical Master School of the Faculty of Biomedical Sciences of the Università della Svizzera Italiana. This is in line with the 2018-2021 EOC strategic plan for a Cantonal hospital of national and academic value.

Editorial Board
of the EOC Scientific Report
The Oncology Institute of Southern Switzerland (IOSI) is one of the largest clinical cancer research centers in Switzerland. With more than 50 phase I-III clinical trials open it offers access to innovative therapies and is involved in the development of new anti-cancer treatments.

In 2018 a scientific research board was established with the aim to evaluate new clinical trials to eventually activate. The IOSI Departments of Medical Oncology, Haematology, Radiation Oncology and Palliative Care’s Clinical Research is centrally coordinated by the IOSI Clinical Research Unit (CRU). The IOSI-CRU staff includes study coordinators and research nurses and provides the infrastructures and support for researchers of the Institute. In addition, the New Drugs Development Unit is taking care of the activation and conduct of early phase clinical trials, which include phase I trials for solid tumours and lymphomas. Although IOSI performs research in different types of cancer, lymphoproliferative diseases, prostate cancer and new drug development represent the main areas of interest, because of the strong collaboration with the preclinical research program of the Institute of Oncology Research (IOR), which have the same three main focuses. Other topics of interest include breast cancer, acute leukemia, lung and gastrointestinal cancer, and radiomics.

In 2018, 29 new clinical trials (including 5 phase I trials) were activated and 95 patients were included in clinical trials, among them 23 patients in phase I trials evaluating new drugs. Lymphoma and chronic lymphocytic leukemia, prostate, breast and lung cancer were the tumour types more frequently included.

In addition to these trials, several projects performed in collaboration with the IOR are evaluating the use of peripheral blood biomarkers as predictors of patients’ outcome. This type of research, already active and largely expanded in lymphoma and chronic lymphocytic leukemia under the supervision of Prof. Dr. D. Rossi, is now active, starting from 2018, also for prostate cancer in collaboration with Prof. Dr. A. Alimonti. Another important aspect of research in 2018 was represented by the efforts to develop an adoptive cell therapy group and we expect that the first clinical trial using CAR-T cells for patients with lymphoma will be opened in 2019.

Clinical research at the IOSI has a strong and long-standing collaboration with national and international research groups. As in the past, during 2018 clinical research was performed in collaboration with the Swiss Group for Clinical Cancer Research (SAKK), the International Extranodal Lymphoma Group (IELSG) directed by Prof. Dr. E. Zucca, the International Breast Cancer Group (IBCSG) where Prof. Dr. O. Pagani is an influential member and more locally, with the help of the EOC Research Found (ABREOC), the Clinical Trial Unit (CTU) and the Pathology Institute in Locarno (ICPL). For the phase I studies, in addition to the collaboration with pharmaceutical industries, several investigator-initiated studies have been developed by researchers of the IOSI in collaboration with the IOR, the CTU and the SAKK. Thanks also to these collaborations, many publications could be completed in 2018 including IOSI members and researchers from IOSI have presented results in national and international conferences.
Scientific Report 2018

Institute of Clinical Neurosciences of Southern Switzerland – Neurocenter (NSI)

Prof. Dr. Alain Kaelin, PhD
Medical and scientific director

The Neurocenter of Southern Switzerland (NSI) hosts the Services of Neurology, Neurosurgery, Neuroradiology, Pain management Center as well as the Laboratory for Biomedical Neurosciences. It is a priority for the NSI to implement basic and clinical research. Both an exceptional publication activity and several academic nominations reflected this scientific endeavour in 2018. Furthermore, the NSI actively contributed to the development of the new Faculty of Biomedical Sciences of the Università della Svizzera Italiana, among other with the creation of two new PhD programs. The pertaining projects are summarised in the following sections.

Laboratory for Biomedical Neurosciences (LBN)
Our translational research focusses on the elucidation of the molecular mechanisms involved in the initiation, progression and consequences of motor disorders such as Parkinson’s Disease (PD) or other neurodegenerative diseases collectively defined as proteinopathies. Another important objective is training and education of young scientists. This year, the laboratory hosted five PhD students affiliated with the universities of Bern, Zurich, Basel and USI and two master students.

Neurodegeneration Research Group
The main focus is on aberrant post-translational modifications, subcellular localisation and self-assembly of the proteins involved in the development of neurodegenerative disorders such as frontotemporal lobe dementia, PD, or Alzheimer’s disease.

Parkinson and Basal Ganglia Research Group
A translational research project performed in collaboration with the Movement Disorders group, searches for early biomarkers in skin samples. This project is possible thanks to the creation at the NSI of a biobank and a PD database in Ticino. The first results have been published in 2018.

Movement Disorders Center
The priority relies on dyskinesias in Parkinson’s Disease (PD) and the influence of neuronal plasticity changes during sleep. Furthermore, a translational research project in patients affected by cervical dystonia using non-invasive transcranial magnetic stimulation started in 2018 and is the first PhD project in Human Neurosciences of the USI, under the supervision of PD Dr. S. Galati who received his “venia legendi”. In addition, a translational research project using skin biopsy to diagnose PD was continued in 2018.

Multiple Sclerosis Center
The research focuses on early diagnosis, exploring pioneering MRI techniques, understanding better MS symptoms like fatigue or searching for innovative treatments of overactive bladder. We also participate to a nationwide investigator initiated project on MS epidemiology. The Center is also collaborating with the industry for international studies on innovative treatments. The responsible of the Center (Prof. Dr. C. Gobbi) was nominated titular professor at the USI and PD Dr. C. Zecca, received the “venia legnidi”.

