Cancer Research in Switzerland

A publication of the Swiss Cancer Research foundation,
the Swiss Cancer League and the cantonal cancer leagues
on their funded research projects 2020

Imprint

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Shannon Zwicker (*1992 in Igis GR) lives and works in Zurich. She studied Art & Communication at the Lucerne University of Applied Sciences and Arts and graduated in 2016. She sees her artistic work as a playful search for form, often using photographs as a reference point for her drawings and paintings.

Her way of gradually approaching her goals corresponds to the modus operandi of cancer research, in which it is necessary to persistently and patiently search for answers to the still numerous unsolved questions.

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Cancer Research in Switzerland

Edition 2021

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Editorial

This year, the Swiss Cancer Research foundation celebrates its 30th anniversary. Together with its partner organization, the Swiss Cancer League, it has funded over 1000 research projects in the last 30 years. And by providing many scholarships, the two organizations have supported young researchers in basic research and in oncology, in this way also contributing to making Switzerland a worldwide leader in cancer research. At the same time, with their investments in cancer research, the Swiss Cancer League and the Swiss Cancer Research foundation have made numerous new discoveries possible that have led to significant improvements in treating and combatting cancer.

For instance, we know today that physical activity and social interaction and exchange with others play an important role on the way to recovery, whereas 30 years ago we physicians were still primarily advising our patients to take it easy and rest. And for types of cancer that 30 years ago were still considered incurable, there are very effective treatments today. We are expanding the horizons of knowledge on many fronts: Molecular genetic pathology and new imaging techniques in radiology have revolutionized diagnostics, for example. Surgery has developed minimally invasive and organ-sparing procedures; advances in radiation oncology have led to high-precision radiation therapy. And the new immunotherapy approaches have shown some spectacular successes.

Thomas Cerny

Gilbert Zulian

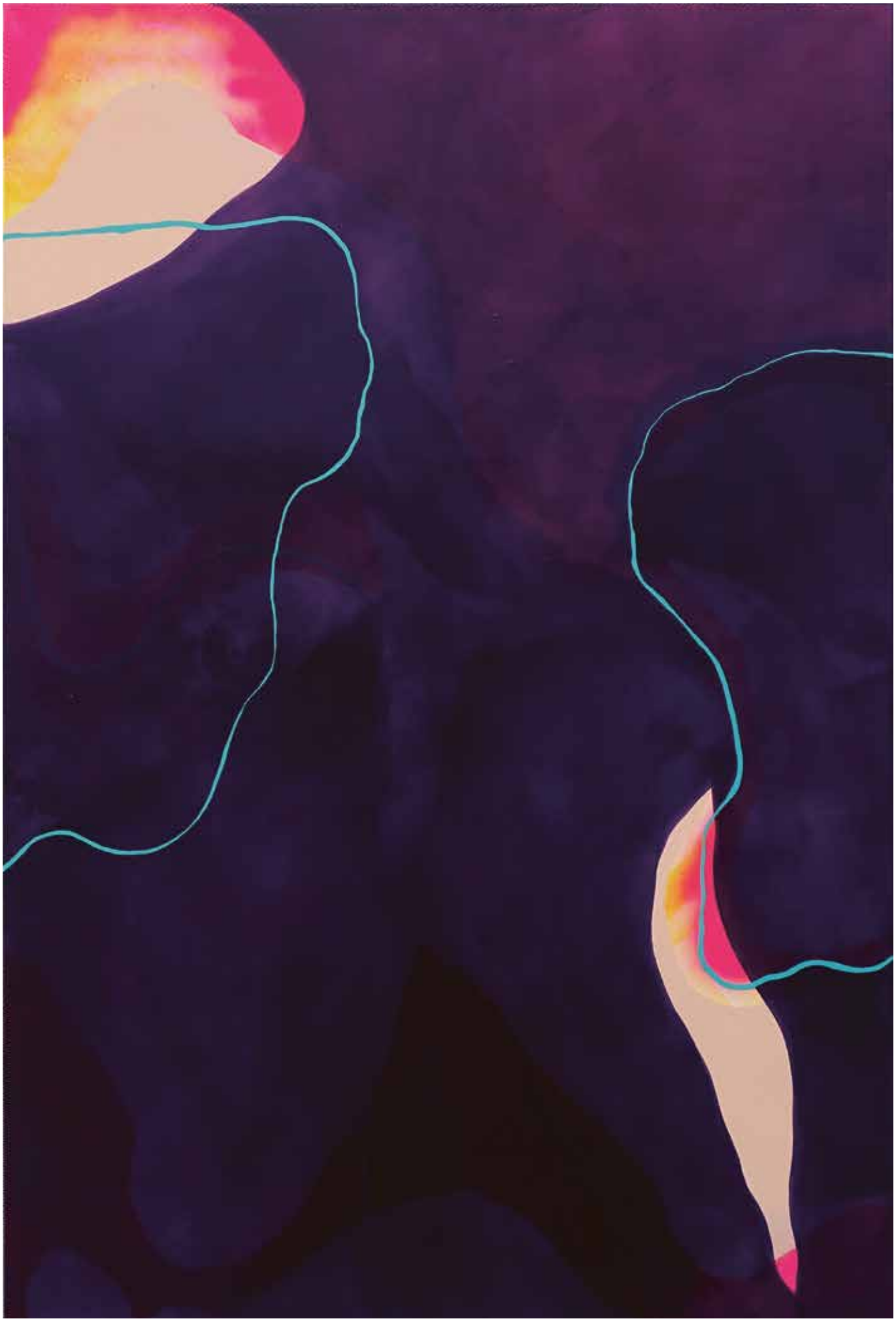
"In sum, the intensive research efforts of the past decades have led to ever more precise, and well tolerated treatments – and in this way have contributed to more persons surviving cancer."

In sum, the intensive research efforts of the past decades have led to ever more targeted, precise, and well tolerated treatments – and in this way have contributed to more and more persons surviving cancer. However, the advances in treatment are accompanied by ever higher prices of cancer drugs. This is a development that threatens our health care system based on solidarity – and a development that we are opposing together, so that treatments will not be available only to those who can afford them but rather will continue to be available to all patients who need them. In addition, the advances in cancer treatment force us to direct much more attention to the late effects caused by cancer and cancer treatment. For this, valuable long-term data is available, thanks for example to the Childhood Cancer Registry, which the Swiss Cancer League and the Swiss Cancer Research foundation have supported financially for a long time.

In the last 30 years, the two partner organizations have always placed a special focus on patient-centred research. We have funded research projects that examine the benefits of cancer drugs in relation to their costs, for instance. And investigations that are of no interest to the pharmaceutical industry, such as studies on whether a drug retains its effectiveness at lower doses and when taken for a shorter period, so as to minimize the side effects. All of these activities depend on something that we have not yet mentioned, however: the generosity of all of our charitable donors. To them we extend our heartfelt thanks! It is only thanks to their support that we have been able to advance cancer research. We would like to count on them also in the future – so as to be able to continue to make important progress in the coming years.

Prof. em. Thomas Cerny, MD
President of the Swiss Cancer Research foundation

PD Gilbert Zulian, MD
President of the Swiss Cancer League



Research promotion of the Swiss Cancer League and Swiss Cancer Research foundation

Cancer research in times of a pandemic

Originating from a wet market in Wuhan, a city in central China with a population of over a million residents, the novel human coronavirus disease COVID-19 spread rapidly worldwide. The numerous ramifications – direct and indirect – made the year 2020 anything but ordinary in many ways. This also holds true for the research in the field of cancer, as three examples show.

Back to square one

In Kristina Schoonjans' laboratory at the Ecole Polytechnique Fédérale in Lausanne (EPFL), researchers working on a project funded by the Swiss Cancer Research foundation are studying whether the biological stress response of the human body is associated with the development of liver cancer. When danger threatens, muscles tense, the pulse rate goes up, and breathing quickens. At the same time, stress signals also have an impact on how quickly wounds heal or on the life span of liver cells. Conducting several experiments with mice, the researchers are testing the hypothesis that liver cancer cells exploit to their own benefit these millions-of-years-old stress mechanisms that were shaped in the course of evolution.

But when in mid-March the Federal Council declared that an 'extraordinary situation' existed in Switzerland and brought public life to a standstill, the animal experiments were also delayed. There were no animal food deliveries from abroad. "We had to sacrifice half of our mice … I found it traumatic", Schoonjans reports in the research magazine Horizonte. As raising genetically modified rodents for research can take up to a year, some of the researchers were not able to complete their project, "even though they are brilliant and represent the next generation", says Schoonjans. In the meantime, the researchers have restarted their projects, although some have had to start from scratch.

"We must give our patients the best possible treatment also in times of COVID-19, this includes rapid vaccination."

PD Sacha Rothschild, MD, chief physician at University Hospital Basel

Where the pandemic triggers greater innovation

With a scholarship from the Swiss Cancer Research foundation, Ewelina Biskup set out for Shanghai in April 2018, where she – within the framework of a collaboration that she had established over the previous 10 years – has since been working on diagnostics and treatment of cancer in geriatric patients. "Unfortunately, there are no practice guidelines that deal with the oncological challenges in this particular population", says Biskup. Older patients with cancer therefore are in danger of being over- or undertreated, as "the possibilities in therapeutic and palliative geriatric oncology are often underestimated", Biskup explains. This is problematic, because suboptimal care often reduces the quality of life of older persons with cancer and their families.

In January 2020, as first reports of a mysterious respiratory disease in China made the rounds, Biskup happened to be in Europe, giving lectures at various locations. Although many of her acquaintances advised against it, she returned to Shanghai on one of the last flights. "I wasn't afraid until I was on the plane", Biskup says. But fortunately, COVID-19 did not rage in Shanghai as fiercely as in other regions of China. By the end of May, public life was more or less back to normal, reports Biskup, who as a physician is also affiliated with University Hospital Basel.

In Shanghai Biskup has more than enough to do. In addition to her research project on cancer in geriatric patients, she is also participating in efforts to find ways to treat patients with cancer and at the same time protect them from COVID-19. The focus is on applications based on artificial intelligence and precision medicine technologies that make it possible for patients to be followed closely remotely and for them to take chemotherapy drugs at separate centres or even at home. Biskup chose Shanghai, among other things, "because China is the most dynamic country in the world and I want to make my own contribution to progress", she says. She points out that the pandemic has triggered an enormous boost to innovation: "I have to learn fast to keep up."

Cancer treatments in times of COVID-19

At the *Krebsinfotag 2021* Sacha Rothschild spoke on the challenges presented by cancer treatment during the COVID-19 pandemic. Rothschild, head of Clinical Research Oncology at University Hospital Basel, remarked that the bans on hospital visiting during the lockdown were emotionally stressful for patients as well as their families. "Particularly in palliative situations, having no or very restricted contact with family members is very difficult", says Rothschild. Still, compared to the rest of the world, Switzerland was in a privileged situation, for according to a survey by the World Health Organization (WHO), cancer care was restricted in 40 % of countries worldwide in the year of the pandemic: "Fortunately, in Switzerland we were able to keep provision of care at a high level", says Rothschild.

In Switzerland cancer screening programmes were suspended from mid-March to the end of April. But cancer treatments were not delayed or cancelled, as happened in many other places in the world. According to a survey in the United States, half of all patients with cancer believe that their cancer care deteriorated due to COVID-19. And an editorial in the journal The Lancet Oncology warned that many decisions made under the pressure of the pandemic could have a negative effect on cancer mortality for many years.

Half the number of oncological studies than the year before

At University Hospital Basel some clinical trials were temporarily stopped during the lockdown: "We suspended all phase I trials, so as not to place additional strain on the hospital infrastructure", says Rothschild. All in all, the pandemic put a damper on clinical research: "Worldwide, oncology studies decreased by more than half last year", Rothschild reports. But in Switzerland, oncologists at 23 different hospitals joined together and launched the CaSA study. For the study, the researchers collected data on a total of 359 cancer patients who got infected with SARS-CoV-2 between the end of March and the end of August 2020 in Switzerland. 64 of those patients died from the infection.

"The COVID-19 mortality rate in patients with cancer was 18 %, which is substantially higher than the mortality rate in the rest of the population", says Rothschild. In addition, in his presentation Rothschild cited several studies that found that the risk of dying of COVID-19 is higher in patients with unchecked, progressing cancer, but that cancer therapy did not increase this risk. "We must be sure to give our patients the best possible treatment also in times of COVID-19, to control the disease and to reduce its mortality rate", says Rothschild. "This includes in particular rapid vaccination, which numerous studies have found to be safe and effective also in cancer patients."

Science is important – and solves problems

In 2020 the Swiss Cancer Research foundation, the Swiss Cancer League, and the cantonal and regional leagues together provided 24.3 million francs in funding to 139 different research projects and research institutions. We want to express our heartfelt thanks to the charitable donors for their support, which allows us to continue to enable important advances in cancer treatment.

Last year was certainly a special year for everyone. That includes researchers, who with great patience and persistence addressed some of the very numerous questions still needing answers in the search for treatments that are ever more successful and have fewer side effects. Many projects met with delays due to the COVID-19 pandemic. This was also because some researchers had to quarantine or could not go to their laboratories during the lockdown (for more on this, see page 8 of this report). For other researchers, new perspectives suddenly opened up. And perhaps some were even glad to finally have more time to write research papers.

We view the fact that we received donations that enabled us to invest over 24 million francs in research even in 2020 as a sign that the pandemic increased awareness among many charitable donors that science is important. And that science can solve problems, as it demonstrated with the record-breaking speed of the development of vaccines against the novel coronavirus SARS-CoV-2. But this ground-breaking success within a single year would never have been possible had it not been for the development, over decades of painstaking labour, of scientific bases and techniques to examine the complex molecular processes in infections.

It is precisely for that reason that the Swiss Cancer Research foundation (SCR), together with its partner organization, the Swiss Cancer League (SCL), and the cantonal and regional cancer leagues (CCL), has been supporting research projects for 30 years that seek to gain knowledge on cancer. How do the different types of cancer develop, and how can we fight against them and treat them? One thing is certain: Every advance in research, even if it does not seem very significant at first glance, increases our knowledge. And the broader our knowledge base, the more numerous the possibilities to improve the survival rate and the quality of life of patients with cancer.

A broad spectrum of research

We fund research projects along the entire range of cancer research, which can be divided into four areas: basic, clinical, psychosocial, and epidemiologic cancer research. *Basic research* studies how cancer cells develop, multiply, and spread in the body. *Clinical research,* for one, works with cancer cells and tumour

Rolf Marti, PhD
Head of the Research, Innovation & Development department, Swiss Cancer League, and director of the Swiss Cancer Research foundation

tissue to identify, for instance, new weak points and targets. For another, clinical research also consists in conducting clinical trials with patients to test new treatments or optimize existing treatments. *Psychosocial research* studies the psychological and social effects of cancer. The goal is to improve the quality of life of patients with cancer and their family members. *Epidemiologic research* investigates the incidence of cancer in the population, for example, or examines the role played by smoking, lack of exercise, or unfavourable environmental conditions, among other things, in the development of cancer.

In addition, in the framework of a programme to strengthen *health services research* in oncology and cancer care, the SCR also funds research projects that weigh the costs and benefits of medical services and demonstrate new ways of organizing health services in oncology as efficiently as possible. Unlike in other areas, research project proposals in the area of health services research are not reviewed by the Scientific Committee but instead by an expert panel expressly set up for the health services research programme; the panel members include also persons with demonstrated expertise in fields such as health economics or nursing sciences (see page 30).

Figure 1
Cancer research funding by SCR, SCL, and CCL since the founding of SCR

Research funding by the CCL has been recorded centrally and published since 2009.

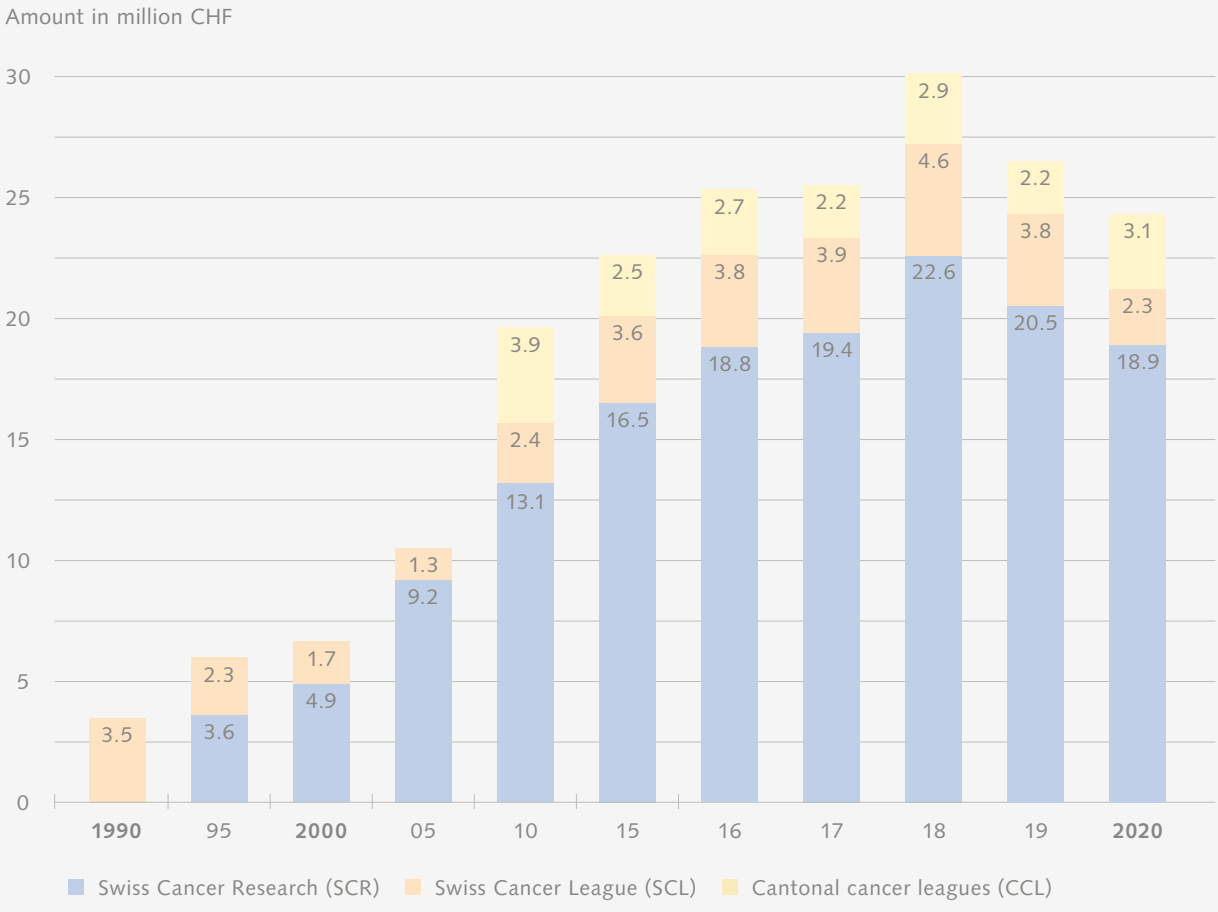


Table 1

Research funding by SCR, SCL, and CCL in overview

Number of grants approved and amount granted in 2020 (all funding areas)

	Number of grants approved	Amount granted in kCHF	Proportion of total funding in %
Total SCR, SCL, and CCL			
Independent research projects	86	18 420	76
Bursaries	7	911	4
Programme for health services research	6	974	4
Research organizations and institutions	4	2 100	8
Programmes, organizations and conferences	36	1 927	8
Total	**139**	**24 332**	**100**
SCR			
Independent research projects	45	13 882	73
Bursaries	5	769	4
Programme for health services research	6	974	5
Research organizations and institutions	4	2 100	11
Programmes, organizations and conferences	15	1 210	7
Total	**75**	**18 935**	**100**
SCL			
Independent research projects	7	2 058	89
Bursaries	2	142	6
Programmes, organizations and conferences	20	117	5
Total	**29**	**2 317**	**100**
CCL			
Independent research projects	34	2 480	81
Research organizations and institutions	1	600	19
Total	**35**	**3 080**	**100**

(percentage of funds)

Many thanks for the generous funding amount

In 2020 the SCR, SCL, and the CCL gave nearly 24.3 million francs in funding to 139 research projects and research institutions (Figure 1; Table 1). More than three quarters (78 %) of all funds granted came from the SCR; the SCL contributed nearly 13 % and the CCL 9 %. The SCR and SCL provided 0.9 million francs to directly support young researchers, making it possible for a total of seven bursary recipients to study their research questions in Switzerland or also abroad using up-to-date research methods. Here we would like to extend heartfelt thanks to the charitable donors.

As in previous years, in the competition for funding, the most successful cancer research centres were the universities and university hospitals in Lausanne, Zurich, Bern, and Basel (Table 2). Next come the scientists at the research locations in Geneva and Bellinzona, who raised approximately 1.5 million Swiss francs and 1.1 million Swiss francs, respectively.

34 high-quality research proposals unfortunately not funded

With the largest part of the funding, the SCR and the SCL supported independent research projects, where the researchers alone determine what research questions they will investigate. In 2020 a total of 183 research proposals were submitted to the two partner organizations (Table 3). Compared to the previous year, competition for the limited research funding was

Table 2
Distribution of competitive cancer research funding by SCR and SCL to the research institutions in 2020

Research institutions	Number of projects	Amount in kCHF	Proportion in %
Kantonsspital Aarau	1	245	1.4
Universität/Inselspital Bern	12	3 534	19.8
Universität/Universitätsspital Basel	11	2 226	12.5
FMI Basel	1	375	2.1
EOC Bellinzona	1	320	1.8
IRB Bellinzona	2	555	3.1
IOR Bellinzona	1	274	1.5
Université/HUG Genève	5	1 558	8.7
EPF Lausanne	6	2 147	12.0
Université/CHUV Lausanne	6	1 593	8.9
Unisanté Lausanne	2	443	2.5
Kantonsspital St. Gallen	2	568	3.2
Universität Luzern	1	355	2.0
ETH Zürich	1	244	1.4
Universität/Universitätsspital Zürich	13	3 388	19.0
Total	**65**	**17 825**	**100**

Abbreviations

CHUV	Centre Hospitalier Universitaire Vaudois
EOC	Ente Ospedaliero Cantonale
EPF	Ecole Polytechnique Fédérale
ETH	Eidgenössische Technische Hochschule
FMI	Friedrich-Miescher-Institut
HUG	Hôpitaux Universitaires de Genève
IRB	Istituto di Ricerca in Biomedicina
IOR	Institute of Oncology Research

Table 3
Distribution of funds by SCR and SCL and success rates of the independent research projects in the different domains

	2019		2020	
	Grant applications	Amount in kCHF	Grant applications	Amount in kCHF
All projects				
Received/applied for	170	50 778	183	52 066
Recommended	103		92	
Approved	68	19 058	58	16 915
Success rate	40 %	38 %	32 %	32 %
Basic research				
Received/applied for	81	27 652	88	29 180
Recommended	55		57	
Approved	32	10 317	32	10 438
Success rate	40 %	37 %	36 %	36 %
Clinical research				
Received/applied for	53	15 889	49	14 540
Recommended	29		20	
Approved	17	5 017	11	3 386
Success rate	32 %	32 %	22 %	23 %
Psychosocial research				
Received/applied for	8	1 666	11	2 287
Recommended	4		3	
Approved	4	480	3	752
Success rate	50 %	29 %	27 %	33 %
Epidemiologic research				
Received/applied for	7	2 378	10	2 011
Recommended	7		6	
Approved	7	2 261	6	1 365
Success rate	100 %	95 %	60 %	68 %

	2019/2020		2020/2021	
	Grant applications	Amount in kCHF	Grant applications	Amount in kCHF
Health services research				
Received (letter of intent)/applied for	21	3 193	25	4 048
Invited (full proposal)/applied for	10	1 376	10	1 561
Recommended	8		6	
Approved	8	983	6	974
Success rate	80 %	71 %	60 %	62 %

quite a bit more intensive, as can be seen in the different success rates. After careful review of all proposals, the Scientific Committee responsible for evaluating them rated 92 research projects as high in quality and promising – and recommended them for funding. However, due to the limited funding available, the SCR foundation board and the board of the SCL were able to approve grants for only 58 research projects. Unfortunately, 34 research projects that were also recommended by the Scientific Committee for grants could not be funded, as there were not enough funds for all high-quality research proposals submitted.