Neuromuscular Unit, Myosuisse
The Neuromuscular Unit participates in the Swiss Register of Neuromuscular Disorders. In 2018, a multicenter, international study on Neuralgic Amyotrophy, comparing the idiopathic and the HEV-related form was continued and the investigator, Dr. P. Ripellino received the important Baasch-Medicus Award.

Neuropsychology and Behavioural Neurology Research Unit
Several collaborative projects are underway, mainly in collaboration with other research group, for example for the “MoCA-DCI study”, which analyses the impact of delayed cerebral ischemia on neuropsychological
outcome after aneurysmal subarachnoid haemorrhage. An external project with Prof. Dr. E. Albanese (USI) is also ongoing to investigate the distribution and determinants of dementia in Ticino.

Neuroradiology
The main projects in diagnostic neuroradiology were on high resolution MRI in Multiple sclerosis, in cooperation with the NSI Multiple Sclerosis Center (founded by ABREOC and Swiss Multiple Sclerosis Society), data analysis for the project “Role of multimodal CT in differentiating stroke from stroke mimics in the acute setting” and the MRI project “High-resolution post-contrast imaging at 3 Tesla: a comparison of three different techniques” (funded by ABREOC). The main projects in interventional neuroradiology were mainly on the treatment of vertebral lesions with a minimally invasive vertebral body stenting reconstruction and treatment of severe osteoporotic or neoplastic vertebral fractures with an innovative stent-screw assisted internal fixation (SAIF technique).

Neurosurgery
The priority is on topics that are already tested in local clinical trials or are short of coming into clinical use such as improving the intraoperative visibility of tumor cells for enhanced surgical resection; A new microscope permitting a more sensible and promising detection of tumor cells by fluorescence otherwise was built together with the company Zeiss. Clinical research in 2018 focused on improving patient safety during surgical resection by intraoperative neuromonitoring in collaboration with the “Italian national committee of research”, during aneurysm surgery (funded by ABREOC). Two prospective multi-centric studies evaluates the indication of decompressive hemicraniectomy in patients with intracerebral hematoma and the neuropsychological impact of post-aneurysmal SAH vasospasm, respectively. The research focus in spinal neurosurgery is on new minimally invasive technologies.

Pain Management Center
The Center promotes research to reduce or manage pain. Academic cooperation with the University of Maastricht and the VUMC (Amsterdam) has been continued in 2018 and is related to the effects of dorsal root ganglion stimulation for treatment of diabetic neuropathy. Research collaboration on other different research projects also started with Prof. M. Barbero (SUPSI) in 2018.

Sleep and epilepsy group
Our group is internationally recognised for its results in the area of sleep related movement disorders such as restless legs syndrome. The 2018 has been an exceptional year in term of publications, including one paper in Nature reporting important findings in the pathogenesis of narcolepsy. These results have been obtained thanks to consolidated local and external collaborations, to the financial support of 3 grants from the SNF, 1 grant from the Italian Ministry of University and 2 locals grant. A full PhD program started this year with the aim of exploring the state dissociation of brain function during parasomnia and an international new post-doc Master in Sleep and Consciousness started with success. The responsible of the Center (Prof. Dr. M. Manconi) was nominated titular professor at the new Faculty of Biomedical Sciences at the USI.

Stroke Center
The group performs mainly clinical research and is interested in understanding the role of multimodal advanced neuroimaging for the diagnosis and in selecting best treatment for acute ischemic stroke. The Center also participates in numerous national and international projects mainly dedicated to acute stroke management, stroke prevention and stroke recovery in the acute phase. The center also offers a platform for industry promoted international trials.
Imaging Institute of Southern Switzerland (IIMSI)

Prof. Dr. Luca Giovanella
Medical and scientific director

IIMSI includes many of the imaging specialisations within the EOC. It is organised in a single medical and administrative structure meeting patients needs transversally through the multisite hospital of Ticino Canton. It is composed by the EOC Clinic of Radiology (4 diagnostic and 2 interventional radiology units), the EOC Clinic of Nuclear Medicine and Thyroid Centre (2 diagnostic NM units, 2 thyroidology outpatient clinics and 1 in-hospital therapy unit) and the EOC Medical Physics Unit.

EOC Clinic of Nuclear Medicine and Thyroid Centre
- Positron-emission tomography radiomics of lymphoproliferative diseases (Lead: PD Dr. L. Ceriani). New quantitative PET parameters are developed to improve treatment strategies and to early predict treatment effectiveness. Moreover, integrated models to describe tumour lesions are developed by combining PET metrics with biological and genomic features and applying new Artificial Intelligence tools [partnership with IELSG, SAKK, IDR, IOSI, Amsterdam University Medical Centre, Federazione Italiana Linfomi, United Kingdom Cancer Research Institute].
- Theragnostics and biomarkers of thyroid cancer (Lead: Prof. Dr. L. Giovanna). New molecular imaging and circulating biomarkers are developed and integrated to improve radiiodine treatment and follow-up strategies in patients with thyroid carcinoma. In addition, new imaging tracers and circulating markers of medullary thyroid cancer and related syndromes are developed and assessed [partnership with Universities of Marburg (D), Essen (D), Leipzig (D), Paris Descartes (F), Zurich (CH), Udine (I), European School of Multimodal Imaging and Therapy and European Association of Nuclear Medicine, Vienna (A)].
- Evidence-Based Nuclear Medicine (Lead: PD Dr. G. Treglia). Production of evidence-based documents (systematic reviews and meta-analyses) and guidelines on PET/CT in cooperation with several international institutions.