Financing of indispensable services that benefit research

In addition to funding independent research projects, the SCR and the SCL also supported four different research organizations (Table 4). The funds finance central and indispensable services provided by these organizations that benefit clinical and epidemiologic research in Switzerland. In clinical research, for example, the organizations take on administrative tasks and submit the necessary documents to the ethics committees and Swissmedic, the authorization authority, for the study approval process. Since the Cancer Registration Act (Krebsregistrierungsgesetz [KRG]) came into force on 1 January 2020, the federal government pays the costs for cancer data registration, which is performed by the National Institute for Cancer Epidemiology and Registration (NICER) and the Childhood Cancer Registry (ChCR, or KiKR in German). The SCR therefore no longer makes the contribution that it previously paid to the two organizations. The other

Table 4
Supported research organizations

Funding in the years 2014–2020

Amount in kCHF

	2014	2015	2016	2017	2018	2019	2020
Swiss Group for Clinical Cancer Research (SAKK)	*1 050	*1 100	*1 150	*1 300	*1 300	1 100	1 100
International Breast Cancer Study Group (IBCSG)	450	400	350	350	350	350	350
National Institute for Cancer Epidemiology and Registration (NICER)	250	250	250	250	250	250	0
International Extranodal Lymphoma Study Group (IELSG)	200	250	250	350	350	350	350
Swiss Paediatric Oncology Group (SPOG)	150	150	200	250	250	300	300
Swiss Childhood Cancer Registry (SCCR)	75	100	100	100	100	100	0
Total	**2 175**	**2 250**	**2 300**	**2 600**	**2 600**	**2 450**	**2 100**

*of wich 200 000 CHF funded by SCL

The research organizations supported, in brief

Swiss Group for Clinical Cancer Research (SAKK)
SAKK is a decentralized academic research institute that has conducted clinical studies on cancer treatment in all larger hospitals in Switzerland since 1965. SAKK encompasses a network of about 20 Swiss research groups and a coordination centre in Bern. In particular for rare cancers SAKK works together with selected collaborative groups in other countries. SAKK aims to improve existing cancer treatments, study the effectiveness and tolerability of new treatments (chemotherapy, medications, surgery), and establish new treatment standards. → www.sakk.ch/en

International Breast Cancer Study Group (IBCSG)
Since 1977 the IBCSG has conducted academic clinical trials with the aim to improve treatment for women with breast cancer. The IBCSG is a multicentre study group with a coordination centre located in Bern, a data management centre and a statistics centre in the United States, and a pathology reference laboratory in Italy that serves the entire organization. In Switzerland, all university clinics, numerous cantonal hospitals, and oncologists in private practices participate in IBCSG studies. → www.ibcsg.org

International Extranodal Lymphoma Study Group (IELSG)
The IELSG is a multicentre study group that was created in 1998 in Ascona, with a coordination and data management centre in Bellinzona. It aims to coordinate international research activities in the area of extranodal lymphomas. As these lymphomas are rare and moreover develop in all organs in the body, different treatments are required. To jointly test and optimize the treatments, more than 200 international institutes participate in the IELSG network. → www.ielsg.org

Swiss Paediatric Oncology Group (SPOG)
SPOG has been conducting clinical cancer research in paediatric oncology and haematology since 1977, with the aim to improve treatment and quality of life of children and adolescents with cancer. SPOG is a national, independent association with headquarters in Bern. The members are all paediatric oncology departments at Swiss hospitals and the Swiss Childhood Cancer Registry. As childhood cancers are relatively rare, research in childhood cancer is possible only in the framework of international collaborations. At present, SPOG is taking part in more than 20 clinical trials in which approximately 150 young patients in Switzerland are participating. → www.spog.ch

"The broader our knowledge base, the more numerous the possibilities to improve the survival rate and the quality of life of patients with cancer."

four organizations receive compensation for their expenditures based on performance agreements. The performance agreements define in a clear and binding way the requirements regarding reporting and evaluation as well as the targets for research. In addition, there is the condition that the research organizations must secure independent and long-term financing that guarantees their continuing existence independently of the contributions from the SCR. In 2020 the SCR paid out a total of 2.1 million francs to the four research organizations (Table 4).

Rolf Marti, PhD
Rolf Marti, head of the Research, Innovation & Development department and member of the Managing Board at the Swiss Cancer League (SCL), and director of the Swiss Cancer Research (SCR) foundation, retired in June 2021.
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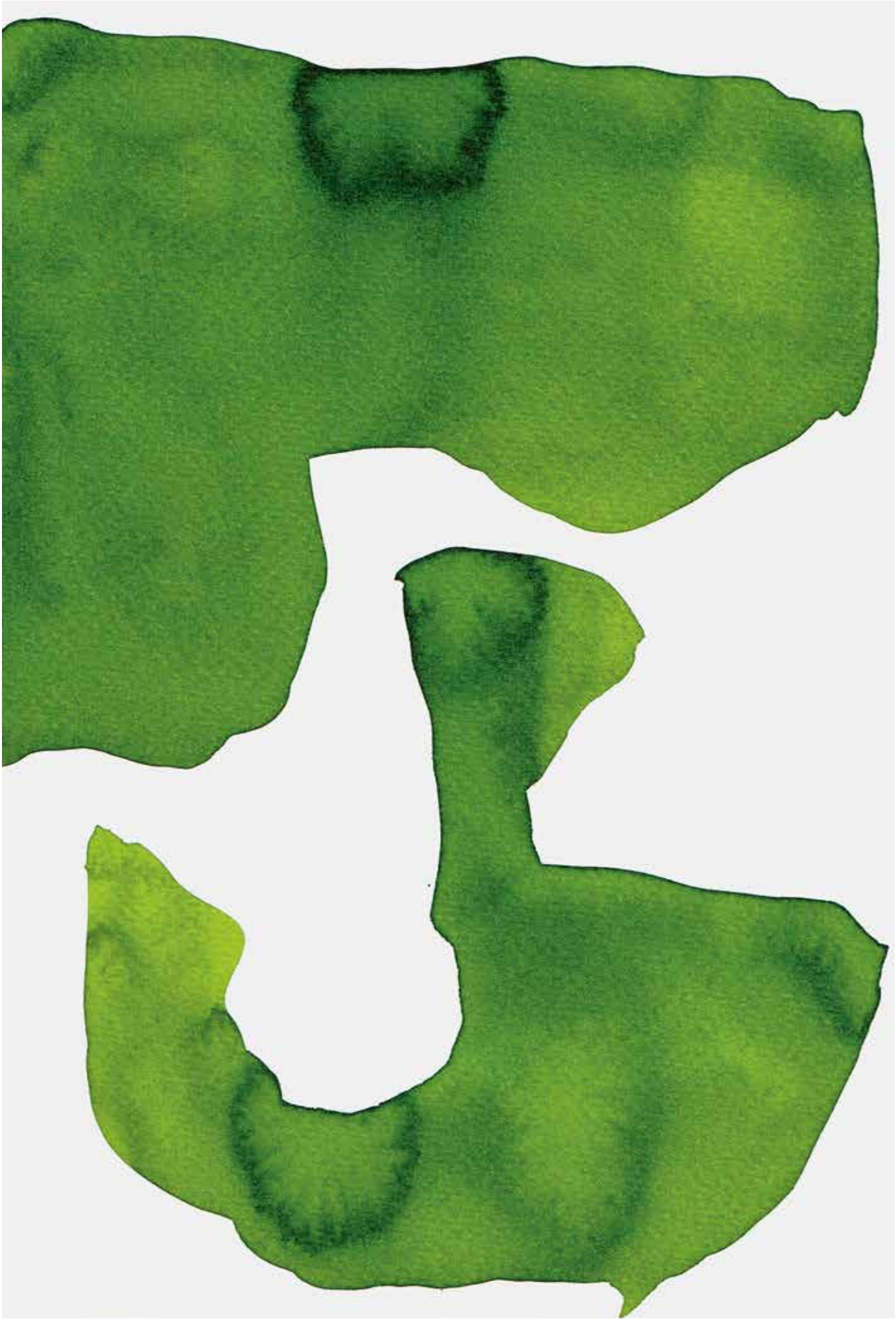

Handover of staff at the SCR office

After 18 years as head of the office of Swiss Cancer Research, Rolf Marti stepped down, turning management over to Peggy Janich on 1 June 2021.

Rolf Marti, you are retiring after nearly two decades of management in research funding. What are your particularly lasting memories?
Rolf Marti: A lot of things, naturally! Perhaps first of all, working together with the Scientific Committee. The Committee members are top researchers that do first-class work for little pay; they give the research proposals submitted a thorough review. I always found it fascinating to follow the discussions on selecting the best proposals.

Eight years ago, we commissioned an external evaluation of our decision process. A survey of more than 200 researchers revealed that most of them rate the evaluation of the grant applications as transparent and fair. A bibliometric analysis found that many of the funded research projects produce publications that are frequently cited. That means that the Scientific Committee's selection of research proposals is excellent and that we therefore support research projects that are of high quality and important.

What I also liked very much was being in touch with latest research – and thus often ahead of the times. For example, the research proposals submitted on immunotherapy increased dramatically 10, 15 years ago. It is a wonderful feeling to be able to observe today how the findings have been translated into clinical reality and are directly benefitting patients.

What developments have you seen in research funding since 2003, when you started?
Rolf Marti: The funding volume has grown greatly, from about 5 million to more than 20 million francs per year today. This has been an enormous fund-raising success. We are very grateful that so many people are willing to support cancer research. More and more foundations have joined in. The Scientific Committee's careful selection process has earned us trust over the years. If you give funds to a research project that the Scientific Committee has recommended for funding, you know that you are investing in important projects and the right projects.

Peggy Janich: In addition to funding independent research projects, Swiss Cancer Research has always also kept an eye on the research landscape in Switzerland and possible financing gaps. And so, in 2005 the first performance agreements came into being, by which we also provide remuneration for research activities that take place more in the background – such as data preparation and processing in cancer registries. Many

"The careful selection process has earned us trust over the years."

"In coming years we will see advances at ever shorter intervals."

of these activities are longer term and do not really follow a project logic where results have to be produced within a 3-year duration. But many research studies are based on longitudinal data and would not be possible at all were it not for these activities.

Rolf Marti: Swiss Cancer Research has also always made it a point to use specific programmes to boost research activities in an area not yet receiving much attention in Switzerland or to promote collaboration – also across disciplinary boundaries. For example, from 2003 to 2010 in the framework of the Collaborative Cancer Research Projects (CCRP), Swiss Cancer Research funded a total of six large-scale translational projects that built bridges between basic research and clinical applications. And with our last programme, we strengthened health services research in oncology, which studies the quality, benefits, and costs of medical care and often focuses on the experiences of the patients affected.

Peggy Janich, since June of this year you are the new director of the Swiss Cancer Research foundation.
Peggy Janich: Yes, but it isn't an abrupt beginning for me. I have been working at the Swiss Cancer League for 5 years and have headed Research Funding for 4 years. During this time, I have profited greatly from Rolf's knowledge and have been able to take over more and more responsibility. So, I have grown into my new position almost quite naturally. I do know that I am following in big footsteps …

Rolf Marti: Size 43!

Peggy Janich: … but I am of course greatly looking forward to helping to shape the future of Swiss Cancer Research.

Where do you see the biggest challenges?
Peggy Janich: One challenge certainly is to keep up the high level in fundraising. That will probably be increasingly difficult due to the ever-stronger competition for funds. What's more, research has made enormous advances. Today, a research project does not look at one single gene but rather the entire genome. Frequently, the topic is the multitude of interactions between tumours and the immune system. Cancer research has become very, very complex – and therefore also expensive.

We are also receiving more and more good-quality research proposals that are rated highly in the evaluation by the Scientific Committee but which we cannot support due to our limited available funds. That is frustrating for everyone – for the Scientific Committee, for the researchers, and also for us. That's why we are trying to show more what is being achieved with the donated money. For laypeople, research is actually an important topic, but it is often not comprehensible. With a new podcast series, we are aiming to highlight the direct benefits: We will present how persons with cancer and their families in a special situation benefit directly from research.

In this way we hope to give greater publicity to the work of the Swiss Cancer Research foundation and, of course, to raise more money. We need it, to make new research findings possible. The knowledge gain in cancer research is growing exponentially. So, in coming years we will see advances in diagnostics and treatment at ever shorter intervals.

Partner organizations and committees

Swiss Cancer Research foundation (SCR)

The Swiss Cancer Research foundation has been funding projects in all areas of cancer research for 30 years. The SCR pays particular attention to supporting patient-centred research projects that result as far as possible in direct patient benefit. The funding comes from donations, and the SCR foundation board is responsible for allocating the funds to the research projects. The board's funding decisions are based on the recommendations made by the Scientific Committee, which reviews the grant applications according to clearly defined criteria.

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www.cancerresearch.ch

Swiss Cancer League (SCL)

The Swiss Cancer League works towards a world where fewer persons get cancer, fewer persons suffer from the consequences and die of cancer, and more persons are cured of cancer. Persons with cancer and their families should receive care and support in all phases of cancer. The SCL, headquartered in Bern, is the national umbrella organization of the cantonal and regional cancer leagues. The SCL supports the cantonal cancer leagues through information brochures and services. It operates the cancer support helpline (0800 11 88 11) and advises persons with cancer also per e-mail, chat, or Skype. The SCL is also active in the area of health policy and informs the wider public on risk factors and cancer screening measures. It also offers specific continuing education courses for a variety of professionals and funds cancer research.

Contact

Swiss Cancer League
Effingerstrasse 40
P. O. Box 8219
CH-3001 Bern
Tel. +41 (0)31 389 91 00
info@swisscancer.ch
www.swisscancer.ch

Cantonal cancer leagues (CCL)

The 18 cantonal and regional cancer leagues provide persons with cancer and their family members with individual counselling by experts on treatment and financial and organizational questions. The CCL staff often advise persons over a longer time period and support them in difficult situations. They provide information on legal and insurance issues and provide contacts to other support institutions, such as home care organizations. If persons with cancer experience financial difficulties as a result of their illness, they can apply for support payments. The CCL also organize group meetings and courses where persons with cancer can talk about their fears and experiences and discuss ways to cope with their illness. Some cancer leagues offer specialized psycho-oncology support for children of adults with cancer. And in some cantons, there are outpatient oncology care services that support persons with cancer at home. The CCL do not all offer the same services. The type and extent of services depend greatly on the financial and human resources as well as on the services provided by other providers in the region.

Cantonal and regional cancer leagues in the German-speaking part of Switzerland and in Liechtenstein

- Aargau Cancer League
- Basel Cancer League
- Bern Cancer League
- Central Switzerland Cancer League
- Eastern Switzerland Cancer League
- Grisons Cancer League
- Liechtenstein Cancer League
- Schaffhausen Cancer League
- Solothurn Cancer League
- Thurgau Cancer League
- Zurich Cancer League

Cantonal cancer leagues in the French-speaking part of Switzerland and in Ticino

- Fribourg Cancer League
- Geneva Cancer League
- Jura Cancer League
- Neuchâtel Cancer League
- Ticino Cancer League
- Valais Cancer League
- Vaud Cancer League

The board of the Swiss Cancer Research foundation

The board is the highest body of the Swiss Cancer Research foundation (SCR).
It monitors adherence to the foundation goals and manages the foundation's assets.
The board of the SCR meets two to four times a year. Based on the recommendations
of the Scientific Committee, it decides on the granting of funds to researchers.

The members of the SCR foundation board serve on a voluntary basis.
The members are:

President

Prof. em. Thomas Cerny, MD
Kantonsspital St. Gallen

Prof. Daniel E. Speiser, MD
Université de Lausanne
Basic research representative

Nicolas Gerber, MD
Universitäts-Kinderspital Zürich
Paediatric research representative

up to December 2020

Prof. Martin F. Fey, MD
Inselspital Bern
Clinical research representative

Christine Egerszegi-Obrist
Former member of
the Swiss Council of States
Mellingen

since January 2021

Prof. Adrian Ochsenbein, MD
Inselspital Bern
Clinical research representative

Silvio Inderbitzin, PhD
St. Niklausen

Prof. Beat Thürlimann, MD
Kantonsspital St. Gallen
Clinical research representative

up to April 2021
Treasurer

Gallus Mayer
Former Banking specialist
St. Gallen

Prof. Murielle Bochud, MD
Unisanté Lausanne
Epidemiologic research
representative

since May 2021
Treasurer

Adrian Vils
Financial expert
Rapperswil BE

The board of the Swiss Cancer League

The board members represent different specialties in the fight against cancer and also the different regions of Switzerland. The board is responsible for strategic management of the Swiss Cancer League – and in this role they make the decisions on the granting of the funds.

The members of the board are:

President
PD Gilbert Bernard Zulian, MD
Former head physician of Palliative Medicine
Hôpital de Bellerive, Hôpitaux universitaires de Genève (HUG)

Vice president
PD Georg Stüssi, MD
Head, Department of Haematology
Istituto Oncologico della Svizzera Italiana (IOSI)

Prof. Solange Peters, MD
Head physician of medical oncology
Centre hospitalier universitaire vaudois (CHUV)

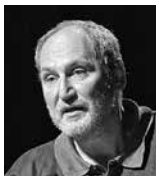
Franck Moos
Managing director
Valais Cancer League

Christoph Kurze
Managing director
Grisons Cancer League

Hans Neuenschwander, MD
Former head physician of Palliative Care
Ospedale regionale di Lugano

up to April 2021
Treasurer
Gallus Mayer
Former Banking specialist
St.Gallen

since May 2021
Treasurer
Adrian Vils
Financial expert
Rapperswil BE



Markus Notter, MD
Radiation Oncology
Lindenhofspital Bern

Brigitta Wössmer, PhD
Head psychologist of Psychosomatics
Universitätsspital Basel

up to May 2020
Karin Zimmermann, PhD
Scientific staff
Universitäts-Kinderspital Zürich

since September 2020
Marika Bana, PhD
Scientific staff
Hochschule für Gesundheit Freiburg

The Scientific Committee

Members of the Scientific Committee in April 2018 (from left to right): Pedro Romero, Sarah Dauchy, Jürg Schwaller, Mark Rubin, Primo Schär, Joerg Huelsken, Maria Blettner, Andrea Alimonti, Simone Benhamou, Aurel Perren, Emanuele Zucca, Jörg Beyer, Nancy Hynes (president), Beat Schäfer, Martin Pruschy, Sabine Werner, Silke Gillessen, Rolf Marti (head of Research, Innovation & Development department), Tatiana Petrova, Peggy Janich (head of Research Funding), Sophie Pautex.

Criteria for high-quality cancer research

The quality of research grant applications is evaluated according to the following criteria:

- Cancer relevance: Is the proposed research project expected to contribute important new observations or knowledge on the causes, prevention, or treatment of cancer?
- Originality or socioeconomic significance: Is the proposed research project original, innovative (basic research projects), or of socioeconomic importance (clinical or epidemiologic projects)?
- Choice of methodology: Have the most appropriate methods for realization of the project been chosen?
- Feasibility: Is the project feasible in terms of finances, human resources, and organization?
- Track record: What are the applicant's (or the project group's) previous research achievements?

The Scientific Committee reviews the research proposals submitted to the SCR and the SCL by researchers requesting funds for their research projects and ideas. In the evaluation of research grant applications, the main criterion is always whether a research project can generate important new findings. The Scientific Committee also rates the originality and feasibility of the research projects (see box, "Criteria for high-quality cancer research").

Each research grant application is reviewed carefully by several experts (see box, "The research grant application review process"). At two meetings of the Scientific Committee per year, the grant applications are discussed in depth and ranked on a list. Only the best projects are recommended for funding. Based on the recommendations, the board of the SCR or the SCL decide which projects will be granted financial support.

The Scientific Committee receives operational support from the Research, Innovation & Development department of the SCL. The department organizes the calls for and the peer review of research grant applications, makes the grant payments in annual increments, and receives the interim and final research reports of the funded projects.

The research grant application review process

The grant application is submitted online.
↓
The grant application is sent to two members of the Scientific Committee for review.
↓
The two Scientific Committee members recommend external reviewers.
↓
The Research, Innovation & Development department of the SCL asks the external reviewers to review the grant application.
↓
The grant application is reviewed. Four to six reviews are obtained for each grant application, two of which are by Scientific Committee members.
↓
The grant application and the reviews are discussed in detail at the biannual meeting of the Scientific Committee.
↓
After the meeting, the Research, Innovation & Development department writes up detailed minutes and creates a ranking list of all grant applications discussed, following the Scientific Committee's recommendations.
↓
The ranking list is forwarded to the boards of the SCR and SCL. The boards make the final funding decision.
↓
The grant applicant is informed of the decision by the Research, Innovation & Development department. Reviewer comments are fed back to the applicant anonymously.

The members of the Scientific Committee are recognized experts with an excellent scientific track record. Together they cover all scientific areas relevant to cancer research.

The members of the Scientific Committee are:

President

Prof. Nancy Hynes, PhD
Friedrich-Miescher-Institut für
biomedizinische Forschung (FMI)
Basel

Basic research

Prof. Andrea Alimonti, MD
Istituto Oncologico
della Svizzera Italiana (IOSI)
Bellinzona

Prof. Jürg Schwaller, MD
Departement Biomedizin
Universitätsspital Basel
Basel

Prof. Joerg Huelsken, PhD
Institut suisse de recherche
expérimentale sur le cancer (ISREC)
Ecole Polytechnique Fédérale de
Lausanne (EPFL)
Lausanne

Prof. Manuel Stucki, PhD
Klinik für Gynäkologie
Universitätsspital Zürich
Schlieren

Prof. Tatiana Petrova, PhD
Département d'oncologie fondamentale
Université de Lausanne
Epalinges

Prof. Sabine Werner, MD
Institute of Molecular Health Sciences
ETH Zürich
Zürich

Prof. Pedro Romero, MD
Département d'oncologie
Université de Lausanne
Epalinges

Clinical research

Prof. Jörg Beyer, MD
Klinik für Onkologie
Universitätsspital Zürich
Zürich

Prof. Andreas Boss, MD
Institut für diagnostische und
interventionelle Radiologie
Universitätsspital Zürich
Zürich

Prof. Markus Joerger, MD, PhD
Onkologie/Hämatologie
Kantonsspital St. Gallen
St. Gallen

Prof. Aurel Perren, MD
Institut für Pathologie
Universität Bern
Bern

Prof. Mark A. Rubin, MD
Department for Biomedical
Research (DBMR)
Universität Bern
Bern

Prof. Beat W. Schäfer, PhD
Abteilung Onkologie
Universitäts-Kinderspital Zürich
Zürich

Prof. Emanuele Zucca, MD
Istituto Oncologico della Svizzera
Italiana (IOSI)
Ospedale San Giovanni
Bellinzona

Psychosocial research

Sarah Dauchy, MD
Département interdisciplinaire
de soins de support
Gustave Roussy
Villejuif, France

Prof. Sophie Pautex, MD
Unité de gériatrie et
de soins palliatifs communautaires
Hôpitaux universitaires de
Genève (HUG)
Chêne-Bougeries

Epidemiologic research

up to December 2020

Prof. Simone Benhamou, PhD
Institut national de la santé et
de la recherche médicale (INSERM)
Paris, France

since January 2021

Stefan Michiels, PhD
Service de Biostatistique et
d'Epidémiologie Gustave Roussy
Villejuif, France

Milena Maria Maule, PhD
Dipartimento di Scienze Mediche
Università di Torino
Torino, Italy

Panel of experts for health services research

For evaluation of the grant applications submitted to the Health Services Research in Oncology and Cancer Care programme, the Swiss Cancer Research foundation brought together a panel of experts. The members of the panel cover a wide range of disciplines – and have proven knowledge in health economics or nursing sciences, for example.