EOC Clinic of Radiology
- Validation of work in progress MRI sequences for different musculoskeletal diseases (Lead: PD Dr. F. Del Grande). New musculoskeletal MRI sequences are validated to accelerate MRI examinations maintaining high diagnostic image quality [partnership with the Johns Hopkins Hospital in Baltimore, US].
- Role and feasibility of medical hypnosis for claustrophobic patients undergoing MRI examinations (Lead: Dr. N. Ferrera). Observational study on the role of medical hypnosis as an alternative to pharmacologic sedation for claustrophobic patients during MRI examinations.
- Establishing ultrasound references for vascular structures in pediatric populations (Lead: Dr. M. Cristallo).

EOC Medical Physics Unit
Lead: Stefano Presilla, PhD
This Unit provides technical support to IIMSI researchers and is developing a research line on absorbed dose estimations and optimization of dose-image quality ratio.

The Imaging Institute of Southern Switzerland was established in January 2019.
Institute of Pediatrics of Southern Switzerland (IPSI)

**Prof. Dr. Giacomo Simonetti**  
Medical and scientific director

Surgical and medical pediatrics is concerned with the health of neonates, infants, children, and adolescents; their growth and development; and their opportunity to achieve full potential as adults. Pediatric care encompasses a wide spectrum of health services ranging from preventive health care to the diagnosis and management of acute and chronic (often malformative) diseases. Pediatrics deals with biological, social and environmental influences on the developing child and with the impact of disease and dysfunction on development. Children differ from adults anatomically, metabolically, physiologically, immunologically, psychologically and developmentally.

The Institute of Pediatrics of Southern Switzerland has a dedicated research unit, conducted by Dr. F. Vanoni, PD Dr. B. Goeggel Simonetti and Dr. A. Glücksberg-Stefani, which is included in the SwissPedNet network, a Swiss based network founded in order to promote pediatric clinical research in Switzerland. In this contest, the Institute of Pediatrics of Southern Switzerland is involved in the SPHN Project “Harmonizing the collection of health related data and biospecimens in pediatric hospitals throughout Switzerland”.

The research unit is oriented mainly on clinical research in different fields of pediatrics:

- **Cardiology**  
  Infectious disease, Neuropediatrics, Neonatology, Nephrology, Nursing sciences, Oncology, Pediatric Surgery and Rheumatology.

Below principal area of research for each subspecialty:  
**Cardiology-Nephrology** (Dr. C. Leoni-Foglia, Dr. A. Stefani-Glücksberg, Prof. Dr. M. G. Bianchetti and Prof. Dr. G. D. Simonetti): childhood hypertension, cardiovascular risk factors in the young.

**General Pediatrics** (Prof. Dr. M. G. Bianchetti and Prof. Dr. G. D. Simonetti): Systematic reviews of rare diseases or rare complications of frequent pediatric diseases.

**Infectious disease** (Dr. L. Kottanattu): prevalence of rare infectious diseases in childhood.

**Neuropediatrics** (PD Dr. B. Goeggel-Simonetti, Prof. Dr. G. P. Ramelli): Neurovascular diseases, epilepsy, autism spectrum disorders and cerebral palsy.

**Neonatology-Nursing Science** (RN, MSc, PhD(c) C. Balice, Dr. M. Ragazzi): Pain prevention in the newborn.

**Onco-hematology** (Dr. P. Brazzola): Participation in childhood oncology therapy protocols and registries. Pharmacological development in hemophilia.

**Pediatric Surgery** (Dr. M. Mendoza, Dr. V. De Rosa and Dr. E. Montaruli): minimal invasive surgery, orthopedic and surgical trauma.

**Rheumatology** (Dr. F. Vanoni): international cohort rheumatology diseases registry, periodic fevers.

The main goal of the research unit is to promote high-quality pediatric clinical research in the Italian part of Switzerland and to approach young fellows and medical students of Swiss Universities to clinical research in pediatrics.

The Faculty of Biomedical Sciences of the Università della Svizzera Italiana will have a Master Medical School starting in 2020. Together with teaching activities, researchers of the Institute of Pediatrics of Southern Switzerland will promote clinical research in pediatrics among the students of the University. Members of the institute are active in the supervision of master- and MD-theses.
Institute of Pharmacological Sciences of Southern Switzerland (ISFSI)

Prof. Dr. Alessandro Ceschi, FEAPCCT
Medical and Scientific Director

The Institute of Pharmacological Sciences of Southern Switzerland (ISFSI), which was established in 2017, includes the Division of Clinical Pharmacology and Toxicology, with its clinical services including the Pharmacogenomics and Pharmacogenetics Unit advising other departments and healthcare professionals on safe drug use and promoting the rational use of medicines, the Regional Pharmacovigilance Centre, and a small Research Unit, and the Central Pharmacy Service, with the Hospital Pharmacy, Clinical Pharmacy, and Public Pharmacy.

The final goal of our activities is to personalise drug therapy by optimising beneficial effects while minimising adverse effects and costs.

Research activities have a focus on pharmacoepidemiology and improving drug safety of numerous medications - such as e.g. immune checkpoint inhibitors and benzodiazepines - and are performed in cooperation with other institutes, departments and units, in particular clinical pharmacology and toxicology departments of Swiss university hospitals.

We have expertise in using large pharmacovigilance databases such as the WHO global database of suspected adverse drug reactions. In 2018 we launched a parallel group randomized controlled trial to assess the impact of medication reconciliation at hospital admission on healthcare outcomes, which is now ongoing.

During the same year we performed a study on pediatric poisoning with chemical products in collaboration with the Swiss Federal Office of Public Health. The study Swiss Drug Emergency Network (Swiss-DEN): a multicenter analysis of acute recreational substance toxicity, was started in 2017, and we were subsequently allowed to enter the Euro-DEN Plus study as an official centre among other 32 acute care facilities in 21 countries across Europe.

ABREOC supports our centre and ongoing projects are related to acute toxicity following use of cannabis products, MDMA, and pregabalin with heroin, as well as seizures as a complication of recreational drug use.
Institute of Laboratory Medicine (EOLAB)

Franco Keller, PhD
Director

The Institute of Laboratory Medicine (EOLAB) was set up to meet the requirements of modern clinical laboratory medicine delivering analytical results to the medical staff. EOLAB recognize the importance of research into its activity in order to be continuously up-to-date and to offer the best service and collaboration to all medical departments. The EOLAB specialists are actively involved in boards of several scientific societies as well as working groups nationally and internationally.

The Microbiology Service (SMIC) of EOLAB contributes with his known out and data to EOC internal projects as well as to external projects.

During 2018 microbiological examinations have been pursued for HIV and HCV patients in the frame of national HIV and HCV cohort studies. Case reports on clinical significant cases with uncommon bacterial and fungal strains have been published in collaboration with clinicians from EOC and colleagues of Swiss university hospitals. The SMIC harbours the national reference laboratory for Legionella disease and contributes to international projects on epidemiology and typing of these bacterial strains isolated from patients and environment. Collaboration to the health authorities of the Ticino Canton and in particular the Ufficio del medico Cantonale has led to a research project and publication of data on the serological prevalence of antibodies against tick-borne encephalitis (TBE) in goats as indices for the diffusion of these disease until now unknown, in the southern part of Switzerland. A project on hepatitis E associated to neurological disorders in collaboration with Neurocenter (NSI) represents a successful collaboration between clinicians and microbiologists in establishing a proved correlation between a viral infections and a neurological manifestation.

The Clinical Biochemistry and Pharmacology Laboratory (BFC) is collaborating with different EOC departments to develop new test for quantitation of hormones. BFC is also involved in a European network for the harmonization of steroid hormone quantitation in mass spectrometry and have a close collaboration with the pharmacology unit of the university of Turin and Amedeo di Savoia Hospital in Turin on pharmacology and pharmacogenomics field documented by several papers.
1. EOC Institutes and multisite Departments

EOC Department of Surgery

Prof. Dr. Majno-Hurst
Head of Department

The EOC Department of surgery has seen with enthusiasm the challenge of becoming player in the Swiss academic surgical scene, also in view of the upcoming Master of Biomedicine of USI. Research has become part of the curriculum for young surgeons in Lugano and Bellinzona, and will be included in the structured training programme (Dr. M. Arigoni, Dr. M. Guigli-Poretti). A short summary of main projects is provided. Several projects are conducted together by surgeons in the different hospitals. Working as a single Department rather than as four different smaller units is indeed one of the aims of the new Board.

General, Visceral and Vascular Surgery

Perioperative medicine and preparation for surgery
Several papers were published as a result of the collaboration between the department of surgery and anaesthetics, including thoracic surgery (Dr. D. La Regina, PD Dr. S. Cafarotti, PD Dr. A. Saporito). In Lugano, 2 publications on enhanced recovery after surgery concept (Prof. Dr. D. Christoforidis) are being finalised while another project on easily accessible ways to optimize the physical conditions of patients undergoing complex operations is starting (Dr. R. C. Balzarotti, Dr. R. Poggi, Dr. A. Cristaudi).

Colorectal and pelvic floor surgery
Several clinical projects are under way, as well as two translational projects: the LiBReCA study has started recruiting patients with rectal cancer undergoing neoadjuvant therapy at the Regional Hospital of Lugano and Clinica Moncucco to assess the value of liquid biopries (free tumoral circulating DNA) to predict tumour response and identify complete responders. The project is funded by Fondazione San Salvatore, ABREDC and Fondo Ricerca Moncucco (CHF 255’000). Another translational project focuses on the impact of intestinal microbiota in modulating the immune response to colorectal cancer. This has resulted in the appointment of PD Dr. G. Iezzi, a leader in the field, and in the winning of competitive funds by the SNF and the Gebert Rüf Foundation (CHF 860’000). This project will be conducted in close collaboration with the Department of Oncology and the two institutes for basic research (IOR and IRB) in Bellinzona. The Regional Hospital of Mendrisio Surgical Unit has contributed to the SAKK multicenter study on reconstruction after low anterior rectum resection and collaborates to the investigation of minimally invasive endoscopic techniques for treatment of complex anal fistulas and pilonidal diseases (Dr. P. Meinero). In proctological and pelvic floor disease, there is a close collaboration with the Units of Urology and Gynaecology, and a very specialised monthly clinic with the participation of Dr. P.A. Lehur, an international expert in the field. An international congress on the pelvic floor is held in Mendrisio.