The submitted research project proposals are evaluated and selected in a two-step process. The following persons make up the members of the expert panel:

- **Prof. Marcel Zwahlen, PhD** (president)
  Institut für Sozial- und Präventivmedizin, Universität Bern, Bern
- **Prof. Corinna Bergelt, PhD**
  Institut und Poliklinik für Medizinische Psychologie, Universitätsklinikum Hamburg-Eppendorf, Germany
- **Prof. Urs Brügger, PhD**
  Berner Fachhochschule für Gesundheit, Bern
- **Cinzia Brunelli, PhD**
  Fondazione IRCCS Istituto Nazionale Tumori, Milano, Italy
- **Prof. Sabina De Geest, PhD**
  Institut für Pflegewissenschaften, Universität Basel, Basel
- **Prof. Oliver Gautschi, MD**
  Medizinische Onkologie, Luzerner Kantonsspital and Universität Bern, Luzern and Bern
- **Prof. Thomas Perneger, MD** (up to May 2020)
  Service qualité des soins, Hôpitaux universitaires de Genève, Genève
- **Prof. Isabelle Peytremann-Bridevaux, MD**
  Institut universitaire de médecine sociale et préventive, Université de Lausanne, Lausanne
- **Prof. Thomas Rosemann, MD**
  Institut für Hausarztmedizin, Universitätsspital Zürich, Zürich
- **Prof. Thomas Ruhstaller, MD**
  Brustzentrum Ostschweiz, St. Gallen

Prizes for outstanding achievements in cancer research and the fight against cancer

Cancer Medal

The Swiss Cancer League awarded the Cancer Medal 2020 to former Federal Councillor Pascal Couchepin for his commitment to promoting palliative care. The Recognition Award 2020 was given to Nannette Keller for her project 'Nanas Lunchbox', which upon request provides healthy meals to families with children with cancer. The focus of the Swiss Bridge Award 2020 was also in the area of childhood cancer: Research funds were awarded to a research project in Germany and one in Switzerland.

Former Federal Councillor Pascal Couchepin receives the Cancer Medal 2020.

The Swiss Cancer League awarded the Cancer Medal 2020 to former Federal Councillor Pascal Couchepin for his work in promoting palliative care. As health minister, Couchepin initiated the National Strategy for Palliative Care in 2009 with the aim to expand medical and nursing services and palliative care services and to maintain the best possible quality of life of people in Switzerland until the end of life.

Since then, palliative care has gained importance nationally, in the health care system and also in education and training. Society and politics can also not avoid dealing more intensively with the final phases of life, as the Swiss population on average is becoming increasingly older. The Swiss Cancer League has always focused strongly on quality of life. And palliative care is an important topic both in the counselling sessions at the cantonal and regional cancer leagues and on the national Cancer Helpline.

The Cancer Medal
The Cancer Medal was designed by iron sculptor Bernhard Luginbühl. It is awarded by the Swiss Cancer League every one to two years to recognize outstanding services in the areas of prevention, early detection, and the fight against cancer and its consequences.
→ www.krebsliga.ch/krebsmedaille

Recognition Award

In 2020 the Swiss Cancer League gave the Recognition Award with 5000 francs prize money to Nannette Keller. Eight years ago, her 8-year-old son was diagnosed with leukaemia. This suddenly turned their whole family life upside down. What had been everyday things – such as family meals at the dinner table – became something special. While their son was in hospital, it was often Nannette Keller's mother-in-law who cooked. But many families with children with cancer miss out on the pleasure of a family meal.

"What moves me especially about Nannette Keller's project is how a deeply distressing situation led her to act for people experiencing similar difficulties", says Daniela de la Cruz, CEO of the Swiss Cancer League. "For me, Nanas Lunchbox is an act of solidarity, a showing of compassion." Upon request, the project delivers warm and healthy meals, easing the burden on families in difficult times. Accompanying each meal is also a handwritten card and a little surprise; as bright spots they are meant to give confidence and hope.

Nannette Keller (left) and Daniela de la Cruz, CEO of the Swiss Cancer League (right), at the presentation of the recognition award.

The Recognition Award
With the Recognition Award the Swiss Cancer League honours persons or organizations for their committed work towards improving the situation of patients. The award goes in particular to innovative projects or inventions that aid persons with cancer.
→ www.krebsliga.ch/anerkennungspreis

Swiss Bridge Award

The Swiss Bridge Award 2020 was shared by David Jones' research team at the German Cancer Research Center in Heidelberg and Ana Guerreiro Stücklin's research team at University Children's Hospital in Zurich.

Europe-wide competition

For the 2020 prize award of 500 000 francs, the Swiss Bridge Foundation called for research projects by young researchers aiming to learn more about childhood cancers. A total of 36 researchers from 13 European countries competed for the prize. In a two-stage evaluation process, the jury of renowned experts under the chairmanship of Prof. Gordon McVie, MD, selected two research projects: one in Germany and one in Switzerland.

Identifying still unknown genetic causes of brain tumours

In a new research project, David Jones and his team at the German Cancer Research Center in Heidelberg are examining still unknown genetic underpinnings of childhood brain tumours. In mouse models of the brain tumours, the researchers want to run in vivo screens by using CRISPR, often called 'genetic scissors', to systematically eliminate one gene after the other. If in some cases this slows the growth of the tumour, then the missing gene must play an important role in the cancer processes. In addition, Jones' team wants to conduct sophisticated further investigations to examine possible resistance mechanisms of tumours. And to propose corresponding combination treatments that would be tested first in animal experiments. Subsequently, promising treatments could possibly find clinical application and be made available to young patients for the first time even quite soon – thanks to a well-established collaboration with the Heidelberg University Hospital.

Combination treatments for oncofusion-driven paediatric gliomas

The research project conducted by Ana Guerreiro and her research team at University Children's Hospital Zurich also focuses on brain tumours, which is actually less surprising than one might first expect, given that brain tumours account for the majority of mortality in paediatric cancer patients. Guerreiro's research team is interested in a certain type of congenital brain tumours characterized by the fusion of different genes. They are clarifying what impact such oncofusions have and what signal pathways in the complex network of tumour cells thus gain another meaning. From the results that Guerreiro and her team seek to gain, they want to design and validate new combination strategies that not only have enhanced anti-tumour activity but also prevent drug resistance.

Swiss Bridge Award

The Swiss Bridge Foundation was founded in 1997 at the initiative of Thomas Hoepli, foundation board member, with the support of the Swiss Cancer League. The foundation's aim is to fund high-quality cancer research projects in Switzerland and other countries with support from private donors and foundations. Since its beginnings, the Swiss Bridge Foundation has awarded more than 25 million francs for research work in Belgium, Brazil, England, France, Germany, Israel, Italy, Norway, Spain, Sweden, and Switzerland.

In memory of Gordon McVie (1945–2021)

Professor John Gordon McVie, chairman of the Scientific Jury that selects the best research projects for the Swiss Bridge Award, died with non-Hodgkin lymphoma and COVID-19 on 20 January 2021. Born in Glasgow, Scotland, McVie was an oncologist and tireless champion of cancer research. He was an international authority with numerous important contributions to the field of cancer treatment. Grateful for the decades-long, pleasant, and professional cooperation with him, the Swiss Cancer League and the Swiss Cancer Research foundation will long remember Gordon McVie.

Large parts of society and politics are not aware that conducting clinical studies has become very complex and expensive. If we are to continue finding answers to questions that are not only shaped by the interests of the pharmaceutical industry, then additional sources of financing must be mobilized, says Nicolas Bonadies, head of the clinic at the Department of Hematology and Central Hematology Laboratory at Bern University Hospital and head of the I-CARE for MDS study.

Nicolas Bonadies, you head a study that aims to improve quality of care for patients with myelodysplastic syndromes (MDS), a group of diseases that affect the blood-forming cells in the bone marrow. But the Swiss Group for Clinical Cancer Research (SAKK) has now halted the study prematurely. What happened?

Over the last years, SAKK slid into financial difficulties. At the end of last year, it had to take corrective action to avoid going into insolvency. One consequence was that our study had to be closed. The rationale was that closure of our so-called observational study would not result in any direct health disadvantages for the patient. In my opinion, however, closure results in indirect damage: With our study we aim to measure the quality of care for patients with MDS in Switzerland. It is only by completing the study that we can identify possible undertreatment or overtreatment – and correct it.

SAKK had wanted to keep pace with the ever-increasing speed of innovation in oncological research, and in 2015 it adopted an expansion strategy, also to enable access to new treatments for as many patients as possible. For this reason, SAKK started a great deal more clinical trials in recent years than previously. Most of the SAKK trials – such as our MDS study – are independent, patient-centred studies, which can rarely cover their costs. So, what happened was a constantly growing deficit that apparently remained undetected for a long time. How that could happen is currently under review.

For me and many others, this situation was completely unexpected. Suddenly, the funds to conduct our study were unfortunately no longer available. This is very trying for all, and it is also a serious breach of trust. Numerous colleagues are now in crisis mode: We have to find additional funding to be able to continue the studies.

"Commitment to independent clinical research is needed in Switzerland."

How much money are we talking about here?

For our observation study we planned a duration of 4 years and the inclusion of 400 patients with MDS – and budgeted the expenditure at approximately 1 million francs. This amount may seem alarmingly high at first glance, but it does not even completely cover the personnel costs necessary for participation in our study at the various hospitals. Because of the current legislation, anyone conducting a clinical trial today is held to a very high standard, which ensures the safety and security of all patients.

Specifically, this means that the principal investigator has to, among other things, develop and write a clinical trial protocol, set up a database, obtain official approvals – and then gather the data and check their correctness. These tremendously complex processes can be managed by a hospital only with experienced personnel and a great deal of professionalism and networking. The effort required of all involved is often greatly underestimated. I experience this again and again in everyday life as head of the study unit at our clinic. Large-scale multicentric studies indeed easily cost a few million francs – and thus exceed the financial resources of academic clinical centres in Switzerland.

This development has been increasingly intensified by the arrival of precision medicine. The increase in knowledge contributes to diseases now being divided into more and more subgroups that differ in their biology and response to treatments. To be able to draw meaningful conclusions from clinical trials, however, we must continue to recruit a sufficient number of patients – and we therefore have to network even more than ever. It is precisely for this purpose that we set up the Swiss MDS study platform.

What will you do now?

At the moment our study is at a standstill until we can ensure that there are adequate funds again. We have no choice but to work towards patchwork financing, whereby a mosaic of various funders finance individual parts of our project. However, the current COVID-19 pandemic is making it difficult to raise funds. I have contacted a number of foundations and written numerous applications, also in my free time, requesting funding for the study. Despite great efforts, I have had little success, such that I have to admit that unfortunately, there is no reasonable relationship between expenditure and profit. I am disappointed that there is so little interest in the study on the part of public sector sources. As a clinician, I can't understand it. And in the endeavour to analyse data from everyday care for quality assurance I often feel very much alone.

What has to change, in your opinion?

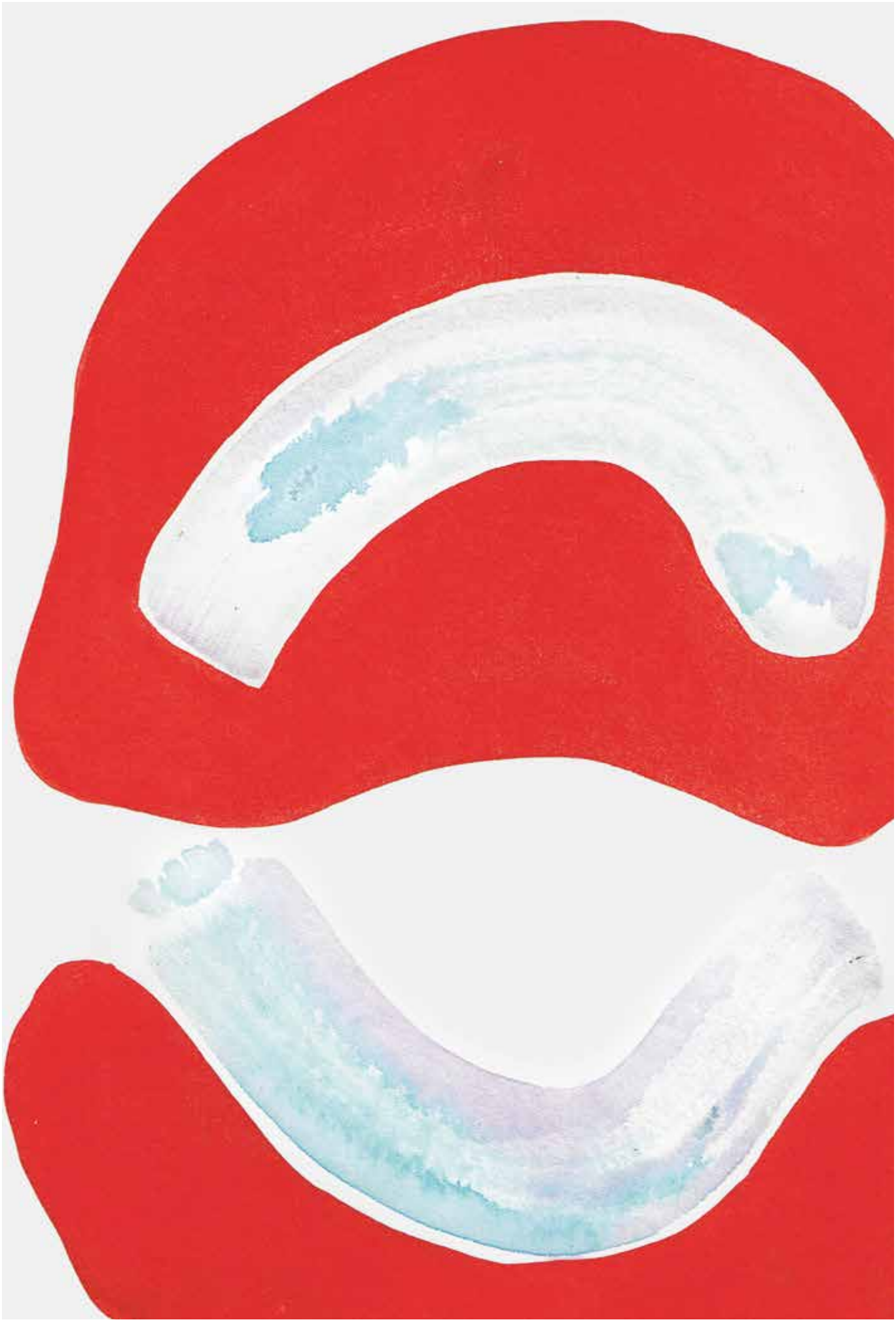
As a society, we have to understand that the conducting of clinical trials has become very complex, difficult, and expensive. Up to now, SAKK has received approximately 5 million francs per year from the federal government. But that is just a drop in the bucket, when 20 trials are running at the same time, each with a budget of several million francs. For this reason, we must find new sources of financing. I see one possible solution in making it an obligation for pharmaceutical firms, as beneficiaries in the system, to do more. This could mean, for example, that the companies pay a certain percentage of their profit from medications

into a fund. The money would be administered by a national institution, which could use it to finance high-quality independent research that is not tied primarily to the interests of the pharmaceutical industry and that generates findings that are of great benefit from the perspective of patients, society, and the care providers.

You want pharmaceutical companies to finance trials that do not match their interests? Resistance is inevitable.

Yes, I am aware of that. That's why I think that a political commitment is needed. No one pays taxes voluntarily, but as a society we need solidarity, and we are often also thankful for the services of our social welfare state. It's similar with independent clinical research. We actually all agree that Switzerland benefits from an institution like SAKK. It is an advantage to have a national platform so that we can study important oncological questions in a coordinated and jointly implemented way. Networks of that kind should be further strengthened through targeted measures. Research funding that is focused on individual research projects and researchers does not help here. We need new funding strategies and sources of funding that are not so much geared towards competition but instead aim more at collaboration and the building of networks.

Independent clinical research is in a considerable crisis not only in Switzerland but also in other Western countries. I fear that with the current structures, soon it will be possible to study only a very small number of research questions in independent research. With that, we risk having our clinical knowledge base being shaped more and more by the interests of the financially strong pharmaceutical industry. And that in the generating of new knowledge we risk becoming more and more dependent on it. To prevent that, we need and depend on the necessary societal and political support.



Oncosuisse initiative

‘Access to Cancer Medicines’

The Oncosuisse initiative and its network

This Oncosuisse initiative aims to make cancer medicines available to all patients with cancer. The core method of the initiative is “governmental learning spiral”. This special technique is based on the assumption that it is necessary to frame the learning process in view of the challenges to be met in governing and not in view of existing organizational structures[1]. This gives the experts the flexibility to develop solutions that make it possible for everyone involved to participate actively in the whole process. The initiative thus approaches the topic from various angles, and productive exchange is promoted, so that ultimately, pragmatic solutions are found. The Oncosuisse initiative found its official start at a meeting on 9 November 2019. Since then, the network has grown to include nearly 100 experts. At the second meeting on 11 September 2020, six action measures to assure access to cancer medicines were identified and described in detail. These measures will be developed and implemented by the members of the network and with operational support from Oncosuisse.

Off-label use more relevant than ever

Off-label use of pharmaceutical drugs is a central concern when it comes to access to cancer medicines. In fact, four of the six measures deal with this topic. The suggested measures in this area aim to reduce the administrative burden for oncologists and health insurers. Ultimately, the goal is to ensure equitable access to cancer medicines for all patients.

Expanded right to request

This measure aims to extend to third-party organizations – such as medical societies, patient associations, or health insurers – the right to request a change to the list of drugs and special therapies (list of pharmaceutical specialties, LS) of the Federal Office of Public Health (for example, addition of a new indication or expansion of the indication) for older drugs that are no longer protected by patents. National Councillor Flavia Wasserfallen is bringing this project to the political arena and examining various means to achieve this goal.

List of recommendations

This measure aims to produce a list of older, inexpensive, patent-free medicines that are (almost) always reimbursed by the health insurance providers but for which nevertheless, according to Articles 71a–71d of the Ordinance on Health Insurance, a request for reimbursement must be submitted. Behind the development of this list is close collaboration between the health insurers, the physicians participating in the project, and the Swiss Cancer League. The goal is to simplify the whole process for these medications to enable fast access to treatment.

Panel of experts for difficult cases

This measure aims at setting up a board of experts for what are called difficult cases. The aim is not to bypass established procedures for reimbursement of off-label uses but rather to solve problems that arise with innovative and specific off-label uses. This measure therefore focuses on cases where appraisal and interpretation of the therapeutic benefit is complex.

Dimitri Kohler, PhD
Project manager of Lernspirale, Oncosuisse, Swiss Cancer League

An expert board could provide the necessary specialized knowledge when required, so as to aid the appraisal. This project is headed by the Swiss Society of Medical Oncology (SSMO) and the Swiss Society of Hematology (SSH). They are basing their work on the findings of the Swiss Patient Access Pilot (SPAP) project.

Cost–benefit

This measure focuses on treatments that are approved in Switzerland but are not yet on the list of drugs and special therapies (list of pharmaceutical specialties, LS). For these treatments, the lack of clinical trials makes appraisal of the therapeutic benefit difficult. The lack of data impedes price negotiations between health insurers and pharmaceutical companies. This in turn makes access to the treatment itself difficult. The plan is to create a platform that brings together all currently available knowledge on these new treatments.

Better information exchange for more efficiency

The last two measures address access to cancer medicines in a broader perspective and do not focus on off-label uses only.

Ensuring knowledge transfer

This measure aims to bring together clinical and molecular data in a central registry in order to create a platform for access to data from clinical practice (real world data). This would ensure that treatments are always based on the latest scientific findings.

International cooperation

This last measure aims to strengthen international cooperation. It has become increasingly more difficult for governments to conduct activities such as horizon scanning, health technology assessment, or price negotiations. If these activities were conducted jointly and in a coordinated manner, they would be considerably more effective. To this purpose, the Swiss Cancer League is building on its participation in the Access to Medicines Task Force of the Association of European Cancer Leagues (ECL) to develop a toolbox to promote this kind of cooperation.

Dimitri Kohler, PhD

Dimitri Kohler studied economics and statistics. After completing his PhD in health economics, he joined the Swiss Health Observatory (Obsan), where he was a project manager working on cantonal demand planning for nursing home beds and on diverse other tasks, especially tasks connected with implementation and analysis of quality indicators for hospitals. Since 2017 at the Swiss Cancer League, Kohler is responsible for the area Costs and Reimbursements, with a special focus on the prescribing of and reimbursement for off-label uses.

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Reference

1. Blindenbacher R, Nashat B. La «spirale d'apprentissage gouvernemental», ou comment répondre aux défis complexes de la gouvernance, dans «La gouvernance en révolution(s) – Chroniques de la gouvernance 2012». Institut de recherche et débat sur la gouvernance – IRG, Ed. Charles Léopold Mayer; 2012. P. 359-69.

Need recognized for improvement in off-label reimbursements

At the end of 2020, the Federal Office of Public Health published the final report of an evaluation of reimbursement for the cost of medicinal products in individual cases. It confirmed that Articles 71a–71d of the Ordinance on Health Insurance are sensible and important in terms of ensuring rapid access to essential drugs. However, the report also pointed out a need for optimization. Specifically, the criticisms concern the administrative burden and the unequal treatment of the insured persons. The data analyses revealed substantial differences in the coverage approval rates of individual health insurance companies; the health insurers criticize the evaluation, however. The report also recommends specific solutions that will now be pursued.

On one thing, everyone agrees: The four Articles 71a–71d of the Ordinance on Health Insurance[1] provide sensible and important regulation. They make it possible for patients in Switzerland to be treated with drugs in a way that is not included in the medicinal product's professional information as approved by Swissmedic or with drugs that are on the list of pharmaceutical specialties but are to be used outside of their authorized indication or limitation. The provisions of the ordinance stipulate under what conditions the off-label treatments can be used and reimbursed by the mandatory health insurance. For patients with life-threatening illnesses, physicians can submit an application for exceptional cost reimbursement, as long as the use of the drug is expected to result in major therapeutic benefit and as long as no other equally effective, approved alternative is available. In any case of exceptional cost reimbursement, the health insurers must issue prior approval of costs after consulting their medical examiners. Once reimbursement has been approved, the price of the drug is determined through negotiations between the health insurer and the manufacturer. However, the articles of the ordinance also leave room for interpretation. This means that although the current pragmatically developed regulation makes fast access to often essential drugs possible, it cannot in its present form sufficiently ensure equal treatment.

Current situation is unsatisfactory

Medications used outside of their authorized indication are prescribed especially for rare diseases and in oncology: Off-label drugs are used in the treatment of about one third of all adult patients with cancer and almost all children with cancer; in total, 50 % of the applications submitted for exceptional cost reimbursement originate from the oncology area. Moreover, with the rapid medical development towards modern precision medicine, the number of cases will continue to rise steeply in the future. For this reason, the process originally conceived as an exceptional rule has reached its limits.

The actors involved in the process, the health insurers and the medical specialists, criticize mainly the disproportionately high level of administrative burden in connection with the requests for reimbursement. Although the majority of applications for cost reimbursement in individual cases are approved and the process is unproblematic, the work needed for more

[1] Art. 71a, Art. 71b, Art. 71c and Art. 71d, revised version of the Ordinance on Health Insurance (HIO) of 1 February 2017, in force since 1 March 2017 (AS 2017 623)

Franziska Lenz
Head of Policy & Public Affairs, Swiss Cancer League

complex medical cases is laborious and unsatisfactory. For years, patient associations have criticized the in part unequal treatment in cost reimbursement. The reason that the assessments differ is that, for one thing, these are assessments in individual cases. At the same time, oncology specialists point out that in part, also similar cases are assessed differently. The heterogeneous assessments are due, among other things, also to the fact that in Switzerland there are more than 50 different health insurers but no binding uniform models for assessment of medical benefit. In addition, due to a lack of transparency, the decisions by the health insurers are not always comprehensible.

What is more, although the Federal Office of Public Health (FOPH) is responsible for supervision of the health insurers, it lacks the legal authority to assess the therapeutic benefit of off-label treatments in individual cases. Therefore, the FOPH cannot check whether the health insurers' assessments of therapeutic benefit and specification of the maximum level of remuneration are correct. When applications for cost reimbursement are rejected, patients' only recourse is to take legal action – but in a life-threatening situation people do not usually have the time or strength for that.

Steep increase in requests

The first regulatory provisions on reimbursement for the cost of medicinal products in individual cases (Art. 71a and Art. 71b) came into force on 1 March 2011. The first ambiguities soon became apparent. In 2013 a study commissioned by the Swiss Cancer League found that off-label drug use in cancer treatment is very common and that the costs are not always reimbursed in a consistent way. Already at that time, various proposals were put forward for curbing off-label cases and for uniform assessment of therapeutic benefit in individual cases.

A first revised version of the Ordinance on Health Insurance came into force on 1 March 2017. This improved the situation slightly: For example, a two-week deadline for the decision on an application for cost reimbursement was introduced. Politically controversial was whether this infringed the right of all persons insured to equal treatment and whether there was a need for further action – especially also because unequal treatment had not been demonstrated based on a sufficiently large and representative sample. For this reason, the health insurers were required by the FOPH to submit data on cost reimbursement approvals and rejections for a period of three years[2]. Based on this data, the FOPH conducted an evaluation of Articles 71a–71d of the Ordinance on Health Insurance in 2019 and 2020 to examine the status of implementation and determine the expediency and effectiveness of the measures. Here, the FOPH analysed in particular what costs arise at the expense of the mandatory insurance due to application of the articles and how the provisions could be optimized. The final report of the evaluation was released on 18 December 2020.

Majority of the reimbursement approvals result in low costs

A majority of the stakeholders surveyed during the evaluation underlined the importance of Articles 71a–71d. At the same time, considering the continuously increasing number of requests for cost reimbursement in individual cases, many experts expressed doubts as to the sustainability of the provisions of the ordinance. From 2017 to 2019 the number of new applications increased by nearly 50 %. In 2019 approximately 38 000 new applications were submitted.

The main criticism of the present-day process concerns the high level of administrative burden for all actors involved. The average time required for preparing and assessing an application as well as administration in the hospital pharmacies is around 5 hours per case. Extrapolated for all applications, that is approximately 200 000 work hours, or 20 million francs additional costs per year.

In the negotiations on price, the health insurers and pharmaceutical companies usually reach agreement. Often there are contractual arrangements, so that the prices do not have to be negotiated in the individual case. The health insurers reported that agreement on the price of the medicinal products could not be

[2] Art. 28 Paragraph 3bis, 4 and 5, HIO, in force from 1 March 2017 to 31 December 2020 (AS 2019 4771)

reached in 10 % of the negotiations. Failed negotiations mostly result in rejection of the request for cost reimbursement.

The evaluation found that three quarters of all requests for cost reimbursement are approved. Although some very expensive cases make up a large percentage of the costs, most of the applications are for relatively low costs: In 2019, 90 % of the cost reimbursements caused half of the costs of reimbursement in individual cases, and the other 10 % caused the other half. Approximately 30 % of the approved applications resulted in a reimbursement cost of less than 1000 francs. Applications in the area of oncology made up approximately 44 % of all applications in 2017 and 60 % of the total costs reimbursed. In 2018, 50 % of all applications came from oncology and accounted for 63 % of total costs reimbursed (no analyses are available for 2019).

Equitable treatment of all insured persons is not assured

The data analyses revealed substantial differences between individual health insurers in the approval rates and rates of adherence to the deadline. However, it did become evident during the evaluation that there had been uncertainties and different understandings regarding the data delivery, making the data only partially comparable. The FOPH tried to take this into account by comparing only those health insurers that had delivered data according to the same understanding.

Although the health insurers criticize the evaluation, the heterogenous approval rates indicate that equal treatment cannot be assumed. This was revealed also by their handling of an example request for reimbursement: Three insurers decided to approve cost reimbursement, six decided on treatment on a trial basis, and four did not approve cost reimbursement. The remaining three insurers could not come to a decision based on the information provided and returned the application with a request for more information. These findings are astonishing, considering that all of the participating health insurers had used the same tool for assessing clinical benefit.

The OLUTool Onko from the Swiss Society of Independent Medical Examiners (SGV) was developed in collaboration with the Swiss Society of Medical Oncology (SSMO), the Swiss Society of Hematology (SSH), and the Swiss Cancer League as a Swiss adaptation of the European Society for Medical Oncology's ESMO-Magnitude of Clinical Benefit Scale.

The evaluation team has provided the following recommendations to the Swiss Parliament, Federal Council, and the stakeholders involved.

Revision of the legal bases

From a legal standpoint, the question arises as to whether – in view of the scope and future medical developments – regulation at the level of an ordinance is sufficient. For this reason, the legal basis of key cornerstones at the statutory level will be examined. To be examined as well is the procedure for off-label treatments in the inpatient sector. In addition, there will be further examination of the scope of application of the ordinance provisions, and unclear terms in the provisions, such as "major therapeutic benefit", will be better defined.

Also to be considered is making the FOPH list of drugs and special therapies more 'dynamic' or 'versatile' so as to reduce the burden in application of Art. 71a–71d of the HIO – for example, in that the FOPH might use its authority to make additions to the list without applying for an approval or in that further actors would be given the right to submit a request for additions to the list of drugs and special therapies.

Also to be clarified is the procedure in the case of a lack of, or still open, price agreement between insurers and authorization holders, especially the rules regarding treatments on a trial basis.

Registry and digital platform for submitting requests for reimbursement

To increase the efficiency and reduce the administrative burden, a digital platform is to be created for the submission and review of the requests for reimbursement. A standard form would be filed that contains all needed information, and the decisions would also be registered. A further advantage is that if the recommendations outlined here are adequately implemented, comparable data from all health insurers on Art. 71a–71d HIO would be available.

Increased transparency

In negative decisions, an obligation to state reasons is to be introduced for health insurers, so that the rejected requests for reimbursement of costs are understandable for service providers and patients.

Central office for assessment of therapeutic benefit in complex cases

In complex cases the assessment of therapeutic benefit should be undertaken by an independent panel of experts. The assessments, in anonymized form, would be accessible to specialists, and the decision on cost reimbursement would continue to be made by the health insurers.

Revision planned for 2021

With this, the recommendations are largely in line with longstanding demands raised by specialists in oncology and haematology. Some of the approaches are already being used in the context of ongoing multi-stakeholder projects. To be mentioned here are the Oncosuisse initiative 'Access to Cancer Medicines', with the measures 'list of recommendations', 'panel of experts for difficult cases', and 'expanded right to request', and the Swiss Patient Access Pilot project conducted by Roche, Bristol-Myers Squibb, and the Swiss Society of Medical Oncology. The FOPH plans to give concrete form to the measures with participation of the actors in 2021 and to develop a proposal with revised ordinance provisions. The corresponding consultation process is planned to commence in the fall of 2021.

Franziska Lenz
During and after studying media and communication sciences, journalism, and contemporary history at the University of Fribourg, Franziska Lenz worked for almost ten years at the Parliamentary Services assisting the Federal Assembly in Bern. She then worked as a consultant at a public affairs agency, advising clients on planning and implementation of measures for representing their interests and on their relations with government, the economy, and society. Lenz has headed Policy & Public Affairs at the Swiss Cancer League since September 2016.
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Research-related activities at Oncosuisse starting in 2021

With the conclusion of the National Strategy Against Cancer (NSC), Oncosuisse reached a milestone. All of the projects generated findings, and many projects could be completed. From the research point of view, some examples to mention are the efforts to improve networking in clinical research and the National Cancer Registry, the research funding programme 'Health Services Research in Oncology and Cancer Care' funded by Swiss Cancer Research, and the platform Umwelt & Krebs [environment and cancer], which discussed new evidence from research in view of implementation with representatives from the world of practice.

Strengthening the research community

With the Oncosuisse Forum, Oncosuisse continues to follow the aims of the NSC: Not yet concluded projects will be brought to completion, and an even more strongly networked community in the field of cancer will be established. The main goal of the Oncosuisse Forum is networking the actors in the field of cancer and joint planning and conducting of projects. Like the first and second National Cancer Programmes – although not as extensively – Oncosuisse is developing, together with the actors, the 'Masterplan 2030': a stocktaking of urgent issues in the field of cancer (including recommendations for action), which will be addressed at the national level.

Oncosuisse will thus promote activities in four areas, two of which (Research; Data & Registries) are strongly research-related and two of which (Prevention & Screening; Treatment, Aftercare, & Quality) are somewhat less so. Based on the stocktaking, the actors in these four topic areas will meet at a conference to describe and prioritize activities bottom-up and decide on further steps. Oncosuisse prepares the foundation documents, creates the opportunity for exchange, and supports the activities that result, possibly also including fundraising support. Based on the example of the 2021 Community Building Conference "HSR in Switzerland: What is the way forward?" initiated by Oncosuisse and co-organized by Swiss Cancer Research, the aim will be to further examine ways to strengthen connections and collaboration in a specific research community (https://hsrconference.ch).

Strengthening a common voice on policy vis-à-vis administrative and political authorities

Oncosuisse has long been committed to ensuring that actors working in the field of cancer develop joint positions, respond to the political consultation process, and proactively influence national policy. But now, Oncosuisse aims to intensify these activities and to bring together a broader group of actors. For this purpose, it has created new structures, such as the policy group Oncosuisse Forum, and has contracted a professional monitoring and consulting agency. Through such activities, Oncosuisse was also in the past able to successfully make voices from the field of cancer heard in political processes. Examples recently are the intervention at the federal level on the notion of

Michael Röthlisberger, PhD
Managing director at Oncosuisse

research in the Federal Health Insurance Act (KVG) *(Forschungsbegriff des Krankenversicherungsgesetzes)*[1] or the Oncosuisse position statement in response to the political consultation process on the second "set of measures to contain costs" *(Kostendämpfungspaket)*[2]. Beyond that, Oncosuisse ensures the monitoring of political – and explicitly also research policy – issues and responds if needed. A monitoring report is generated four times a year.

Continue ongoing activities, implement results in the world of practice

Oncosuisse conducts various activities that are research-related, such as the activities Minimum Standards for Tumour Boards, Knowledge Transfer Immuno-Oncology, and Quality in Oncological Network. In the future, the plan is to also focus on applying existing empirical evidence in clinical practice. The example of the platform environment and cancer demonstrated that representatives from the world of practice very willingly take up the findings of current research and would like to apply them in their work. This model will be extended. Suitable here, for example, would be the results of the supported projects in the Swiss Cancer Research's funding programme, 'Health Services Research in Oncology and Cancer Care': This is because the findings of geographically and temporally limited studies are valuable, but the value becomes raised to a higher power when the knowledge gained is broadly applied in health care!

Michael Röthlisberger, PhD
Michael Röthlisberger completed a PhD in basic cancer research. He then headed the research department of the Swiss Academy of Medical Sciences (SAMS) and was co-overall project manager for the NSC, among other things. Röthlisberger became managing director at Oncosuisse in January 2021.
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[1] www.nsk-krebsstrategie.ch/wp-content/uploads/2019/11/Jusletter-KVG.pdf

[2] www.oncosuisse.ch/gesundheitspolitik/stellungnahmen

Research funding by the cantonal and regional cancer leagues

Overview of the many-sided efforts

The cantonal and regional cancer leagues invest significant amounts in the funding of cancer research. In this way, they make an important contribution to the advancement of knowledge in the fight against cancer.

The Swiss Cancer League was founded in 1910 as the *Schweizerische Vereinigung für Krebsbekämpfung* (Swiss Association to Fight Against Cancer). Back then, it was a small committee of physicians who set themselves the goal to support and advance cancer research in Switzerland. Today, the Cancer League is a professional non-profit organization, composed of the national umbrella organization Swiss Cancer League and 18 cantonal and regional cancer leagues, which advocate for people with cancer and their families in many ways. Funding cancer research continues to be one of its core tasks. Funding takes place not only at the national level through the Swiss Cancer League and the Swiss Cancer Research foundation; the cantonal and regional cancer leagues are also committed to funding research in their regions.

In 2020, seven cantonal and regional cancer leagues provided more than 3 million francs in funding to a total of 35 research projects (Table). The largest sum was provided by the Ligue genevoise contre le cancer (nearly 1.5 million francs), followed by the cancer leagues of Basel, Ticino, and Zurich, which supported several research projects with sums ranging from 0.4 to just under 0.5 million francs. As in the previous year, these four leagues invested the largest sums in research.

For evaluation of the research grant applications, most of the cancer leagues have their own scientific committees of experts who work in their region. Some of the leagues rely on the expertise of their board members. Other leagues rely on the support of the umbrella organization and participate in funding research projects that have been evaluated by the Scientific Committee of the Swiss Cancer League and its partner organization, the Swiss Cancer Research foundation. In 2020, two of the cantonal and regional leagues did exactly this. The Aargau Cancer League co-funded a research project at the Paul Scherrer Institute in Villigen that is studying a new treatment option for patients with metastatic prostate cancer. And the Cancer League of Central Switzerland participated in funding a project at the University of Lucerne in the area of paediatric palliative oncology. The aim of the project is to contribute towards better support for parents who have lost a child to cancer. These two cancer leagues prove that even without their own scientific evaluation committees, cancer leagues can participate in funding research projects in their own region.

Cooperation with the umbrella organization is also sought by leagues that have their own scientific committee, such as the Basel Cancer League. Since 2017 it has been connected to the online research database of the Swiss Cancer League – a web-based tool that simplifies the process of submission and evaluation of research grant applications: Applicants use an online form created specifically for the Basel Cancer League to submit their research proposals. The members of the scientific committee also use the online

Peggy Janich, PhD
Head of research funding at the Swiss Cancer League and director of the Swiss Cancer Research foundation

database to access the application documents and to draw up their evaluation reports. Paperless, efficient, and secure work is thus ensured. In addition, the database helps to maintain an overview of the various research projects and documents. That is all the more important when a large number of grant applications are submitted – as in Basel recently, which had a new record of 28 applications submitted in 2020.

Also for the cantonal and regional cancer leagues, there are not enough monies available to support all of the high-quality research proposals eligible for funding, unfortunately. Nevertheless, the leagues make an important contribution to supporting committed researchers, who through their tireless efforts are always producing new cancer-relevant findings.

Peggy Janich, PhD
After studying biotechnology at Technische Universität (TU) Cottbus-Senftenberg and TU Dresden, Peggy Janich completed a PhD at the Centre for Genomic Regulation (CRG) in Barcelona. She was a postdoctoral researcher at the University of Lausanne and then joined the Swiss Cancer League in 2016. Janich has been head of research funding at the Swiss Cancer League and Swiss Cancer Research foundation since 2017 and director of the Swiss Cancer Research foundation since 2021.
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Table
Research funding by the cantonal and regional cancer leagues in overview

	Number of projects and institutions supported		Amount granted in kCHF	
Cancer League	2019	2020	2019	2020
Aargau	2	1	90	50
Basel	9	11	585	476
Bern	2	3	142	150
Central Switzerland	1	2	25	95
Geneva	8	9	866	1 496
Grisons	2	0	25	0
Ticino	3	3	190	413
Zurich	5	6	251	400
Total	**32**	**35**	**2 174**	**3 080**

List of funded research projects and institutions

Listed below are the funding contributions that were paid out in 2020.

Aargau Cancer League

Mueller Cristina | Design and application of a new class of PSMA ligands in combination with terbium radioisotopes
Paul Scherrer Institut (PSI), Villigen
CHF 50 000.– | Duration: 1. 8. 2019 – 31. 7. 2022

Basel Cancer League

Ameline Baptiste* | Methylation-based classification of paediatric bone tumours
Institut für Pathologie und medizinische Genetik, Universitätsspital Basel, Basel
CHF 80 000.– | Duration: 1. 6. 2020 – 31. 7. 2021

Bentires-Alj Mohamed | Anticipating and targeting resistance to SHP2 inhibition in breast cancer
Departement Biomedizin, Universitätsspital Basel, Basel
CHF 48 750.– | Duration: 1. 6. 2020 – 30. 11. 2021

Bubendorf Lukas | Development and validation of a targeted next generation DNA sequencing panel for prostate cancer
Pathologie, Universitätsspital Basel, Basel
CHF 45 000.– | Duration: 1. 7. 2020 – 31. 12. 2021

Hutter Gregor | Evaluation of CD64 Blockade in Recurrent Glioblastoma
Neurochirurgische Klinik, Universitätsspital Basel, Basel
CHF 31 250.– | Duration: 1. 6. 2020 – 30. 11. 2021

Kappos Elisabeth Artemis | Impact of pre- versus sub-pectoral implant-based breast reconstruction on oncologic safety
Departement für plastische, rekonstruktive, ästhetische und Handchirurgie, Universitätsspital Basel, Basel
CHF 40 000.– | Duration: 1. 6. 2022 – 31. 5. 2024

Kavvadias Tilemachos | Potential of Fourier Transform Infrared (FTIR) spectroscopy as a rapid, non-invasive diagnostic test in urine for endometrial and ovarian cancer: a proof-of-concept
Gynäkologie und Geburtshilfe, Universitätsspital Basel, Basel
CHF 20 000.– | Duration: 1. 6. 2020 – 31. 5. 2021

Läubli Heinz | Glycosidase-producing viruses for cancer immunotherapy
Departement Biomedizin, Universitätsspital Basel, Basel
CHF 45 000.– | Duration: 1. 6. 2020 – 31. 5. 2022

Leuppi Jörg* | How to mitigate the consequences of cancer and cancer related treatments in childhood cancer survivors
Medizinische Universitätsklinik, Kantonsspital Baselland, Basel
CHF 45 880.– | Duration: 1. 4. 2020 – 31. 3. 2022

Schwaller Jürg* | Modeling and targeting of acute megakaryoblastic leukaemia, an aggressive paediatric cancer
Departement Biomedizin, Universitäts-Kinderspital beider Basel, Basel
CHF 50 000.– | Duration: 1. 9. 2020 – 30. 8. 2022

* supported by the Foundation for Children with Cancer Basel

Vetter Marcus | Effects of synthetic glucocorticoid administration in breast cancer patients
Medizinische Onkologie, Universitätsspital Basel, Basel
CHF 30 000.– | Duration: 1. 10. 2020 – 30. 9. 2022

Worni Mathias | SAKK 44/19: Irreversible electroporation (IRE) followed by nivolumab in patients with metastatic pancreatic cancer: a multicenter single-arm phase II trial
Viszeralchirurgie, Clarunis, Universitäres Bauchzentrum Basel, Basel
CHF 40 000.– | Duration: 1. 3. 2020 – 28. 2. 2022

Bern Cancer League

Alberts Ian Leigh | Head-to-head comparison of 68Ga-PSMA-11 and 18F-PSMA-1007 for the detection of recurrent prostate cancer in PSMA-ligand PET/CT
Universitätsklinik für Nuklearmedizin, Inselspital Bern, Bern
CHF 50 000.– | Duration: 1. 9. 2020 – 28. 2. 2022

Müller Simon | A new angle: epigenetics in head and neck cancer
Universitätsklinik für Hals-, Nasen- und Ohrenkrankheiten, Kopf- und Halschirurgie, Inselspital Bern, Bern
CHF 30 000.– | Duration: 1. 6. 2020 – 30. 9. 2021

Radpour Ramin | Determination of the molecular signature of leukaemia stem cells and paired T cells in the bone marrow of AML patients
Department for BioMedical Research (DBMR), Universität Bern, Bern
CHF 70 000.– | Duration: 1. 6. 2020 – 30. 11. 2021

Central Switzerland Cancer League

Michel Gisela | Needs, desires and psychosocial outcomes in bereaved parents who lost their child to cancer: palliative and end-of-life care in paediatric oncology
Departement für Gesundheitswissenschaften und Medizin, Universität Luzern, Luzern
CHF 70 000.– | Duration: 1. 8. 2020 – 31. 7. 2023

Roser Katharina | Adolescent and young adult cancer survivors in Switzerland: epidemiology and psychosocial health
Departement für Gesundheitswissenschaften und Medizin, Universität Luzern, Luzern
CHF 25 000.– | Duration: 1. 1. 2020 – 31. 12. 2022

Geneva Cancer League

Cohen Marie | Targeted delivery of the PEDF gene into ovarian cancer cells: a promising therapeutic approach in ovarian cancer
Centre de recherche translationnelle en onco-hématologie et maternité, Hôpitaux universitaires de Genève, Genève
CHF 124 309.– | Duration: 1. 1. 2018 – 31. 12. 2020

Coppari Roberto | A new molecular target to improve the treatment of lung cancer
Département de physiologie et métabolisme, Université de Genève, Genève
CHF 125 000.– | Duration: 1. 1. 2020 – 31. 12. 2022

Goossens Nicolas | Risk prediction and identification of new targets for chemoprevention of hepatocellular carcinoma in patients with non-alcoholic fatty liver disease (PREDICT-HCC)
Service de gastro-entérologie et hépatologie, Hôpitaux universitaires de Genève, Genève
CHF 110 383.– | Duration: 1. 1. 2020 – 31. 12. 2023

Hugues Stéphanie | Impact of the tumour microenvironment on lymphatic vessel features and immunomodulatory functions
Département de pathologie et d'immunologie, Université de Genève, Genève
CHF 100 675.– | Duration: 1.1.2019 – 31.12.2021