Hepatobiliary surgery
Projects are under way concerning the contribution of radiology to hepatobiliary surgery, the prediction of the presence of bile duct gallstones, the standardisation of surgical difficulty in obtaining clear surgical margins, a system for grading the difficulty of minor liver resections, and new concepts in surgical liver anatomy.

Bariatric surgery
This field is growing rapidly on the academic side, with collaborations with a prominent fellow programme in Montreal, and taking advantage of the high rate of follow-up of local patients. Several projects have been proposed on the gastroesophageal reflux disease (i.e. a multicentre study with the University of Montreal focusing on the effect of concomitant hernia repair and sleeve gastrectomies). New procedures have been described recently in Bariatric Surgery. The SADI-S (single anastomosis duodenal ileostomy-sleeve) is becoming popular because of low complication rates and good weight loss in super-obese patients. Research projects on this topic is our priority: this procedure will be performed in selected cases from all surgeons of our bariatric team.

Endocrine Surgery
Since 2016, the dedicated Regional Hospital of Mendrisio Endocrine Surgery Team (Dr. F. Fasolini, Dr. G. Peloni) participates to the European Eurocrine register. Projects are under way concerning the use of intraoperative neurophysiologic monitoring in preventing recurrent laryngeal nerve palsy and intraoperative study of autofluorescence and ICG angiography for enhancing identification and preservation of parathyroid glands.

Vascular surgery
Research work is concentrating on endovascular treatments of complex aortic and peripheral vascular disease, and
arteriovenous fistulas for vascular access for dialysis.

Abdominal wall surgery
Several papers on inguinal hernia management have been published, focusing on minimally-invasive approach and cost-effectiveness.

Health economics
This is an issue of growing concern. The financial aspect of minimally-invasive surgery and complications in the era of DRG have been topics for several publications.

Upper GI-Surgery
Projects are under way to assess the learning curve of simulation-based anti-reflux surgery through the use of laparoscopy models and synthetic tissue.

Wound Care
The treatment of chronic wounds is subject of interest at Regional Hospital of Mendrisio in network with the Italian Academy of Wound Care and the University of Foggia, with an international masterclass on the subject.

Orthopaedic surgery
The Orto-Trauma research group (Prof. Dr. Ch. Candrian) is composed of a clinical research team (Dr. G. Filardo, Dr. M. Delcoglio), and a Regenerative Medicine Technologies Laboratory (Dr. M. Moretti). More than 10 researchers, including medical doctors, biomedical engineers, and biologists, work side by side with the orthopaedic surgeons. Studies have a special focus on regenerative medicine, traumatology, ligamentous knee surgery and shoulder surgery. The Regenerative Medicine Technologies Lab works on translational research projects (including SNF projects) funded for improving therapies and diagnostics of orthopaedic diseases, based on the generation of biological substitutes as musculoskeletal tissue grafts and of in vitro 3D models for disease characterization and development of new diagnostic tools.

Plastic surgery
Research is focusing on 1. preoperative imaging in flap surgery (evaluation of vessel course and extent of skin perfusion using angio-RM and thermography to avoid irradiation (collaboration with PD Dr. F. Del Grande and Dr. V. Tobe), 2. tissue preconditioning in elective breast surgery using local heat to accelerate wound healing and reduce the rate of wound-breakdown (collaboration with Prof. Dr. H. G. Machens, TU München), 3. handling of an autonomous vacuum system to stabilize skin grafts and local flaps (collaboration with Smith & Nephew). Finally, projects are under way to study the quality of life in oncoplastic breast surgery and prepectoral implant-based breast reconstruction, a new trend to avoid problems related to subpectoral implant-position (collaboration with Dr. F. Meani).

Urological surgery
The Urology unit of Regional Hospital of Bellinzona and Valli is collaborating in a swiss trial on stone disease (NOSTONE TRIAL) as well as a participating center in Global Prevalence Study on Infections in Urology.

Oncourlogy
The Urology unit of Regional Hospital of Bellinzona and Valli is collaborating with the IOSI in several trials:
- An exploratory proof of mechanism study to assess the effect of Ruxolitinib on tumor infiltrating myeloid cells and additional immune subsets in prostate cancer patients.
- Development of in vitro models for the study of prostate cancer and personalized therapies.
- A prospective exploratory proof-of valid biomarkers in blood to predict the response to therapy in prostate cancer patients, a single center study.
- The MAP-CAT Study – Multidisciplinary approach to prostate cancer treatment.

Neurourology and functional urology
The new Neurourology Unit (Regional Hospital of Bellinzona and Valli and Regional Hospital of Lugano) is focusing most of its research activities on neuromodulation for lower urinary tract disorders in both non neurological and neurological patients. Different trials have been or are being submitted to Ethics committee:
- An international multicentre randomized control trial on transcutaneous tibial nerve stimulation.
- A prospective, single arm, interventional, self-controlled pilot study to assess the performance and safety of the new generation, wireless, MR compatible, implantable tibial nerve stimulator system in patients affected of Multiple Sclerosis.
- A retrospective study on pudendal neuromodulation.
EOC Department of Internal Medicine

Prof. Dr. Luca Gabutti
Head of Department

The Department of Medicine groups together the general Internal Medicine Services provided by the EOC hospitals, as well as specialty areas akin to internal medicine such as: angiology, cardiology, clinical nutrition, dermatology, endocrinology-diabetology, gastroenterology, hepatology, immune-allergology, infectiology, nephrology, pneumology, and rheumatology.