Labidi-Gali Intidhar | Impact of ovariectomy in patients with germline BRCA1 mutated breast cancer
Département d'oncologie et division de pathologie clinique, Hôpitaux universitaires de Genève, Genève
CHF 93 146.– | Duration: 1.1.2018 | 31.12.2020

Matthes Thomas | Junctional adhesion molecules and their role in the haematopoietic bone marrow niche and as new therapeutic targets for the treatment of acute myeloid leukaemia
Département de médecine, Université de Genève, Genève
CHF 130 000.– | Duration: 1.1.2020 – 31.12.2021

Senn Pascal | Prevention of cisplatin-induced deafness in an animal model
Département des neurosciences cliniques, Université de Genève, Genève
CHF 95 545.– | Duration: 1.1.2018 – 31.12.2020

Walter Martin A. | A nanohydrogel polymer serving as a platform for optimal delivery of an advanced prostate cancer drug
Département de radiologie et informatique médicale, Hôpitaux universitaires de Genève, Genève
CHF 116 714.– | Duration: 1.1.2019 – 31.12.2020

Centre de recherche translationnelle en onco-hématologie (CRTOH) | Funding of the CRTOH and funding of the personalized research program
CRTOH, Université de Genève, Genève
CHF 600 000.– | Duration: 1.1.2015 – 31.12.2022

Ticino Cancer League (Fondazione ticinese ricerca sul cancro)

Bertoni Francesco | Transcriptome analysis to improve the outcome prediction and to identify novel therapeutic targets in follicular lymphoma patients
Institute of Oncology Research, Università della Svizzera Italiana, Bellinzona
CHF 214 812.– | Duration: 1.1.2020 – 31.12.2021

Catapano Carlo | Targeting mitochondrial dynamics and cancer cell plasticity in prostate cancer
Institute of Oncology Research, Università della Svizzera Italiana, Bellinzona
CHF 60 400.– | Duration: 1.1.2020 – 31.12.2020

Grassi Fabio | A purinergic checkpoint in tumour infiltrating lymphocytes as a possible target in cancer immunotherapy
Institute for Research in Biomedicine, Università della Svizzera Italiana, Bellinzona
CHF 137 690.– | Duration: 1.1.2020 – 31.12.2021

Grossmann Nico | Molecular classification of muscle-invasive bladder cancer patients scheduled for radical cystectomy using a single-sample transcriptomic consensus classifier
Klinik für Urologie, Universitätsspital Zürich, Zürich
CHF 57 192.– | Duration: 1. 1. 2020 – 31. 12. 2020

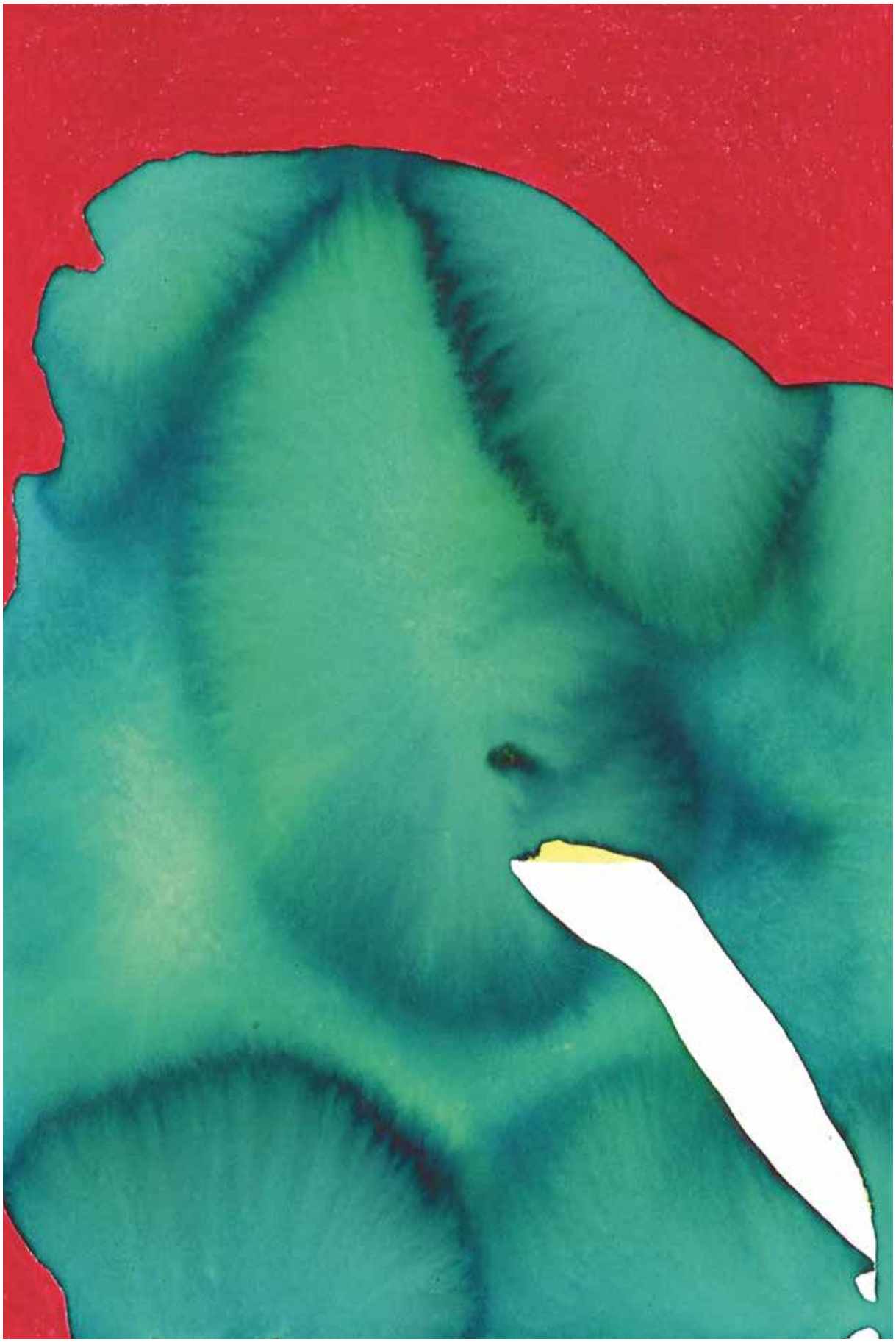
Guerreiro Stücklin Ana, Baumgartner Martin | Optimizing therapies for BRAFV600E-driven gliomas
Onkologie, Kinderspital Zürich, Zürich
CHF 78 096.– | Duration: 1. 1. 2020 – 31. 12. 2020

Jae-Hwi Jang | Targeting lung cancer by CD26/DPP4 inhibition in combination with anti-PD-L1 antibody
Klinik für Thoraxchirurgie, Universitätsspital Zürich, Zürich
CHF 71 600.– | Duration: 1. 1. 2020 – 31. 12. 2020

Kahraman Abdullah | Genome-wide identification of drugable non-coding cancer driver mutations via aberrant alternative splicing in prostate and pan-cancer
Institut für Pathologie und Molekularpathologie, Universitätsspital Zürich, Zürich
CHF 73 821.– | Duration: 1. 1. 2020 – 31. 12. 2020

Pauli Chantal, Planas-Paz Lara | Targeting the purine biosynthesis pathway in pancreatic ductal adenocarcinoma (PDAC) – A functional precision medicine approach to target KRAS driven pancreatic cancers
Institut für Pathologie und Molekularpathologie, Universitätsspital Zürich, Zürich
CHF 71 007.– | Duration: 1. 1. 2020 – 31. 12. 2020

Silina Karin | Spatial gene expression profiling of tumour-associated tertiary lymphoid structures
Experimentelle Immunologie, Universität Zürich, Zürich
CHF 48 283.– | Duration: 1. 1. 2020 – 31. 12. 2020



The Role of lymphatic vessels in tumour development and anti-tumour immunity

Lymphatic vessels (LVs) transport fluids, cells, and proteins, such as antigens, from tissues to draining lymph nodes. They interlace the blood vessels and are essential for tissue fluid homeostasis, lipid absorption, and immune responses. During tumour development, the cells lining the vessels, called lymphatic endothelial cells (LECs), remodel, proliferate, and migrate, stimulated by factors produced in the tumour microenvironment (TME). These TME factors therefore contribute to lymphatic vessel sprouting in the tumour and the tumour-draining lymph nodes. This process, called lymphangiogenesis, occurs in several types of primary human cancers and facilitates metastatic spreading.

Beside their important role in tumour cell dissemination, LVs impact tumour immunity by exerting a dual role that might change over time. At first, tumoural LVs are required for the recruitment of immune cells and the initiation of an adaptive immune response[1,2]. However, the immunosuppressive features of LECs in the TME subsequently dampen ongoing anti-tumour immunity[3,32]. In contrast, tumour lymphangiogenesis can potentiate immunotherapy in melanoma[4]. Therefore, LVs play a paradoxical role in impacting tumour progression by being crucial for the initiation of anti-tumour immunity and immunotherapy, while promoting metastatic dissemination and inhibiting established immunity. There is therefore an urgent need to precisely decipher the temporal implication of LVs in tumour cell dissemination and anti-tumour T-cell immunity.

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Lymphatic vessels and tumour metastasis

Metastasis is a term describing the process whereby cancer cells migrate from the primary tumour to distant organs, where they form secondary tumours. Metastasis is the principal cause of mortality in human cancers. Although tumoural cells can also disseminate through blood vessels, the majority of solid cancers, such as breast cancer and melanoma, propagate through the LVs and first reach their draining lymph nodes (LNs)[5]. The presence of tumoural cells in LNs is associated with poor prognosis in several cancer types[6]. Recently, studies have demonstrated that metastatic tumour cells migrate into the lymphatic vessels to reach adjacent LNs, where they invade blood vessels to further colonize distant organs[7,8].

Tumoural LVs are not passive conduits transporting cancer cells to distant organs. They are sensitive to factors present in the TME that modify their phenotype and functions. Vascular endothelial growth factor C (VEGF-C), produced by tumoural cells and immune cells of the TME, is the principal inducer of tumoural LV expansion. Expression of this lymphangiogenic factor in patient samples is associated with metastasis in several cancers[6,9,10]. In murine models, alterations of the lymphangiogenic axis modulate metastatic dissemination to LNs and/or distant organs[11–19].

Expansion of the lymphatic vessels within the LNs has also been suggested to represent a pre-metastatic niche that facilitates metastatic cell colonization of the LNs[13,20,21], and LVs from distant metastatic regions further contribute to tumour progression by attracting chemo-resistant cancer stem-like cells[22]. Moreover, using a transgenic mouse model with inducible lymphangiogenesis in the lung, a study demonstrated that LVs promote metastasis in the lung and further spreading to other organs[23]. In melanoma patients, lymphatic exudates are enriched in tumour-derived factors and exhibit a distinct tumoural protein profile depending on metastatic stage of the patients[24]. Therefore, lymphatic exudate analysis could represent a new tool for identifying novel markers reflecting disease evolution and for designing personalized therapies.

Lymphatic vessels and anti-tumour immunity

Beside their crucial role in tumour cell dissemination, LVs are key players in the initiation and the regulation of anti-tumour immune responses, including T-cell activation and infiltration in tumours. The transport of tumoural antigens by dendritic cells (DCs) through lymphatic vessels to the draining LNs is crucial for the initiation of tumour-specific T-cell responses in melanoma[1,25]. Consistent with a positive role of the lymphatic vasculature in anti-tumour immunity, the expression of genes associated with lymphatics or LV density correlates positively with tumoural immune cell infiltration and inflammation in primary colorectal cancer and melanoma[4,26,27].

Transgenic mice lacking LVs or mice with disturbed local LVs exhibit limited tumour drainage, reduced migration of DCs to the draining LNs, generally decreased tumour immune cell infiltration, and impaired induction of anti-tumour adaptive immune responses[1,2]. The density of LVs and the lymphatic score (attributed by the relative expression levels of

genes related to LVs) are also associated with the infiltration of immunosuppressive cells and the expression of immunoregulatory molecules[1,4,26].

Although LVs are required for a successful intratumoural T-cell infiltration, they also dampen ongoing adaptive anti-tumour immunity. In mouse melanoma, VEGF-C potentiates the immunosuppressive functions of LECs in draining LNs that foster the apoptosis of tumour specific $CD8^+$ T-cells[28]. In colorectal cancer, VEGF-C signalling in tumoural LECs enhances their immunosuppressive properties[29]. In several subcutaneous tumour mouse models, tumoural LECs exhibit a higher expression of the immunosuppressive molecule PD-L1 compared to naïve skin LECs[3,30]. In response to IFN-γ (interferon gamma) produced by tumour-specific $CD8^+$ T-cells, tumoural LECs increase their expression of PD-L1, thereby decreasing the accumulation of intratumoural $CD8^+$ T-cells[3].

Recently, we showed that IFN-γ signalling in tumoural LECs induces the expression of major histocompatibility complexes II (MHC-II) at their surface, which locally promote the suppressive functions of regulatory T-cells, associated with an inhibition of cytotoxic $CD8^+$ T-cell effector functions and promotion of tumour growth[32]. Interestingly, in mice, VEGF-C-induced lymphangiogenesis potentiates tumour regression upon immunotherapy[4,31]. Furthermore, there is a positive correlation between serum VEGF-C levels in patients with melanoma and immunotherapy responses and progression-free survival[4]. Therefore, although the dual role of LVs in anti-tumour immunity needs to be considered, targeting the lymphatic vasculature represents a promising therapeutic strategy to restrain cancer cell dissemination.

Our research

Studies indicate that LECs are strongly modulated by inflammation or infections, reflecting a possible phenotypic and functional specialization of those cells depending on the organ and the immune microenvironment. In the laboratory, we are exploring the effect of the TME on LEC phenotype and functions. Depending on the cancer stage, therapeutic targeting of specific immunoregulatory LEC functions, rather than targeting the entire tumour lymphangiogenesis process, might be a better strategy for immunotherapies.

Our research projects aim to dissect the molecular and cellular features of tumoural LVs and examine how the targeting of specific molecules may impact anti-tumour T-cell immunity, tumour growth, and metastasis. Our first studies identified VEGF-C-induced tumour-associated lymphangiogenesis as a regulator of tumour-specific $CD8^+$ T-cells[28]. Tumoural LECs can further function as tolerogenic antigen-presenting cells to locally promote Treg suppressive functions and tumour growth.

Indeed, genetic abrogation of MHC-II in LECs leads to an alteration of tumour-infiltrating Treg suppressive phenotype and functions, resulting in increased

tumour-infiltrating T effector cell responses and tumour growth regression[32]. Interestingly, in adoptive T-cell therapy settings, whereas low doses of tumour-specific cytotoxic T lymphocytes promote the immunosuppressive functions of tumoural LECs, high doses of T-cells induce LEC apoptosis, leading to a reduction of intratumoural density of LVs. This is associated with reduced lymphatic flow drainage and reduced metastatic dissemination in LNs. The killing of tumoural LECs by adoptively transferred tumour-specific cytotoxic T lymphocytes depends on the cross-presentation of tumour antigens by LECs. Those effects are abolished in mice lacking the receptor for IFN-γ in LECs, indicating that adoptive T-cell therapy relies on IFN-γ to restrain tumoural LVs (Garnier et al., manuscript in preparation). This study provides important insights on how cytotoxic T lymphocytes modulate LVs, and it may aid the designing of optimized protocols for adoptive T-cell therapy.

Recent transcriptomic profiling highlighted significant numbers of genes differentially expressed by LECs isolated from mouse melanoma tumours, tumour-draining LNs, and non-draining LNs (unpublished). The differential expression of several molecules implicated in the regulation of anti-tumour immunity, lymphangiogenesis, and tumour metastasis were further validated at transcript and protein levels. Among those, tumoural LECs represent a significant source of cholesterol 25-hydroxylase (Ch25h), an enzyme implicated in the production of 25-hydroxysterol and another metabolite, both recently described as immunomodulators. Genetic deletion of Ch25h in LECs results in increased tumour growth and significant impairment of tumoural infiltration of immune effector cells. The accumulation of adoptively transferred tumour-specific cytotoxic T lymphocytes is also altered in the absence of Ch25h expression in LECs, suggesting that intratumoural Ch25h levels and lymphatic vessel density could be used as combined predictive markers for response to immunotherapy. In addition, oxysterol levels being possibly modulated by fat in the diet, fine-tuning of lipid metabolism may not only promote the discovery of novel therapeutics but may contribute to re-evaluations of dietary approaches and a personalized medical approach for cancer patients.

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Stéphanie Hugues completed a PhD in immunology in 2002 in Nice, France, and completed her training as a postdoctoral fellow at the Curie Institute in Paris. She was awarded an SNF Assistant Professorship in 2010 at the Department of Pathology and Immunology of the Faculty of Medicine in Geneva. She obtained an ERC consolidator grant in 2012 and was promoted to associate professor in 2016. Hugues' research is focused on how stromal cells, in particular lymphatic endothelial cells, contribute to the shaping of immune responses in autoimmunity and cancer.
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Selected results

Project
Genetic and pharmacological inhibition of the mitochondrial pyruvate carrier: effects on tumor growth and metastasis
Département de biologie cellulaire, Université de Genève, Genève
CHF 160 150.– | Duration: 1.1.2019 – 29.6.2020 | KFS-4434-02-2018

Project coordinator
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Limiting the energy metabolism of cancer cells

Cells that have a nucleus have their own tiny energy plants called mitochondria. Using substances that inhibit the import of fuel into mitochondria, researchers have throttled the energy production of cancer cells – and in this way possibly also their ability to metastasize.

One characteristic that distinguishes cancer cells from healthy cells is that they grow faster and divide more rapidly. This requires increased metabolism, which supplies the cancer cells with sufficient energy. Primarily responsible for this are the mitochondria. Mitochondria evolved from ancient bacteria that were incorporated into larger host cells millions of years ago. They then developed into highly specialized organelles, where cellular respiration takes place.

For their function as tiny power plants of the cell the mitochondria rely on fuel, which they take up in the form of pyruvate, an end product of glycolysis or also oxidation of lactate. Pyruvate plays an essential role in cell metabolism, which is why Jean-Claude Martinou's research team at the University of Geneva has been interested in it for years.

In their project funded by the Swiss Cancer Research foundation, the researchers restricted cancer cells' energy production and examined how the cells reacted. In experiments using cultures of human breast cancer cells, the researchers turned off the gene whose product is responsible for the import of pyruvate into mitochondria and therefore has been named the mitochondrial pyruvate carrier (MPC).

Through this, the researchers were in fact able to reduce migration of cancer cells. In line with these findings, the cells also showed reduced migration after being treated with MPC inhibitors, as Martinou writes in the final project report. The researchers explain the findings by the fact that cancer cells apparently require a great deal of energy when they escape from the primary tumour site and generate secondary tumours in another part of the body. The MPC inhibitors could be useful to prevent metastasis, as Martinou concludes. Further research is needed, however, before patients can be treated with such substances.

Reference

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Project
Exploiting the Immune System to Fight Brain Cancer
Département d'oncologie fondamentale, Université de Lausanne, Epalinges
CHF 374 300.– | Duration: 1. 7. 2017 – 31. 10. 2020 | KFS-3990-08-2016

Project coordinator
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Re-educating immune cells to fight brain tumours

Glioblastoma is an aggressive type of brain cancer that claims the lives of 95% of patients within five years. This seems to also be due to immune cells that promote cancer cells instead of fighting them. A research project funded by the Swiss Cancer Research foundation suggests that it is crucial that treatments are targeted not only at the tumour cells themselves but also at the immune cells within the tumour microenvironment.

In contrast to many other types of cancer, for which great progress has been made in recent years, glioblastoma continues to be a frightening diagnosis. Half of patients with glioblastoma die within 14 months, and only 5% live longer than five years. Patients undergo surgery, radiation therapy, and chemotherapy – but even when all treatment options are exhausted, medicine cannot do much against the disease, unfortunately.

As Johanna Joyce and her team outline in their final scientific report, the researchers have found that immune cells in the tumour microenvironment of a glioblastoma not only promote the growth of the tumour but can also weaken the response to chemotherapy and radiation therapy. These immune cells, called tumour-associated macrophages (TAMs), comprise up to 30% of the bulk tumour mass. TAMs can be educated by the tumour and within the tumour microenvironment to promote cancer development and progression rather than fight it.

But Joyce and her team at the University of Lausanne have now demonstrated that the behaviour of these immune cells can be changed pharmacologically to restore their anti-tumourigenic function. The researchers write about "re-education" of the immune cells, which has proven successful in mouse glioma models. The administered re-educating substances were PLX3397 and BLZ945, which are now being tested for the first time in clinical trials with patients with cancer.

It remains to be seen whether these drugs will prove effective and in fact be used one day to treat patients with glioblastoma. But it is already clear that they have some advantages over current therapies. Today, therapies directly target cancer cells, which constantly change and therefore often develop resistance to cancer drugs. In contrast, tumour microenvironment-targeted therapies that halt interactions between the tumour and the immune cells in the microenvironment are an attractive therapeutic approach, says Joyce, for "immune cells are genetically normal and thus less likely to acquire drug resistance."

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Yan D, Kowal J, Akkari L, Schuhmacher AJ, Huse JT, West BL, Joyce JA. Inhibition of colony stimulating factor-1 receptor abrogates microenvironment-mediated therapeutic resistance in gliomas. *Oncogene*. 2017;36:6049-58. doi: 10.1038/onc.2017.261.

List of approved research projects in 2020

More information about the funded projects can be found on www.krebsliga.ch/researchprojects

Total funds allocated: CHF 10 629 553.–

Aye Yimon | Translating precision reactive metabolite signalling to precision cancer intervention
Laboratory of Electrophiles and Genome Operation, EPF de Lausanne, Lausanne
CHF 374 750.– | Duration: 1. 7. 2021 – 30. 6. 2025 | KLS-5101-08-2020

Beer Hans-Dietmar | A novel role of p62 in skin cancer
Dermatologische Klinik, Universitätsspital Zürich, Zürich
CHF 82 550.– | Duration: 1. 12. 2020 – 30. 11. 2021 | KFS-5087-08-2020

Boyman Onur | The role of interleukin-2 in tumour immunoediting and immunotherapy
Klinik für Immunologie, Universitätsspital Zürich, Zürich
CHF 375 000.– | Duration: 1. 8. 2020 – 31. 7. 2023 | KFS-5028-02-2020

Caflisch Amedeo | Targeting the m6A-RNA epitranscriptomic mark as a novel therapy for blood cancer
Biochemisches Institut, Universität Zürich, Zürich
CHF 359 950.– | Duration: 1. 7. 2020 – 30. 6. 2023 | KFS-5016-02-2020

Collart Martine | Understand how the FKBP10 peptidyl-prolyl-cis-trans isomerase is essential for growth of lung cancer cells
Département de microbiologie et médecine moléculaire, Université de Genève, Genève
CHF 375 000.– | Duration: 1. 9. 2020 – 31. 8. 2023 | KFS-5007-02-2020

Correia Bruno | Rational design of CAR-T-cells with improved safety and efficacy
Laboratory of Protein Design & Immunoengineering, EPF de Lausanne, Lausanne
CHF 365 200.– | Duration: 1. 8. 2020 – 31. 7. 2023 | KFS-5032-02-2020

D'Angelo Giovanni | Pharmacological targeting of the golgi localized oncoprotein GOLPH3
Lipid Cell Biology Laboratory, EPF de Lausanne, Lausanne
CHF 328 950.– | Duration: 1. 10. 2020 – 30. 9. 2024 | KFS-4999-02-2020

Derré Laurent | Unravelling bladder tumour immunity to define new treatments and predictive tools
Service d'urologie, Centre hospitalier universitaire vaudois (CHUV), Lausanne
CHF 185 600.– | Duration: 1. 3. 2021 – 28. 2. 2023 | KFS-5105-08-2020

Driessen Christoph | The molecular landscape of proteasome inhibitor resistance of multiple myeloma in vivo
Abteilung Onkologie und Hämatologie, Kantonsspital St. Gallen, St. Gallen
CHF 357 150.– | Duration: 1. 7. 2020 – 31. 12. 2023 | KFS-4990-02-2020

Gfeller David | Robust analysis and prediction of T-cell epitopes in cancer
Ludwig Institute for Cancer Research, Université de Lausanne, Lausanne
CHF 361 750.– | Duration: 1. 3. 2021 – 28. 2. 2024 | KFS-4961-02-2020

Grassi Fabio | Intestinal ecosystem conditioning to improve the outcome of cancer immunotherapy with checkpoint inhibitors
Istituto di Ricerca in Biomedicina, Bellinzona
CHF 250 000.– | Duration: 3. 8. 2020 – 2. 8. 2022 | KFS-5033-02-2020

Guarda Greta | Targeting metabolic rewiring in cancers with altered RFX7
Istituto di Ricerca in Biomedicina, Bellinzona
CHF 305 500.– | Duration: 1. 5. 2021 – 30. 4. 2024 | KFS-5141-08-2020

Hugues Stéphanie | Impact of lymphatic vessel derived oxysterols on anti-tumour immunity and immunotherapy
Département de pathologie et d'immunologie, Université de Genève, Genève
CHF 340 650.– | Duration: 1. 2. 2021 – 31. 1. 2025 | KFS-5108-08-2020

Konstantinidou Georgia | Mechanisms of adaptation of KRAS-induced pancreatic tumours to hypoxia
Institut für Pharmakologie, Universität Bern, Bern
CHF 370 900.– | Duration: 1. 9. 2021 – 31. 8. 2024 | KFS-5115-08-2020

Kruithof-de Julio Marianna | The role of lipid metabolism and fat in metastatic prostate cancer
Universitätsklinik für Urologie, Inselspital, Bern
CHF 348 700.– | Duration: 1. 7. 2021 – 30. 6. 2024 | KFS-4960-02-2020

Lutolf Matthias | Dissecting the complex crosstalk within the colorectal cancer microenvironment through patient-derived tumouroids-on-chips
Laboratory of Stem Cell Bioengineering, EPF de Lausanne, Lausanne
CHF 375 000.– | Duration: 1. 1. 2021 – 31. 12. 2023 | KFS-5103-08-2020

Martinou Jean-Claude | Assessment of D-cysteine therapeutic effects on lung and pleural cancers
Département de biologie cellulaire, Université de Genève, Genève
CHF 122 950.– | Duration: 1. 7. 2020 – 30. 6. 2022 | KFS-5022-02-2020

Meraldi Patrick | Targeting multipolar spindles in cancer cells with a synergistic drug combination
Département de physiologie cellulaire et métabolisme, Université de Genève, Genève
CHF 346 650.– | Duration: 1. 2. 2021 – 31. 1. 2025 | KFS-5117-08-2020

Münz Christian | The contribution of early lytic replication of oncogenic gamma-herpesviruses to lymphoma formation and its immunotherapeutic targeting
Institut für Experimentelle Immunologie, Universität Zürich, Zürich
CHF 369 000.– | Duration: 1. 9. 2020 – 31. 8. 2023 | KFS-4962-02-2020

Nageswara Rao Tata | Age-induced cellular and molecular alterations driving myeloid leukaemia initiation and progression
Universitätsklinik für Hämatologie, Inselspital, Bern
CHF 374 550.– | Duration: 1. 1. 2021 – 31. 12. 2023 | KLS-5158-08-2020

Oricchio Elisa | Define how aberrant cathepsin S activity modifies the tumour microenvironment and explore new therapeutic avenues
Institut suisse de recherche expérimentale sur le cancer (ISREC), EPF de Lausanne, Lausanne
CHF 329 400.– | Duration: 1. 6. 2021 – 31. 5. 2025 | KFS-5102-08-2020

Ruiz i Altaba Ariel | Apoptosis-surviving cells as an origin of metastases
Département de médecine génétique et développement, Université de Genève, Genève
CHF 373 050.– | Duration: 1. 6. 2020 – 31. 5. 2024 | KFS-4965-02-2020

Scheuermann Jörg | Next-generation targeted small molecule-drug conjugates (SMDCs) from DNA-encoded chemical libraries
Institut für Pharmazeutische Wissenschaften, ETH Zürich, Zürich
CHF 243 900.– | Duration: 1. 11. 2020 – 31. 10. 2023 | KFS-5012-02-202

Schottelius Margret | RADIATION: RAdiolabeled DIAbodies for Targeted Imaging in ONcology – establishment of a one-step 18F-labeling platform for the generation of versatile diabody-based tracers
Service de médecine nucléaire et imagerie moléculaire, Centre hospitalier universitaire vaudois (CHUV), Lausanne
CHF 306 150.– | Duration: 1. 1. 2021 – 31. 12. 2023 | KFS-5123-08-2020

Sendoel Ataman | Tackling the role of small open reading frames in cancer
Institut für Regenerative Medizin, Universität Zürich, Schlieren
CHF 371 150.– | Duration: 1. 10. 2020 – 30. 9. 2023 | KFS-5023-02-2020

Theurillat Jean-Philippe | Loss and revival of androgen receptor signalling in advanced prostate cancer
Institute of Oncology Research (IOR), Bellinzona
CHF 273 600.– | Duration: 1. 3. 2021 – 29. 2. 2024 | KFS-5136-08-2020

Thomä Nicolas | Harnessing a new mechanism for kinase inactivation in cancer therapy
Friedrich-Miescher-Institut für biomedizinische Forschung (FMI), Basel
CHF 374 900.– | Duration: 1. 1. 2021 – 31. 12. 2023 | KFS-4980-02-2020

Trono Didier | POU5F1B as new oncogene and therapeutic target
Laboratory of Virology and Genetics, EPF de Lausanne, Lausanne
CHF 373 550.– | Duration: 1. 7. 2020 – 30. 6. 2023 | KFS-4968-02-2020

van den Broek Maries | Control of liver metastasis by conventional NK cells and tissue-resident ILC1s
Institut für Experimentelle Immunologie, Universität Zürich, Zürich
CHF 328 000.– | Duration: 1. 7. 2021 – 30. 6. 2025 | KFS-5104-08-2020

Vannini Nicola | Application of NAD-boosting strategies in cancer immunotherapy
Ludwig Institute for Cancer Research, Université de Lausanne, Lausanne
CHF 361 750.– | Duration: 1. 1. 2021 – 31. 12. 2023 | KFS-4993-02-2020

Vetter Marcus | Personalized treatment for patients with estrogen receptor (ER)alpha-positive metastatic breast cancer: anticipating and targeting resistance to CDK4.6 inhibitors
Medizinische Onkologie, Universitätsspital Basel, Basel
CHF 358 050.– | Duration: 1. 10. 2020 – 30. 9. 2023 | KFS-5140-08-2020

Weber Achim | Characterization of non-canonical open reading frames in hepatocellular carcinoma
Institut für Pathologie und Molekularpathologie, Universitätsspital Zürich, Zürich
CHF 374 800.– | Duration: 1. 1. 2021 – 31. 12. 2023 | KFS-5121-08-2020

Approved bursaries in 2020

Bersier Ludivine | Targeting chemoresistance and immune exclusion in colorectal cancer
Destination: Département d'oncologie, Centre hospitalier universitaire vaudois (CHUV), Lausanne
CHF 191 553.– | Duration: 1. 11. 2020 – 31. 10. 2023 | MD-PhD-5089-06-2020

Tailoring axillary surgery and radiotherapy in breast cancer – the international multicentre randomized phase III trial TAXIS

Background

Worldwide more than two million patients are diagnosed with breast cancer every year. Breast cancer accounts for one third of all cancer diagnoses among women and causes more than 600 000 deaths per year. In Switzerland, about 1200 patients per year need axillary lymph node dissection (ALND) as part of their surgical treatment. ALND is indicated primarily for node-positive breast cancer.

Previous trial findings supported the current trend in clinical practice toward decreased rates of ALND in patients with non-palpable axillary lymph node metastases and showed that axillary radiation is a valid alternative to ALND in selected patients[1,2].

In parallel with the trend for less axillary surgery, radiation oncologists are broadening the indication for extended regional lymph node irradiation based on evidence from two large phase III trials. In addition, data from the latest Early Breast Cancer Trialists' Collaborative Group (EBCTCG) meta-analysis confirmed that post-mastectomy radiation for patients with one to three positive nodes reduced recurrence and breast cancer mortality[3]. Consequently, the present-day loco-regional management of node-positive patients has become controversial, and ALND remains the standard of care for patients with high-volume or treatment-resistant nodal disease.

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Head of breast surgery at the Breast Center Eastern Switzerland, St. Gallen

Dorota Dudka, PhD
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Prof. Walter P. Weber, MD
Head physician breast surgery at University Hospital Basel and the University of Basel

Investigational procedure in TAXIS

Tailored axillary surgery (TAS) is defined as the sentinel lymph node (SLN) procedure in combination with the selective removal of all palpable disease and documentation of the removal of the initially biopsy-proven and clipped lymph node metastasis by specimen radiography.

The concept of selectively marking positive lymph nodes with clips to find and remove them as a targeted procedure has recently emerged as an effective strategy to reduce the high false negative rate of the SLN procedure after neoadjuvant treatment. The metastatic node is marked with a clip during biopsy or shortly after the lymph node metastasis has been confirmed. It is then selectively localized and removed during the procedure[4–6].

This significant reduction of the extent of axillary surgery has the potential to reduce morbidity and improve quality of life of patients with breast cancer, in whom long-term survival is increasingly common due to effective multidisciplinary treatment.

Research background and current status of TAXIS

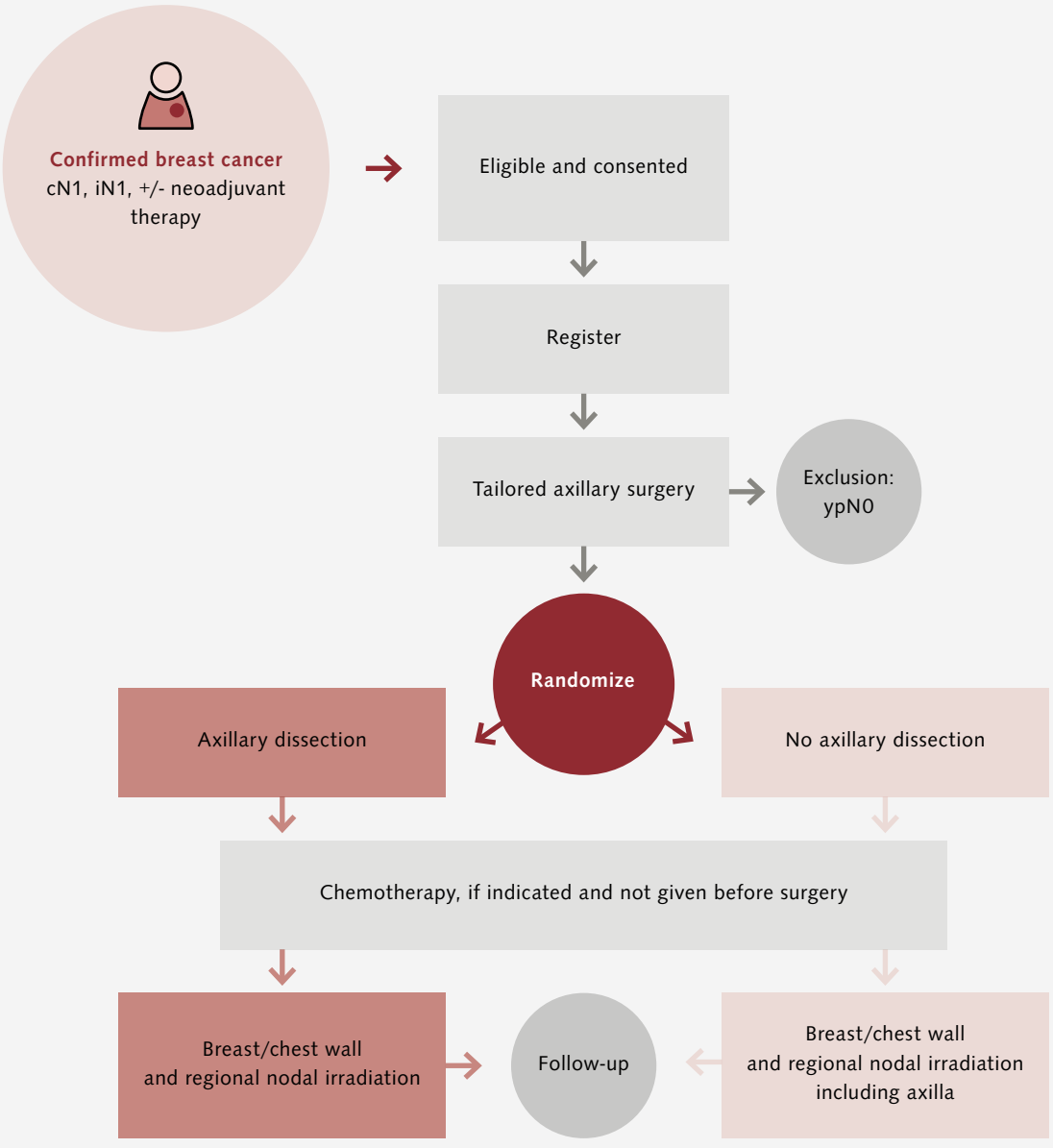
Several surgical trials have been initiated to provide further evidence for the safety of omitting axillary surgery in selected clinically node-negative patients[7]. Two trials (SOUND and INSEMA) investigate the omission of any surgical axillary staging in low-risk patients, i. e. the omission of the SLN procedure, in patients with a negative preoperative ultrasound of the axilla. The results of these two trials have the potential to establish a new indication for axillary ultrasound as a procedure to exclude high volume axillary disease and spare low-risk patients the SLN procedure.

The most progressive ongoing clinical trial on axillary management, which partially overlaps with the TAXIS trial, is Alliance A011202. It compares ALND with axillary radiation in patients with residual disease after chemotherapy, which was an exclusion criterion in other trials. Most other trials excluded patients with residual metastases after neoadjuvant chemotherapy, and the omission of ALND in patients with imaging-detected lymph node metastases is controversial, as these metastases may predict a larger volume of axillary disease[8–12].

In most patients undergoing ALND, the number of negative lymph nodes removed exceeds the number of tumour-affected nodes. Removing multiple unaffected lymph nodes increases morbidity with no oncologic benefit. It is a consequence of radical surgery that follows the principle of complete tissue removal within the anatomical borders of the axilla. TAS may offer non-inferior oncologic outcomes with less morbidity than ALND in patients with clinically positive nodes at first presentation and confirmed nodal disease at surgery with or without neoadjuvant therapy. In TAXIS, we hypothesize that TAS is not less effective in curing patients and preventing recurrences compared to ALND and that TAS improves the quality of life of patients by sparing significant morbidity (Figure 1).

Figure 1
Flow Chart of TAXIS

cN1: Clinically node-positive (palpable lymph node metastasis)
iN1: Imaging node-positive
ypN0: No residual disease after preoperative systemic therapy



TAXIS Progress Report

The trial was activated on 31 July 2018 in Switzerland and was subsequently also activated in Austria, Hungary, Italy, Germany, and Lithuania. As of March 2021, 25 sites in Switzerland and 44 sites in total are open for accrual.

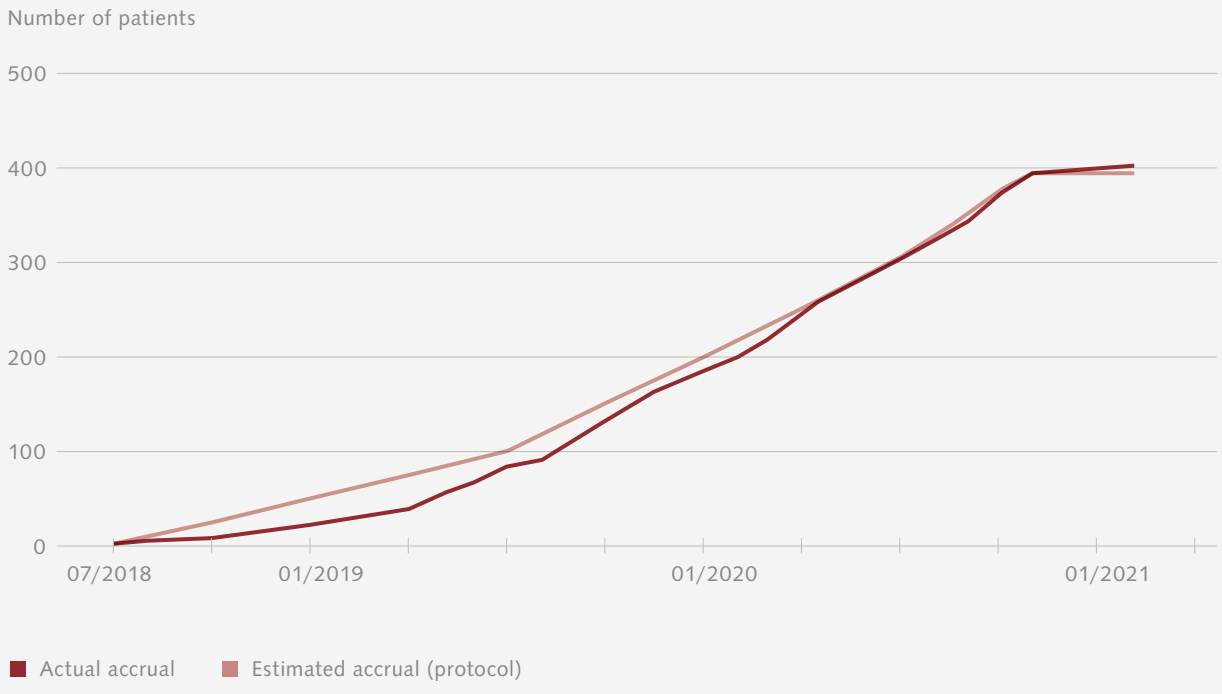
The TAXIS trial plans to accrue 1500 patients. To date, 402 patients have been included in the study, of whom 229 are patients in Switzerland. The actual accrual is perfectly in line with the estimated accrual (Figure 2).

The TAXIS trial was paused in November 2020 by the Swiss Group for Clinical Cancer Research (SAKK) based on their financial restructuring plan. The TAXIS team immediately developed an emergency plan to transfer sponsorship and monitoring activities to the University Hospital Basel. There, the study was reactivated in May 2021 – and since August, other Swiss sites have now also been joining in again.

Challenges of prospective trials in surgery

In the last decades, the majority of surgical research in oncology was conducted as single-centre retrospective studies. Large centres with high patient volumes collected treatment and outcome data, and motivated clinical researchers spent months analysing hospital charts and trying to publish their work. Conducting a properly planned prospective multicentre randomized phase III trial, however, is a completely different thing. Surgeons have had to learn about statistical planning and valid endpoints, motivating peers to join efforts, and adhering to a detailed protocol – something that some still consider to be an inappropriate restriction of surgical arts.

Figure 2
Actual and estimated patient accrual in TAXIS



Putting together a team of surgeons and radiation oncologists who agree on what is standard and what and how we would like to investigate was the first major achievement of the TAXIS group in Switzerland. The SAKK and other well established research organizations allowed a timely start of the trial, but the financial restructuring of SAKK led to an involuntary pause of the TAXIS trial. This unforeseen difficulty puts TAXIS in company with previous practice-changing trials. In fact, all six major international axillary surgery de-escalation trials worldwide experienced major challenges and had to either extend accrual, re-open their trials after closure, or accept that the study turned out to be significantly underpowered.

One large challenge in conducting a surgical trial in general is obtaining adequate funding. Trial planning, conducting, and monitoring is an expensive endeavour, particularly for a phase III trial with 1500 participants and a follow-up time of 10 years. In medical trials investigating new drugs, the developing company comes up with all the money to conduct the trial; investigators are ideally involved in trial planning, but this is not always the case. The participating centres sometimes only calculate the case fee to cover their costs, and the pharma sponsor chooses the best partnering research group. On the other hand, less innovation is taking place in surgery than in new drug development. Nevertheless, surgery still constitutes the backbone of cure in breast cancer treatment and represents the most inexpensive part of the treatment. Obtaining funding for the TAXIS trial has been ongoing for years, and without the generous support of so many foundations including the Swiss Cancer Research foundation, the Swiss Cancer League, and the regional cancer leagues, the present success of TAXIS would not have been possible.

In contrast to medical oncology trials, where the times of large phase III studies that include all subgroups of patients are over and new drugs often benefit only a small proportion of patients, the TAXIS trial has great potential to change clinical practice for most patients with lymph node positive breast cancer. Due to the methodological challenges of conducting surgical trials, including the lack of standardized surgical techniques and the impossibility to blind surgeons for the intervention, evidence to guide treatment is often sparse.

We firmly believe that oncological outcomes will be non-inferior and quality of life and morbidity will be improved by tailoring the extent of surgery to the extent of disease in the axilla. Only the results of well-planned and properly conducted phase III trials with adequate follow-up will be accepted by the vast majority of surgeons, radiation oncologists, and, most importantly, by our patients, since de-escalation studies are often feared for their potential to expose patients to undertreatment.

TAXIS has become one of the largest and most important international surgical trials in the field of breast cancer, comprising over 40 centres in six countries. The main clinical trial will most likely establish a new surgical standard of care, and several important translational subprojects will bring further insights into the mechanisms of metastatic spread of breast cancer.

Michael Knauer, MD, PhD

Michael Knauer is the head of breast surgery at and co-founder of the Breast Center Eastern Switzerland in St. Gallen. After completing his medical degree at the Medical University Innsbruck, he trained in general and visceral surgery in Feldkirch, Austria. In parallel, he completed a PhD with a clinical and translational research fellowship at the Netherlands Cancer Institute in Amsterdam. Since 2014, he has worked in Switzerland. Knauer is the supporting clinical investigator of the TAXIS trial, as well as a board member of the Swiss Society of Senology, the Q-Label certification for breast centres, and the Austrian Breast and Colorectal Cancer Study Group ABCSG.

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Dorota Dudka, PhD

Dorota Dudka studied biotechnology in Wroclaw, Poland. She then spent two years at King's College London working in cancer research before moving to Switzerland, where she completed her PhD in biomedical sciences at the University of Bern/Inselspital in the Department of Radiation Oncology in 2019. Subsequently, she worked as a clinical project manager at SAKK, where she conducted several international clinical trials. Currently, Dudka is the clinical project manager of the TAXIS trial and works at the Breast Care Centre at University Hospital Basel and the University of Basel.