The department cares for the health of adults across all fields of internal medicine, offering outpatient and inpatient services ranging from preventive medicine and diagnostics to the treatment of acute and chronic diseases. Its philosophy of care is based on the integration of bio-psycho-social aspects, with particular attention to the continuity of care.

With regard to clinical research, the general internal medicine department, represented chiefly by Prof. Dr. L. Gabutti and Dr. O. Giannini, conducts research in the fields linked to quality and appropriateness of care inspired by the Choosing Wisely campaign. In pursuit of the same objective, the department is part of the CREATE PRIMA (clinical research from multi-modality big data sources without proprietary interfaces in a multicenter approach) consortium funded by the Swiss Personalized Health Network, which aims to improve the quality of healthcare by collecting data from individual hospitals available in an interoperable data exchange network. Below principal areas of research listed in alphabetical order.

The division of cardiology, represented chiefly by PD Dr. M. Di Valentino, Prof. Dr. A. Gallino and Dr. G. Moschovitis, focuses on the topic of cognitive decline in patients suffering from atrial fibrillation within the Swiss-AF cohort study (supported by the SNF), analyses of the potential triggers of acute myocardial infarction, cardiovascular risk factors in youths, risk factors of stroke or systemic embolism, mortality, hemorrhagic risk, hospitalizations for heart failure and Atrial Fibrillation (AF) recurrence after pulmonary vein isolation (PVI), and analyses of the evolution of atherosclerotic plaques.

The division of dermatology, represented chiefly by Dr. C. Mainetti, deals mainly with dermatoinmunology, infectious dermatopathies, cicatrization disorders, and dermatological emergencies.

The division of infectious diseases, represented chiefly by Prof. Dr. E. Bernasconi and PD Dr. L. Elzi, focuses on therapeutic strategies in the treatment of HIV infection (Swiss HIV Cohort Study) and appropriateness of antibiotic therapy in hospitalized patients (antibiotic stewardship; COMPASS study). There are also collaborations with the Swiss group of fungal infections (Funginos) and the Swiss Tropical Institute.

The division of nephrology, represented chiefly by PD Dr. P. Cippà, PD Dr. V. Forni Onga, Prof. Dr. L. Gabutti and Dr. O. Giannini, is particularly interested in the composition of dialysis fluids, vascular access for hemodialysis, nephrolithiasis (NOSTONE trial), sleep disorders in chronic kidney disease, cardiovascular biomarkers, and epidemiology of vascular stiffness (TEST study), characteristics and gait assessment in chronic kidney disease patients, and pursues a basic research interest in regenerative medicine.

The division of pneumology, represented chiefly by PD Dr. A. Ogna and Prof. Dr. M. Pons, is particularly interested in nighttime respiratory disorders linked to chronic kidney disease, non-invasive high-frequency ventilation applied to radiotherapy and radiological diagnostics, interaction between baroreceptors and chemoreceptors in the genesis of obstructive and central sleep apneas, and pharmacotherapy of asthma and chronic obstructive pulmonary disease.

The main objective of the clinical research is to foster the acquisition of new knowledge and to facilitate the provision of high-quality medical services in the Italian-speaking region of Switzerland.

To introduce young medical fellows and medical students to research is another prime objective that will develop further with the commencement of operations of the Faculty of Biomedical Sciences of the Università della Svizzera Italiana (scheduled for 2020). In fact, supervisions of further master’s theses and doctoral dissertations are planned in the areas of interest of the Department.
The newly constituted EOC Department of Gynecology and Obstetrics offers cutting-edge medical assistance for all aspects of female pathologies. The Department is deployed over the cantonal territory with four hospital facilities, which guarantee capillary distribution of first line gynecological and obstetrical interventions, while concentrating complex procedures within specialized Units, where centralization offers the opportunity to develop necessary skills and experience to deliver personalized medicine and conduct scientific research. In 2018 the Gynecology and Obstetrics Service was active in clinical research with numerous projects, some still ongoing, while others have been finalized with scientific peer-reviewed publications.

Ongoing projects (Dr. F. Meani)
The team of the Breast Cancer Center of Southern Switzerland (CSSI) including this service, is actively enrolling patients to IBCSG 48-14 POSITIVE study, evaluating the pregnancy outcomes and safety of interrupting endocrine therapy for young women with endocrine-responsive breast cancer who desire pregnancy (Lead investigators: Prof. Dr. O. Pagani, Dr. A. Partridge, Dr. H. Azim, Dr. F. Peccatori).

On behalf of the CSSI (Lugano, Switzerland), the service is also actively participating in the INSPIRE phase 4 trial, International Nipple Sparing Mastectomy Registry (Lead investigators: Dr. R. Audiso and Dr. I. Rubio; Investigator at the Regional Hospital of Lugano, Gynecology and Obstetrics Service: Dr. F. Meani).

Dr. Meani, Senior physician of the Service, developed the CSSI App for breast cancer patients, for which he received a donation of CHF 30,000 by the Advocate Group “Anna dai Capelli Corti” in 2017. In collaboration with the Department of communication of USI (Dr. S. Petrocchi) a survey is currently ongoing, with the aim to evaluate the appreciation of the electronic support by our patients and its contribution to the patients/health providers communication and clinical interactions.