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Prof. Walter P. Weber, MD

Walter Weber is the head of breast surgery at University Hospital Basel and the principal investigator of the TAXIS trial. After completing his medical studies, he spent more than two years in the lab in the field of tumour immunology at his home University of Basel and at the Johns Hopkins Medical Institutions in Baltimore, Maryland, USA. He trained to become an SSO-accredited breast surgeon during a breast fellowship with Monica Morrow at Memorial Sloan Kettering Cancer Center. He founded the Oncoplastic Breast Consortium, a non-profit organization building bridges between breast surgeons and patient advocacy to advance the standards of care. Weber's scientific career is dedicated to improving the quality of life of patients with breast cancer on a global scale today and in the future.

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Selected results

Project
High resolution Magnetic Resonance Imaging: towards a non-invasive method to assist proton irradiation for uveal melanoma
Zentrum für Protonentherapie, Paul Scherrer Institut (PSI), Villigen
CHF 302 000.– | Duration: 16. 1. 2017 – 15. 1. 2020 | KFS-3860-02-2016

Project coordinator
PD Alessia Pica, MD | alessia.pica@psi.ch

Optimizing proton therapy through artificial intelligence

Researchers have developed computer software that can determine the spread of uveal melanoma in the eye. Thanks to this information, proton beam radiation can target the tumour with even more accuracy than before, ideally delivering little to no radiation to nearby healthy tissue.

Uveal melanoma is the most frequent primary malignancy of the eye in adults, with an incidence of approximately 1 case per 100 000 per year. Since the 1970s, the preferred treatment for this type of cancer is proton therapy, for in contrast to x-rays in traditional radiation, proton therapy delivers a beam of particles that precisely stops at the tumour, so it is less likely to damage sensitive brain tissue behind the eye. A research project funded by the Swiss Cancer Research foundation has now laid the foundation for further advances in the treatment.

In collaboration with experts in machine learning at the University of Bern and physicians at the University Eye Clinic of Lausanne, radiation oncologist Alessia Pica has developed a software application that can analyse magnetic resonance imaging (MRI) data automatically. From the data on 28 healthy eyes of volunteers and 24 eyes of patients with uveal melanoma, the software constructed 3-dimensional personalized eye models. In addition, it determined the spread of the tumour in the eye accurately, as shown by a comparison of these quantitative evaluations with manual delineations by experienced eye radiation oncologists: "Agreement was higher than 80 %", writes Pica in her final project report.

The researchers find these results encouraging not only because they show that software reduces the time spent on proton radiation treatment planning (the calculations are performed within 10 seconds) – but also because the results indicate that artificial intelligence can deliver important information to the multidisciplinary treatment team. To plan a proton radiation treatment, specialists in ophthalmology, medical physics, and radiation oncologists must exchange information. If they base their planning on patient-specific eye models, the proton beam radiation can target the tumour with even more accuracy than before, ideally delivering little to no radiation to nearby healthy tissue: "Our findings suggest that it is worthwhile to use the system in clinical practice", conclude Pica and her colleagues.

Reference

Nguyen HG, Sznitman R, Maeder P, Schalenbourg A, Peroni M, Hrbacek J, Weber DC, et al. Personalized Anatomic Eye Model From T1-Weighted Volume Interpolated Gradient Echo Magnetic Resonance Imaging of Patients With Uveal Melanoma. *Int J Radiat Oncol Biol Phys.* 2018;102:813-20. doi: 10.1016/j.ijrobp.2018.05.004.

Project
Self-protection of cancer cells against cellular immune attack – by a shield of sugar?
Institut für Pharmakologie, Universität Bern, Bern
CHF 375 000.– | Duration: 1. 2. 2017 – 31. 1. 2020 | KFS-3941-08-2016

Project coordinator
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Cancer cells hide behind a protective shield of sugar

A research project supported by the Swiss Cancer Research foundation has found that cancer cells coat their surface with an overgrowth of sugar molecules to hide from the body's own immune system. These findings point the way to improving cancer immunotherapy.

Sugar molecules are found on the surface of all human cells, as scientists have known for a long time. For 70 years, for instance, it has been known that tumour cells change the composition of the sugar cells on their surface when they degenerate, says Stephan von Gunten, professor of pharmacology at the University of Bern. But until only recently, researchers were not able to take a closer look. Advanced technologies are needed to examine in detail the complexity of the various sugars and their role in cell communication. Here, von Gunten and his team have made a substantial contribution.

In elaborate experiments, they have demonstrated that cytotoxic T-cells (which in healthy individuals can detect and kill tumour cells) form an additional receptor molecule called Siglec-9 when they are in the microenvironment of a tumour. Siglec-9 binds to certain sugars – and signals the immune cells that all is well. This quiets the immune response, which is actually much needed to fight the tumour: "The fact that cancer cells have an overgrowth of the protective sugar molecules on their surface is an adaptive response", says von Gunten. "Cells that equip themselves with a protective shield of sugar are not eliminated as much."

Von Gunten's team conducted the experiments using biopsies from patients with melanoma (malignant skin cancers). But the Siglec-9 signal pathway might be important not only in melanoma: An above-average number of the sugar molecules was also observed on the surface of breast, lung, colon, and renal cancer cells.

In view of its functioning, Siglec-9 is comparable to immune checkpoints; in 2018 the Nobel Prize in Physiology or Medicine was awarded for pioneering work on immune checkpoints and their inhibitors. And indeed, immunotherapy using immune checkpoint inhibitors has shown some spectacular successes. However, the treatment is successful in only a minority of patients. For the majority, new approaches are needed. This is where von Gunten sees a lot of potential for applying his findings. As the Siglec-9 circuit is confined to the tumour microenvironment, targeting those checkpoints might allow activation of the tumour-infiltrating T-cells, or precisely those immune cells that are the most important, as they are at the right place at the right time.

Reference

Haas Q, Boligan KF, Jandus C, Schneider C, Simillion C, Stanczak MA, Haubitz M, et al. Siglec-9 Regulates an Effector Memory $CD8^+$ T-cell Subset That Congregates in the Melanoma Tumor Microenvironment. *Cancer Immunol Res.* 2019;7:707-18. doi: 10.1158/2326-6066. CIR-18-0505.

List of approved research projects in 2020

More information about the funded projects can be found on www.krebsliga.ch/researchprojects

Total funds allocated: CHF 3 788 550.–

Frattini Milo | Proof-of-concept study using ctDNA for treatment adaption of patients with advanced NSCLC with PD-L1 ≥ 50 % receiving first-line pembrolizumab
Istituto cantonale di patologia, Locarno
CHF 319 700.– | Duration: 1. 1. 2021 – 31. 12. 2024 | KFS-5133-08-2020

Le Magnen Clémentine | Multidimensional imaging of patient-derived organoids: towards advancing models of urological cancers for personalized medicine
Labor für translationale urogenitale Krebsforschung, Universitätsspital Basel, Basel
CHF 241 000.– | Duration: 1. 9. 2020 – 31. 8. 2023 | KFS-4983-02-2020

Lugli Alessandro | Tumour budding in colon cancer: tumour buds profile in different tumour microenvironments of the colonic wall
Institut für Pathologie, Universität Bern, Bern
CHF 331 500.– | Duration: 1. 1. 2021 – 31. 12. 2023 | KFS-5114-08-2020

Piscuoglio Salvatore | Augmenting precision medicine for colorectal cancer patients with ex-vivo drug screening
Departement Biomedizin, Universität Basel, Basel
CHF 234 400.– | Duration: 1. 9. 2020 – 28. 2. 2023 | KFS-4988-02-2020

Reyes Mauricio | Artificial Intelligence for Automated QUality Assurance in RadioTherapy for glioblastoma target volume and organs at risk delineation in clinical trials – AQUA RT
Zentrum für Artifizielle Intelligenz in Medizin, Universität Bern, Bern
CHF 355 050.– | Duration: 1. 8. 2021 – 31. 7. 2025 | KFS-5127-08-2020

Rubin Mark A. | Towards a new taxonomy for advanced prostate cancer
Department for BioMedical Research, Universität Bern, Bern
CHF 374 750.– | Duration: 1. 7. 2020 – 30. 6. 2023 | KFS-4982-02-2020

Schäfer Beat W. | Intratumoural heterogeneity of alveolar rhabdomyosarcoma and its contribution to drug resistance and metastasis
Abteilung Onkologie, Universitäts-Kinderspital Zürich, Zürich
CHF 373 250.– | Duration: 1. 1. 2021 – 31. 12. 2023 | KLS-5143-08-2020

Schucht Philippe | RESURGE – Randomized controlled comparative phase II trial on surgery for glioblastoma recurrence
Universitätsklinik für Neurochirurgie, Inselspital, Bern
CHF 258 350.– | Duration: 1. 1. 2021 – 31. 12. 2023 | KLS-5155-08-2020

Streckmann Fiona | Preventing sensory and motor dysfunctions in children receiving neurotoxic chemotherapy – a randomized controlled, multi-centre trial
Departement für Sport, Bewegung und Gesundheit, Universität Basel, Basel
CHF 374 200.– | Duration: 1. 1. 2021 – 31. 12. 2024 | KFS-5145-08-2020

von Gunten Stephan | Tumour glycosylation as immune checkpoint for cytotoxic lymphocytes
Institut für Pharmakologie, Universität Bern, Bern
CHF 373 250.– | Duration: 1. 8. 2020 – 31. 7. 2023 | KFS-4958-02-2020

Weber Walter Paul | Impact of pre- versus sub-pectoral implant-based breast reconstruction on oncological safety
Abteilung Brustchirurgie, Brustzentrum, Universitätsspital Basel, Basel
CHF 150 150.– | Duration: 1. 6. 2020 – 31. 5. 2024 | KFS-4991-02-2020

Bühler Marco | Epigenetic subtypes and tumour heterogeneity of mantle cell lymphoma
Destination: Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), Barcelona, España
CHF 48 000.– | Duration: 1. 11. 2020 – 31. 10. 2021 | BIL KLS-5130-08-2020

Furrer Marc Alain | CAMUS (complication reporting after major urological surgeries) – a worldwide multicentric collaboration study: is the Bern comprehensive complication index applicable and valid in all major urological surgeries in order to reform complication reporting
Destination: Department of Urology, Guy's Hospital, London, GB
CHF 72 700.– | Duration: 1. 8. 2021 – 31. 7. 2022 | BIL KFS-4989-02-2020

Schmid Dominic | Mechanisms of T-cell dysfunction in human tumours
Destination: Departement Biomedizin, Universitätsspital Basel, Basel
CHF 188 250.– | Duration: 1. 9. 2020 – 31. 8. 2023 | MD-PhD-5090-06-2020

Wilhelm Alexander | Molecular analysis of endocrine carcinoma in order to augment risk-stratification and cancer treatment for a more personalized approach
Destination: Department of Surgery, University of California, San Francisco, USA
CHF 94 000.– | Duration: 1. 7. 2021 – 31. 12. 2022 | BIL KLS-5112-08-2020

Learning about other professions is essential to optimize awareness and utilization of palliative care: Insights from a qualitative study in Ticino

Background

Palliative care (PC) is defined as "an approach that improves the quality of life of patients and their families facing problems associated with life-threatening illness"[1]. It works based on a comprehensive and person-centred approach to care that aims at helping patients live as actively as possible. When administered together with therapies that aim at prolonging life, PC manages therapy side effects that can negatively affect the quality of life of patients and of their family caregivers[2].

As the world's population is aging and the number of people living with one or more chronic conditions, including cancer, is growing, the World Health Organization (WHO) proclaimed in 2004 that PC is a major public health issue,[3] and access to PC is acknowledged as a human right by United Nations conventions[4]. Despite its potential and value, however, there is evidence that specialized PC – i. e. care provided by trained professionals[5] – is currently underutilized by the relevant population and that PC services are not adequately exploited[6,7]. Reasons for this underutilization are manifold and have found to be related to personal, interpersonal, and system-level factors[8].

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Nicola Diviani, PhD
Senior researcher at Swiss Paraplegic Research in Nottwil and lecturer at the University of Lucerne

In Canton Ticino, a major effort has already been made to facilitate the implementation of the Swiss national strategy on PC. Specifically, a working group under the coordination of the cantonal doctor's office designed a strategy focused on describing the role of health professionals active in PC, adapting national standards to the local context, and identifying services not yet available at the local level[9]. As a result, the offer of specialized PC in Ticino has been greatly expanded over the years, and the population can now rely on a strong network of public and private services providing high quality PC[10]. However, as in the rest of Switzerland, the utilization of PC services in Ticino remains suboptimal[11].

The focus of this study

Here we present the findings of an interview-based qualitative study conducted between 2018 and 2019 in Ticino with a sample of 50 health care professionals working in and outside PC settings. Our study, which is part of a main project funded by the Swiss Cancer Research foundation, aimed to explore the experiences of health professionals and identify barriers and facilitators to the use of PC in Ticino.

Main findings

As we describe in the following, all participants agreed on the value of spreading awareness of what PC is and the value of interprofessional collaboration as a main resource to enhance the use and impact of PC. We can summarize the findings of our study in three main streams:

Awareness of what PC is among health professionals

Not all health professionals are aware of what PC is, what PC health professionals do, and when PC is needed and important as a health strategy. In particular, reasons for this lack of awareness are the following:

- The lack of formal training in PC targeted at other health professionals, especially doctors
- The existence of different perceptions among health professionals regarding what is more or less valuable in patient care

Collaboration among PC experts and other health professionals

Collaboration among health professionals is beneficial for many reasons. Specifically, it improves patient care and outcomes, and it reduces medical errors and health care costs. Also, it benefits health providers by promoting respect for roles and work and increases job satisfaction[12]. As in other health care settings, however, in PC there are main obstacles to the success of collaboration, especially multidisciplinary collaboration:

- The lack of knowledge and appreciation of the role of other health professionals: It is not always easy to appreciate others' work.
- The difficulties in engaging in joint research projects: When working in specific clusters of practice and research, it is difficult to develop an interdisciplinary perspective.
- The often hierarchical administrative and education structures that can discourage interprofessional collaboration.

- The perceived different roles and positions within the various teams and the fact of not feeling responsible for promoting interprofessional collaboration.
- The traditions and professional cultures of the various health professionals: The fact of belonging to a particular professional culture can create barriers to adopting different practices.
- The lack of time to think "outside the boxes" of daily duties.
- The lack of frameworks and models for interdisciplinary collaboration: Although there are many frameworks in the literature, knowledge translation from these frameworks to actual practice within specific health care contexts is rarely implemented.

Ways forwards

The interviews also highlighted main ways to promote awareness of PC and strengthen interprofessional collaboration. In particular, the health care professionals stated that:

- Learning about other professions is a way to enrich and improve self-reflection upon their own professions.
- Learning about other professions is a main instrument to develop trust between members.
- Developing attitudes that are positive towards sharing responsibility for patient care enriches the outcomes of health interventions.
- It is important to agree on scopes and goals of health care, with clear identification of the specific role of each health professional.
- Identifying different skills and knowledge of the different health professionals is an important way to understand how they can be complementary among themselves.
- Last but not least, the health care professionals want to increase their willingness to work together and to overcome barriers in interprofessional practice.

Conclusions and implications for policy and practice

This study highlights the need to consider systemic determinants so as to facilitate collaboration between health professionals in cancer PC settings and achieve optimum utilization of specialized PC services. Our findings suggest that strategies to improve fruitful collaboration between the providers of these services can benefit by focusing on educational and training activities. These include formal education (e. g. technical and professional training), informal education (e. g. learning from peers/colleagues or mass media), and non-formal education (learning from the environment or from experience), as these methods can highly influence not only skills but also attitudes regarding PC utilization. Additional interventions should encourage a cultural shift towards collaboration (e. g. through overcoming perceptual and organizational silos), in addition to increasing negotiation skills. Finally, interventions involving self-reflection upon providers' own clinical practice and attitudes toward life, illness and death, are sorely needed to improve engagement and collaboration between health care providers.

Acknowledgements

The authors would like to thank the project's co-applicants Claudia Gamondi, Georg Stüssi, Piercarlo Saletti, and Ivan Cinesi for their support in the conceptualization of the study and in data collection, as well as Marco Bennardi, who conducted and analysed the interviews as part of his PhD project. Overall, we thank the Swiss Cancer Research foundation for funding this project, which gave us a marvellous opportunity to understand how to strengthen PC as a health care strategy. A special thanks also to palliative ti for funding a specific part of the project and for the overall collaboration.

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Selected results

Project
Body psychotherapy to improve bodily disturbances following primary cancer treatment
Klinik für Psychosomatik, Universitätsspital Basel, Basel
CHF 188 500.– | Duration: 1. 3. 2018 – 28. 2. 2020 | KLS-4304-08-2017

Project coordinator
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Improving bodily well-being with psychotherapy in cancer patients

Cancer and cancer treatment often lead to strong disturbances in bodily well-being. Body psychotherapy helps patients with cancer to process their cancer experiences, as a study supported by the Swiss Cancer League has found.

Even when cancer has been treated successfully, the insecurity that goes along with strong disturbances in bodily well-being often persists: "Cancer can leave its mark on body and soul", write Astrid Grossert, Gunther Meinlschmidt, and Rainer Schäfert in their final report on their research project. In a clinical trial, the researchers examined whether a body psychotherapy group using body-oriented techniques to improve awareness and perception can help participants to regain trust in their own bodies. "Body psychotherapy has been shown to produce good results, for instance in persons with chronic depression", as Schäfert explains. "However, up to now there has been a lack of evidence for its effectiveness for patients with cancer."

Grossert, Meinlschmidt, and Schäfert had originally planned to include 88 participants in the study, but due to the rather short study duration they had to make do with 40 participants: "Recruitment was more difficult than planned for. We think that this also had something to do with the fact that many persons had to overcome resistance to joining a group", says Schäfert. The researchers were not surprised that the majority of those volunteering were women: "To be willing to try body psychotherapy, you need to have openness, which women tend to have more, although we men are slowly changing our self-understanding", says Schäfert.

The group body psychotherapy consisted of six sessions of approximately 90 minutes each over a time period of about 2 months, in which the participants learned a number of body psychotherapy techniques. They participated in various breathing, awareness, and movement exercises aimed at connecting up bodily sensations and experiences, thoughts, and feelings. Initial, still provisional, evaluations show that after the body psychotherapy intervention, the participants had a greater appreciation of their body awareness than prior to the group sessions: "We are very pleased with this", says Schäfert, "as an effect that is measurable also in a small sample is particularly strong and relevant." For the researchers, a greater appreciation of body awareness marks the beginning of a development leading to a more positive bodily experience: When people affected by cancer address the visible and invisible traces of their illness, they can process their experiences and build new trust in their body.

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List of approved research projects in 2020

More information about the funded projects can be found on www.krebsliga.ch/researchprojects

Total funds allocated: CHF 751 600.–

Bernard Mathieu | Posttraumatic growth in oncology palliative care: an exploratory study of patients' experiences through life narratives
Service de soins palliatifs, Centre hospitalier universitaire vaudois (CHUV), Lausanne
CHF 185 950.– | Duration: 1. 3. 2021 – 28. 2. 2023 | KLS-5098-08-2020

Kobleder Andrea | Trust, interprofessional collaboration and the role of the APN in the treatment pathway of women with gynaecological cancer – a mixed methods study (TANGO-Study)
Institut für Angewandte Pflegewissenschaft, Ostschweizer Fachhochschule, St. Gallen
CHF 210 550.– | Duration: 1. 3. 2021 – 30. 6. 2023 | KFS-5113-08-2020

Michel Gisela | Needs, desires and psychosocial outcomes in bereaved parents who lost their child to cancer: palliative and end-of-life care in paediatric oncology
Departement Gesundheitswissenschaften und Medizin, Universität Luzern, Luzern
CHF 355 100.– | Duration: 1. 8. 2020 – 31. 7. 2023 | KFS-4995-02-2020

Personalized recommendations for colorectal cancer screening: a step in the right direction?

Imagine two neighbours in Canton Vaud, Mr Muller and Ms Rochat. Mr Muller is 68 years old, slightly overweight, and smokes. Ms Rochat is 50 years old, does not smoke, and has normal weight. They both get the same invitation in the mail from the Vaud colorectal cancer screening programme, despite the fact that Mr Muller's risk of cancer in the next 15 years is 7%, compared to 0.9% for Ms Rochat, or nearly 8-fold higher. If Mr Muller chooses to have a colonoscopy, we expect his reduction in risk of developing cancer and dying of cancer to be far greater, as his risk of colorectal cancer should decrease from 7% to 2%, and his risk of dying from 4% to 1%. The benefits for Ms Rochat, in absolute terms, will be far less. The risks and burdens of colonoscopy are similar for both of them, however.

The benefits of colorectal cancer screening thus vary greatly in the 'average risk' population invited for screening. But what if an organized screening programme provided tailored recommendations for the two neighbours? This would allow Mr Muller to get a higher-performing, more invasive test and point Ms Rochat towards a simpler test, or even suggest that she delay screening for 5 to 10 years until her risk is higher. The goal of our project, the PREcision ScreENing randomized controlled Trial (PRESENT), is to determine the effect of such an approach.

Colorectal cancer screening – a success story

Colorectal cancer is the third most common cancer for men and women, but it is ideally suited for screening. Screening is the detection of pre-cancerous lesions and early cancers before they cause symptoms but at a stage when they can be cured. Most colorec-

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tal cancers go through predictable stages over 10 to 15 years, from early adenomas to advanced adenomas (collectively termed polyps), and then to localized cancers, before becoming difficult-to-treat advanced cancers. Beginning at the stage of advanced adenoma and increasingly as early-stage cancers, most lesions bleed tiny amounts of blood that can be detected with stool tests. Polyps can be removed during a colonoscopy, and early cancers can be cured with surgery and much lighter chemotherapy regimens than advanced cancers can.

Since 2013, two screening tests for colorectal cancer have been reimbursed by the basic health insurance in Switzerland (Table). The first, the faecal immunochemical test (FIT), detects the tiny amounts of blood in stool from advanced adenomas and cancers. The test comes in a small, plastic container with a swab. Every two years, you collect a small amount of stool in the secure container and send it by mail to a central laboratory. The whole process takes about 15 minutes, at home. If there are traces of blood (which is the case for only 3 % to 7 % of people), a colonoscopy is needed to see if an advanced adenoma or cancer was the cause of the bleeding.

Alternatively, you can choose to have a colonoscopy directly, nearly guaranteeing that all polyps will be seen and removed by a gastroenterologist; this is an invasive test needing to be done only every 10 years.

Table
Characteristics of the faecal immunochemical test (FIT) and colonoscopy for colorectal cancer screening

Characteristic	Faecal immunochemical test (FIT)	Colonoscopy
How the test works	Detects tiny amounts of blood in stool that could be from advanced polyps or early cancer	Direct visualization of polyps and early cancers by a gastroenterologist using a flexible tube with a camera on its tip
Screening interval	Every two years	Every ten years
Cost	CHF 46, or CHF 4.60 within a screening programme	CHF 800 to 1600, depending on the number of polyps, or CHF 80 to 160 within a screening programme
Advantages	– Done easily and quickly at home – Fewer colonoscopies – Equally good at preventing cancer deaths	– Better at removing polyps before they become cancer
Drawbacks	– Must be repeated every two years	– Risk of severe complications (about 2 per 1000 colonoscopies) – A bowel-clearing substance must be taken prior, to clean out the intestines (‘prep’)

However, in anticipation of a colonoscopy you must take large amounts of a bowel-clearing substance to clean (or 'prep') your colon for the procedure. During the procedure, sedatives are used for your comfort, meaning you must take a day off work. Approximately 2 people per 1000 will have a complication after a colonoscopy that is serious enough to require hospitalization, typically bleeding or a perforation. Finally, colonoscopy is much more expensive than the FIT, and many areas of Switzerland do not have enough gastroenterologists for all eligible people to have a colonoscopy directly.