The CSSI is actively involved in the SPARKO study: development of a minimally invasive procedure for the discrimination of tissue resistivity in breast cancer patients (Lead investigator: Dr. E. Meroni, EOC Regional Hospital of Mendrisio). The project is funded by ABREOC.

The Service is also involved in a multicentric retrospective observational study on the management of young women with breast cancer in Switzerland: The management of young women with breast cancer in Switzerland: a snapshot (Lead investigators: Dr. A. Bordoni, Dr. A. Spitale, Dr. F. Meani, Prof. Dr. O. Pagani, Dr. E. Rapiti, Dr. D. Terribile, Dr. L. Rossi, Dr. G. Montagna). The study was funded by the Swiss Cancer League.

In 2018 the CSSI Participate to the Globalsurg 3 Study on Quality and outcomes after global cancer surgery: a prospective, international cohort study.

The CSSI is also participating to the the OPBC-01 iTOP2 study: a retrospective multicenter analysis comparing conventional and oncoplastic breast conserving surgery regarding local recurrence rates (Local investigators: Dr. F. Meani and Prof. Dr. Y. Harder).

Since March 2018 the CSSI is actively collaborating with Dr. A. Calcinotto (Institute of Oncology Research, IOR) and Dr. S. di Lascio (IOSI), collecting breast cancer tumor samples to contribute to the studies on the relation between senescence in myeloid cells and tumor resistance mechanisms.

The EOC Department of Gynecology and Obstetrics was established in January 2019.
EOC Department of Critical Care

Prof. Dr. Paolo Merlani
Head of Department

The EOC Department of Critical Care is a functional department which includes the Services of Intensive Care, Anesthesia and Emergency Medicine of the four hospitals of the EOC. Aim of the Department is to coordinate the activities of these 12 services, aligning them to the EOC vision and mission, with a particular focus on safety and quality of care.

The Department wants to play an active role in incentivizing and supporting research and teaching, in close relationship with the Medical Master School of USI, with four academics currently involved in the organization and management of the Critical Medicine module for students attending the fourth year of the Medical School.

At the moment, several research projects are ongoing within the services of the Department, in collaboration with different universities and institutions in Switzerland and abroad. Among the topics currently investigated through both clinical and preclinical trials, we mention the following:

- A comparison of safety and effectiveness between two different regional anesthesia techniques in patients undergoing breast surgery.
- The level of toxicity of local anesthetics in relationship to albumin levels in an animal model.
- The potentiality for injection pressure continuous monitoring to prevent nerve damage during peripheral nerve blocks (in collaboration with the Anesthesia Department of Montpellier University Hospital).
- The mechanism of lidocaine inhibition of cancer cells migration (in collaboration with the Institute for Research in Biomedicine).
- The target controlled infusion of systemic lidocaine in surgical patients (in collaboration with Universitätssklinik Balgrist, University of Zurich).
- The influence of pre-habilitation protocols on surgical outcomes (in collaboration with the EOC Department of Surgery).
- Transfusion policies and patients bloodless management in the critical care and surgical patients.

The EOC Department of Critical Care was established in January 2019.
EOC Nursing Research Centre

Yvonne Willems Cavalli
Head of EOC Nursing Area

Since 2005, the EOC Nursing Area has adopted the philosophy of “relationship-based care”. It stresses the importance for health professionals to be able to establish a therapeutic relationship with the people they take care for. One of the responsibilities of consciously taking this approach to care is to act professionally on the basis of the best knowledge available today. In medicine and nursing this knowledge changes quite quickly. What was effective until yesterday, may not be effective today. Hence the importance of developing research also in this professional field, to provide nurses with new knowledge useful to adapt their professional intervention to the specificities of each person (personalisation) and consistent with the best evidence of effectiveness available. The nursing research activities, with dedicated resources, were initially started at IOSI in 2010 and whose activity is documented in the EOC scientific reports starting from that year. In September 2016, also on the basis of the experience developed at IOSI, the Centre for Nursing Research (CRI) was established in the EOC Nursing Area, with the mission of: “To promote the development and quality of nursing care in response to the health needs of the population, promoting innovation and nursing research in all clinical realities of the EOC and maintaining a close link between research (theory) and nursing care (practice)”.

Among the main activities of these research centers, which work in close cooperation having a single manager, there are:

- The activation of training/awareness-raising courses on research topics offered to all EOC nurses. This awareness-raising work is of fundamental importance to create that indispensable synergy of thought and action with the clinical realities and the network of experts and clinical specialists present in each EOC hospital.
- Support, if requested, to cultural and scientific production by colleagues (preparation of abstracts, articles for journals, research projects or other).
- The conception and implementation of nursing research projects, using both quantitative and qualitative as well as mixed methodologies.

Research questions arise from clinical questions usually asked by colleagues working in the clinic or by professional management and they are answered through studies that can be carried out with their own resources or compete for specific funding.

The lines of research currently active are as follows:

- A randomized phase III controlled clinical trial to verify the effectiveness of a patch (Mepitel Film) in reducing the incidence of skin lesions in patients with breast cancer under radiotherapy treatment.
- An observational cohort study to detect the incidence of complications (VTE, BSI) related to the use of 3 central vascular catheters (AVI-PICC-CVC).
- A mixed methods study to evaluate the prevalence of the asthenia symptom among IOSI patients and how the symptom is managed by nurses.
- A mixed methods study, to detect the needs and health problems of women who referred to nursing follow-up visits in senology and professional responses given by nurses.
- A mixed-methods feasibility study to improve the management of painful procedures in neonatology and the development of a complex inter-professional intervention.
Peer-reviewed publications

A comprehensive computer literature search of PubMed/MEDLINE database was carried out. The last database search was performed on February 28th, 2019. Keywords were used in the string search based on the different EOC sites. Inclusion criteria were: a) peer-reviewed articles listed in PubMed/MEDLINE with at least one EOC researcher as co-author; b) final publication of the article in a scientific journal issue in 2018. Articles published in PubMed in 2018 as “Epub ahead of print”, that are citations prior to their publication in final or print format, were therefore excluded from the current analysis.

Journal Impact factor (IF)\(^1\) and Journal IF Quartile\(^2\) of the scientific journals in which EOC researchers published their peer-reviewed articles in 2018 were also evaluated using data from the 2017 Journal Citations Reports (JCR). The scientific activity carried out by the EOC Institutes and Departments, based on the inclusion and exclusion criteria mentioned above, resulted in 373 peer-reviewed articles, of which 302 were reviews or original articles. Results are reported in detail in the figures below.

![Figure 1](image1.png)

**Figure 1.** Number and type of the peer-reviewed articles published by EOC researchers (N = 373) in 2018. Meta-analyses were classified as original articles.

![Figure 2](image2.png)

**Figure 2.** Journal IF of the scientific journals in which peer-reviewed original and review articles (N = 302) were published by EOC researchers in 2018.

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1. Journal IF is defined as all citations to the journal in the 2017 Journal Citations Reports to items published in the previous two years, divided by the total number of scholarly items (these comprise articles, reviews, and proceedings papers) published in the journal in the previous two years. A Journal IF of 1.0 means that, on average, the articles published one or two years ago have been cited one time (Source: Clarivate Analytics).

2. Scientific journals are assigned to a subject category by JCR and ranked by Journal IF. The Journal IF rank is then transformed in a percentile value. The Journal IF percentile is used to calculate the Journal IF Quartile: Q1: Journal IF percentile ≥ 75; Q2: 75 < Journal IF percentile ≤ 50; Q3: 50 < Journal IF percentile ≤ 25; Q4: 25 < Journal IF percentile (Source: Clarivate Analytics).
Figure 3. Journal IF Quartile of the scientific journals in which peer-reviewed original and review articles (N = 302) were published by EOC researchers in 2018. Journals can appear in multiple subject categories; in this case, the highest Journal IF Quartile was selected. Scientific journals without Journal IF were classified as NA.

Figure 4. Type of scientific collaboration (local, national or international) taking into account peer-reviewed original and review articles (N = 302) published by EOC researchers in 2018.

Figure 5. Number of peer-reviewed original and review articles (N = 302) published by EOC researchers in 2018 as first or last author.
Figure 6. Number of peer-reviewed original and review articles (N = 302) published by each EOC Institute or Department in 2018. Meta-analyses were classified as original articles. Publications shared among different EOC Institutes/Departments were counted for each institute/department involved. The Imaging Institute of Southern Switzerland, the EOC Department of Critical Care, and the EOC Department of Gynecology and Obstetrics have been established in January 2019.

Highlights:
- A significant number of peer-reviewed scientific articles was published by EOC researchers in 2018 (N = 373), most of them as original or review articles (N = 302, 81%).
- Peer-reviewed original and review articles were published on scientific journals showing very heterogeneous Journal IFs with a median value of 3. Notably, 12% (N = 35) of original or review articles were published in scientific journals with Journal IF > 10.
- Almost 50% of peer-reviewed original and review articles was published in scientific journals ranked in the Journal IF quartile Q1, further demonstrating the high quality of the EOC scientific production in 2018.
- Nearly 90% of peer-reviewed original and review articles published by EOC researchers in 2018 are the result of national or international collaborations.
- In about half of peer-reviewed original and review articles, the EOC researcher was the first or last author, demonstrating that many of the research projects have been conceived and conducted at EOC.
**h-index of the EOC academic staff**

A search of Web of Science Core Collection as citation database was carried out (last database search on March 14th, 2019). An author search was performed taking into account the list of EOC academic staff (including professors and private docents) appointed at the time of the database search. Academic researchers with age > 65 years and/or with main work position in other institutions beyond EOC were excluded from the analysis. The citation indices calculated were the $h$-index$^3$ of the last 10 years (2009-2018) and the $h$-index of the last 5 years (2014-2018) to obtain a measure of more timely international influence of the EOC academic staff (Example: $h$-index 2014-2018 = 10 means that the EOC researcher has 10 articles published between 2014 and 2018 cited 10 times).

![Box plot of the h-index of the last 10 years (2009-2018) for EOC academic staff with a median value of 11.](image)

**Figure 7.** Box plot of the $h$-index of the last 10 years (2009-2018) for EOC academic staff with a median value of 11.

![Box plot of the h-index of the last 5 years (2014-2018) for EOC academic staff with a median value of 7.](image)

**Figure 8.** Box plot of the $h$-index of the last 5 years (2014-2018) for EOC academic staff with a median value of 7.

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3 $h$-index is a bibliometric indicator developed by Hirsch in 2005 to measure the academic impact of researchers. $h$-index combines productivity (number of documents) and impact (number of citations) (Hirsch JE. An index to quantify an individual’s scientific research output. Proc Natl Acad Sci U S A. 2005;102(46):16569-72).