Apart from high-risk individuals, FIT and colonoscopy have an almost identical impact on your likelihood of dying of colorectal cancer. Colonoscopy does have a greater impact on your chances of developing cancer in the first place. The best way to maximize the benefits of these tests is to implement organized screening programmes, as they provide information to the entire population, remove financial barriers, and improve quality.

The promise of personalized screening

Although research has shown that these screening tests can reduce the burden of colorectal cancer in the overall population, their benefit is limited for many individuals, as can be seen with Ms Rochat. Decades of research into colorectal cancer risk factors have allowed us to identify the high-risk individuals, like Mr Muller, who will benefit most. This approach is demonstrated by the QCancer 15-year calculator* developed in the United Kingdom.

The QCancer questionnaire asks simple questions about your age, sex, weight, etc.; certain behaviours (smoking and alcohol consumption); your family history of gastrointestinal cancers; and your personal history of other cancers. These factors are combined to provide your risk score of colorectal cancer within the next 15 years, which screening programme organizers could use to personalize screening recommendations. The addition of currently available genetic tests brings further precision but not as much as one might expect given their cost.

After calculating the risk score, a person at high risk would receive a strong recommendation for colonoscopy and help from the screening programme with organizing the procedure. A low-risk individual would be informed of their low risk, given a weaker recommendation for a FIT, and encouraged to re-evaluate their level of risk every two to five years, as risk increases considerably with age. A person at moderate risk would receive a strong recommendation for screening, with the modality they prefer.

There are two important benefits to personalized recommendations for colorectal cancer screening. First, resources can be focused on high-risk individuals, ensuring they get the test, which although burdensome, provides maximum benefit. This point is also important at the health-system level, as we do not have enough gastroenterologists to directly offer all eligible adults a screening colonoscopy. Second, with the current approach, low-risk individuals are unknowingly exposed to the risks and burdens of screening, even though they are unlikely to benefit. In our example, Ms Rochat may choose to get a screening colonoscopy, believing she will have a significant benefit, but she might instead suffer a complication like a

* https://qcancer.org/15yr/colorectal/

colon perforation. Time and resources spent getting that colonoscopy may take away time and resources from other patients or from other prevention activities, such as counselling for physical activity.

Potential pitfalls of personalized screening

If we have validated risk calculators, why are we not already doing personalized screening? Because there are numerous uncertainties about the practical implementation of this approach. First, collecting the information necessary to calculate the risk score adds complexity. The Vaud screening programme, for example, currently only knows participants' sex, age, and address when inviting them for screening. Many people already struggle with having colorectal cancer screening because of logistical barriers or the human tendency to delay activities we do not enjoy.

Second, our risk calculators are not perfect, which is particularly concerning if people who are inadvertently told they are at lower risk choose to forego screening but in fact have important risk factors not captured by the calculator. Finally, those working in prevention have long been aware of the prevention paradox: Although we can identify high-risk individuals, a large proportion of cancers occur in low-risk individuals, because they make up the majority of the population. A screening program that discourages low-risk individuals will likely have less public-health impact than screening the entire population. The question is: How much impact is lost?

How to know the actual effect of personalized screening

Given these uncertainties, it is critical that we test personalized screening before implementing it on a large scale, ideally in a randomized trial. We have received funding from the Swiss Cancer Research foundation to do such a pilot trial, dubbed the PREcision ScreENing randomized controlled Trial (PRESENT), in collaboration with the Vaud colorectal cancer screening programme.

Our approach will be to ask, by mail, residents of Vaud who are potentially eligible for screening if they are willing to be assigned, by chance, to receive either personalized information about colorectal cancer screening tests or the generic information given currently. Everyone willing to participate will provide information to calculate their risk score, adapted from the QCancer score to the Swiss situation. We will then compare the proportion of people who have had a FIT, colonoscopy, or no screening 6 months later. This approach allows us to isolate the impact of personalized information on the decision-making of potential screening participants.

This work will be complemented by a modelling study extrapolating the impact of changes in screening use to the likely number of cancers diagnosed and lives saved. Eventually, we hope to study the impact of these clinical outcomes, but a study of that kind requires thousands of participants and many years of follow-up, therefore costing millions of francs. It is not justified unless our current work provides promising results.

Conclusion

In the future, it may be that neighbours like Mr Muller and Ms Rochat receive different invitations for colorectal screening. Invitations that reflect their own, personal balance of risk and benefits. Greater resources could be devoted to ensuring that high-risk individuals have more intensive screening. However, this approach may diminish the overall public health impact of colorectal cancer screening and must be rigorously tested in a randomized trial. The PREcision ScreENing randomized controlled Trial (PRESENT), funded by the Swiss Cancer Research foundation, is a first step towards testing this approach in the context of an organized screening programme in Switzerland.

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His main research areas lie in cancer epidemiology, particularly in planning and evaluating cancer prevention initiatives. Bulliard has been conducting research for over 30 years and teaches at biology and medical schools at University of Lausanne and University of Geneva.

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Selected results

Project
Effect of Direct Acting Antiviral Drugs on the Occurrence and Recurrence of Intra- and Extra-hepatic Cancer in Patients with Chronic Hepatitis C
Universitätsklinik für Viszerale Chirurgie und Medizin, Inselspital, Bern
CHF 198 000.– | Duration: 1. 6. 2017 – 31. 5. 2021 | KFS-4131-02-2017

Project coordinator
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Do treatments for hepatitis C increase the risk of liver cancer?

Treatment of hepatitis C has seen great improvement in recent years, but the new, highly efficacious drugs have been suspected of increasing the risk of liver cancer. Now, however, initial findings – although still preliminary – sound the all-clear.

In Switzerland there are an estimated 40 000 cases of hepatitis C virus (HCV) infection. However, many people do not know that they have an HCV infection, because they don't suffer from specific symptoms. Acute HCV infection clears up without treatment in only approximately 20 % of cases; most people will develop chronic infection, which can result in scarring of the liver (cirrhosis) and an increased risk of developing primary liver cancer.

Until a few years ago, HCV infections were treated with interferon in combination with ribavirin, a treatment with often severe side effects, physical as well as mental. But in the last decade, new drugs were approved: the highly effective direct-acting antivirals (DAAs), which have fewer side effects. DAAs inhibit the replication of the virus in the liver cells and cure the infection in more than 95 % of cases within 8 to 12 weeks, even those with advanced damage to the liver.

But along with the welcome given to this progress in treatment, there was great concern when some reports were published suggesting that treatment with DAAs could increase the risk of hepatocellular carcinoma. In a research project funded by the Swiss Cancer Research foundation, Annalisa Berzigotti and her team at Inselspital Bern have been investigating since 2017 whether there are grounds for this concern. The researchers are using data from the Swiss Hepatitis C Cohort Study, which contains medical history information on 5692 patients who have been treated since 2000 in Basel, Bern, Geneva, Lausanne, Lugano, Neuchâtel, St. Gallen, and Zurich (or are currently still in treatment).

The final results are not yet available. "The project has been delayed somewhat, also due to the research stop during the COVID-19 pandemic", says Berzigotti. But so far, she and her team have evaluated the data on 674 patients that were treated in Bern with either interferon or DAAs. "At present, the limited size of the sample does not allow any robust conclusions to be drawn", stresses Berzigotti. Nevertheless, preliminary results give an all-clear signal: "So far, we have not found any indication of increased risk of cancer."

List of approved research projects in 2020

More information about the funded projects can be found on www.krebsliga.ch/researchprojects

Total funds allocated: CHF 1 628 552.–

Bucher Heiner C. | Measures of longitudinal immune dysfunction and risk of AIDS and non-AIDS defining malignancies in HIV-infected antiretroviral treated positive individuals
Institut für klinische Epidemiologie und Biostatistik, Universitätsspital Basel, Basel
CHF 105 900.– | Duration: 1. 7. 2020 – 30. 6. 2021 | KFS-4981-02-2020

Misselwitz Benjamin | Microsimulation for optimization of personalized colorectal cancer screening strategies considering patient history and genetics
Universitätsklinik für Viszerale Chirurgie und Medizin, Inselspital, Bern
CHF 366 900.– | Duration: 1. 3. 2021 – 28. 2. 2024 | KFS-5164-08-2020

Rohrmann Sabine | Can living well save my life? Cancer-protective lifestyle prevalence – and its association with mortality – across Swiss language regions
Institut für Epidemiologie, Biostatistik und Prävention, Universität Zürich, Zürich
CHF 178 950.– | Duration: 1. 3. 2021 – 28. 2. 2024 | KLS-5096-08-2020

Selby Kevin | Colorectal cancer screening decisions based on predicted risk: the PREcision ScreENing randomized controlled Trial (PRESENT)
Département des Policliniques, Unisanté – Centre universitaire de médecine générale et santé publique, Lausanne
CHF 312 500.– | Duration: 1. 4. 2021 – 30. 9. 2023 | KLS-5111-08-2020

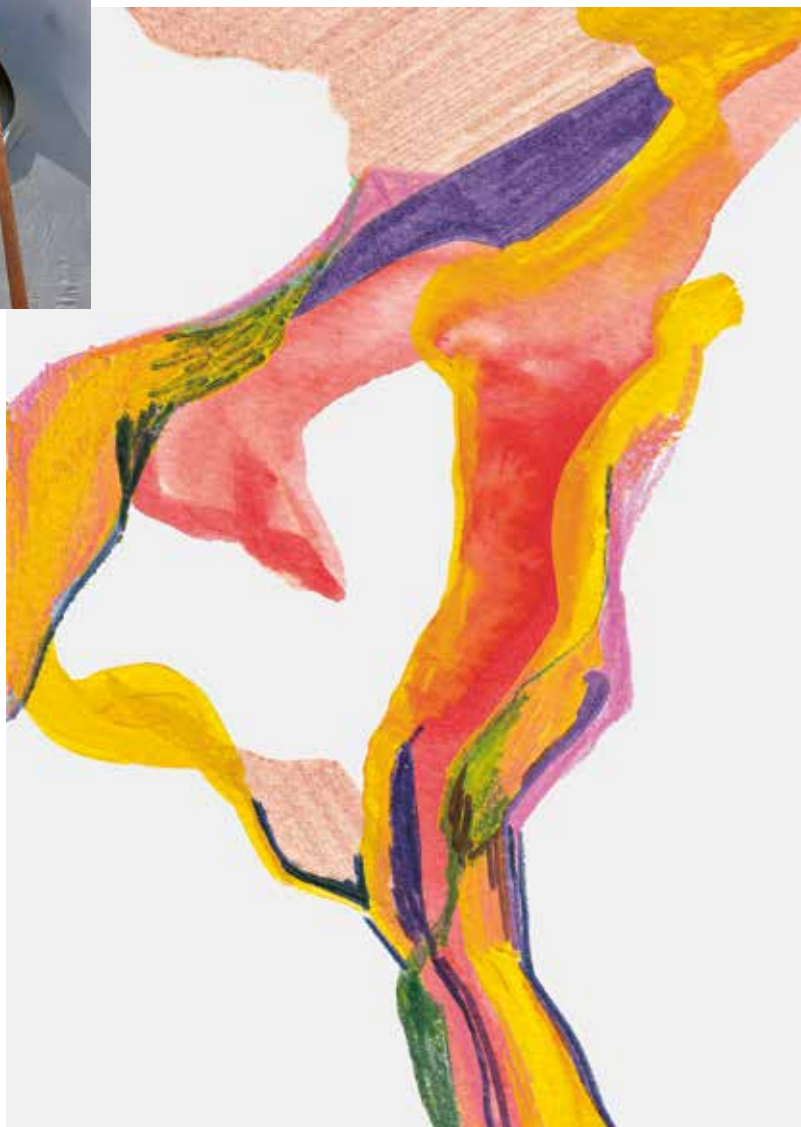
Vokinger Kerstin Noëlle | A comparative analysis of launch prices and price developments of cancer drugs in Switzerland, Germany, England, and the US
Rechtswissenschaftliches Institut, Universität Zürich, Zürich
CHF 63 800.– | Duration: 1. 7. 2020 – 30. 4. 2021 | KFS-5031-02-2020

von der Weid Nicolas | Prospective multicentre cohort study for diagnosing cardiac dysfunction in Swiss childhood cancer survivors
Pädiatrische Onkologie / Hämatologie, Universitäts-Kinderspital beider Basel, Basel
CHF 336 950.– | Duration: 1. 1. 2021 – 31. 12. 2023 | KFS-5027-02-2020

Approved bursaries in 2020

Di Salvo Ivana | Improving cervical cancer screening in women living with HIV attending chronic disease clinics in semi-rural Tanzania
Destination: Ifakara Health Institute and St. Francis Hospital, Ifakara, Tanzania
CHF 73 650.– | Duration: 1. 7. 2020 – 28. 2. 2022 | BIL KFS-4986-02-2020

Zens Philipp Immanuel | Molecular epidemiology of lung cancer brain metastases
Destination: Institut für Pathologie, Universität Bern, Bern
CHF 189 902.– | Duration: 1. 9. 2020 – 31. 8. 2023 | MD-PhD-5088-06-2020



For the first time in Switzerland, a large-scale study gives patients a voice in cancer care

In the Swiss Cancer Patient Experiences (SCAPE) study, around 3000 patients treated for cancer at four hospitals in the French-speaking region of Switzerland completed a questionnaire on their experiences with cancer care. Although participants expressed being satisfied with their care overall, we identified several areas of care where patients reported less positive experiences: information provision at diagnosis, information and support on side effects of treatments, involvement of family members, psychosocial support including financial aspects, and support during the post-treatment phase. The participating hospitals have already taken measures to improve some of the aforementioned aspects.

The importance of integrating patients' perspectives into clinical practice and research as well as into the evaluation of the core dimensions of the quality of the healthcare system is now widely recognized[1,2]. Patients' perspectives are especially important when evaluating whether care is person-centred, meaning delivered in a way that responds to the person's physical, emotional, social, and cultural needs, where interactions with health professionals are compassionate and empowering, and where the person's values and preferences are taken into account[3]. Patients' reports are also key to driving quality improvement initiatives at local, regional, or national levels.

To conduct such evaluations, data need to be collected directly from the patients. Among the different available methods, patient surveys are used most commonly, producing what we call patient-reported

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experiences of care measures (PREMs)[4]. They focus on what effectively happened to patients during their interactions with the health care system, i. e. their experiences of care. PREMs are to be distinguished from patient-reported outcome measures (PROMs), which measure patients' perceptions of their health, symptoms, and quality of life, for instance. The dimensions of PREMs assessed typically evolve around eight dimensions of patient-centred care[5]: respect for patients' values, preferences and expressed needs; coordination and integration of care; information, communication, and education; physical comfort; emotional support, relieving fear and anxiety; involvement of family and friends; continuity and transition; and access to care.

In cancer care, examples of routinely collected cancer PREMs include those collected with the UK National Cancer Patient Experience Survey (CPES)[6] and the US Consumer Assessment of Healthcare Providers and Systems (CAHPS) Cancer Care Survey[7]. In Switzerland, similar initiatives did not exist prior to the SCAPE study. In fact, whereas the Swiss National Association for Quality Development in Hospitals and Clinics (ANQ) collects PREMs in facilities providing inpatient care using a short generic questionnaire, there has been no large-scale or systematic collection of PREMs for patients with cancer specifically, although this is key to evaluating and improving the quality of cancer care[8].

In 2018 we conducted the first multicentre study of patient-reported experiences with cancer care, the SCAPE study (www.scape-enquete.ch), supported by the Swiss Cancer Research foundation. In the study, we surveyed adult patients having received stationary or ambulatory care between January and June 2018 for breast, prostate, lung, colorectal, haematological cancers (leukaemia, lymphoma or myeloma), or melanoma at four hospitals in the French-speaking part of Switzerland. Data were collected with a self-administered questionnaire on patients' experiences across the care pathway, spanning from the first cancer diagnosis to follow-up care in the community, and on clinical and sociodemographic characteristics.

Of the 7145 individuals invited to participate in the survey, 3121 (44 %) completed the questionnaire, and the responses of 2755 patients reporting having at least one of the eligible cancer diagnoses were included in the analyses. Respondents' mean age was 63.9 years; 61 % of the respondents were women; 81 % reported a first cancer, the most common cancers being breast cancer (40 %) followed by haematologic cancers (16 %), lung cancer (15 %), colorectal cancer (11 %), prostate cancer (9 %), and skin cancer (5 %); 5 % reported more than one eligible cancer.

The ratings for overall care were good (mean of 8.5 on a scale from 0–10), but the percentage of patients reporting positive experiences of care ranged from 36 % when it concerned the receipt of a care plan to 96 % when it was about getting understandable answers to important questions from clinical nurse specialists. Moreover, a vast majority of patients reported positive experiences with diagnostic tests, contacts with the clinical nurse specialist, surgery, and hospital care as an inpatient and outpatient. Less

positive experiences were reported for information at diagnosis, information and support on side effects of treatments, involvement of family members, psychosocial support including financial aspects, and support during the post-treatment phase, i. e. during survivorship. For instance, 50 % of the respondents felt they had not been sufficiently informed about long-term side effects; 42 % felt that doctors or nurses did not give their family enough information to help care for them at home; and 40 % of respondents who needed help from health or social services stated that they did not receive enough support.

We also analysed the free-text comments that a third of respondents wrote at the end of the survey and published the results in the journal BMC Health Services Research[9]. Identification of the underlying themes in these comments revealed a sharp contrast between comments on the factual descriptions of medical history and care pathways, and comments on the more personal and emotional aspects of living with cancer, classified under the following themes: 'initial shock', 'understanding and acceptance', 'cancer repercussions', 'loneliness', and 'information and communication'. Another theme in the comments was dedicated to expressing 'gratitude and praise' to health care professionals. These insights on the personal experience of living with cancer provided complementary information to the survey questions, thus underlining the importance of offering an opportunity for comments at the end of surveys.

In collaboration with the expert patient member of the study steering committee, we also prepared a patient brochure that illustrated the survey results by means of patient quotes and that presented quality improvement measures undertaken in each hospital (see below for links).

Based on this first study, we are currently preparing the SCAPE-2 study, which will include patients from hospitals in the German-speaking part of Switzerland in addition to the four hospitals from the original SCAPE study, with a German version of the questionnaire and a special COVID-19 section.

Patient brochure of HUG in Geneva:
www.hug.ch/sites/interhug/files/departements/scape_livret_resultats_hug.pdf
Patient brochure of HFR in Fribourg:
www.h-fr.ch/sites/default/files/2020-10/Scape_livret_resultats.pdf
CHUV press release (French):
www.unisante.ch/sites/default/files/upload/pdf-2020-10/Communique_Unisante_Etude_Scape_WEB.pdf
HFR press release (German):
www.h-fr.ch/de/news-agenda/blog/kliniken/best-noten-fuer-die-onkologische-abteilung-des-hfr

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Selected results

Project
How does the number of abdominal cancer surgeries done in one hospital correlate with patient outcome in the year following surgery? An analysis of Swiss health insurance data
Abteilung Gesundheitswissenschaften, Helsana, Zürich
CHF 69 000.– | Duration: 1. 11. 2019 – 31. 10. 2020 | HSR-4665-11-2018

Project coordinator
Prof. Eva Blozik, MD | eva.blozik@helsana.ch

Smaller hospitals can also deliver excellent results

With difficult operations – such as removal of tumours from the abdomen – the hospital's surgical experience has an impact on treatment outcomes, as numerous studies worldwide have demonstrated. Basically, this holds also for hospitals in Switzerland, but in this country even smaller hospitals with lower surgery volumes achieve very good results, as a new study reveals.

Actually, it is like playing the piano: Practice makes perfect. But evidence that this intuitive concept also holds for difficult surgeries was found for the first time only after the turn of this century by researchers in the United States, as published in an article in the prestigious New England Journal of Medicine in 2002. The researchers found that a higher volume of surgeries at a hospital is associated with lower risk for individual patients of dying during or after a difficult procedure. For instance, removal of tumours from the pancreas at hospitals performing a low number of the operations results in a death rate of 16 %, whereas the death rate for these operations is just under 4 % at higher-volume hospitals.

"Hospitals with a high volume can provide the expertise of multidisciplinary teams and through this, contribute to better treatment", writes Eva Blozik in the final report on her research project, which was supported by the Swiss Cancer Research foundation as part of the programme for strengthening health services research. Based on these and similar findings, Switzerland introduced minimum volume standards for certain complex, highly specialized surgical procedures, thus legally prescribing that these procedures may be performed only at hospitals with experienced teams.

However, "to a large extent, the association between the number of operations and treatment quality in Switzerland has not been investigated", as Blozik explains. "But this information is very important for patients choosing a hospital." Blozik and her team combed through the health insurance company data on 2384 patients that had to have surgery to remove tumours in the colon, pancreas, or stomach. "We found no clear association", Blozik reports.

Findings suggest, for one, that outcomes are better with higher volumes at hospitals and that survival in patients increases when their surgeries are performed at larger rather than at medium-size hospitals. But for another, also smaller hospitals have shown very good treatment outcomes. Blozik and her team therefore suggest that in future, hospitals should be categorized not only according to number of procedures performed but increasingly also according to the actual outcomes.

List of approved research projects in 2020/2021

More information about the funded projects can be found on www.krebsliga.ch/researchprojects

Total funds allocated: CHF 973 650.–

Clack Lauren | Improving organised colorectal cancer screening programmes in Switzerland: an implementation science study
Institut für Implementation Science in Health Care, Universität Zürich, Zürich
CHF 160 950.– | Duration: 1. 9. 2021 – 31. 8. 2023 | HSR-5224-11-2020

Le Pogam Marie-Annick | TOCCATA – ImpacT of the COVID-19 Crisis on the quality of Cancer cAre in SwiTzerlAnd: a controlled time-series analysis using insurance and hospital claims data
Département Epidémiologie et Services de Santé, Unisanté – Centre universitaire de médecine générale et santé publique, Lausanne
CHF 130 900.– | Duration: 1. 7. 2021 – 30. 6. 2023 | HSR-5225-11-2020

Ming Chang | Machine learning techniques for personalized breast cancer prognosis – Swiss BCpro
Departement Klinische Forschung, Universitätsspital Basel, Basel
CHF 69 150.– | Duration: 1. 6. 2021 – 28. 2. 2022 | HSR-5222-11-2020

Puhan Milo | Preoperative smoking cessation program in cancer patients undergoing surgery: a randomized controlled trial
Institut für Epidemiologie, Biostatistik und Prävention, Universität Zürich, Zürich
CHF 249 300.– | Duration: 3. 5. 2021 – 2. 5. 2025 | HSR-5217-11-2020

Rebmann Chigrinova Ekaterina | Analysis of late survival effects, toxicity and outcome of the allogeneic hematopoietic stem cell transplantation for Non-Hodgkin lymphoma in Switzerland. Comparison with autologous stem cell transplantation
Universitätsklinik für Hämatologie und Hämatologisches Zentrallabor, Inselspital, Bern
CHF 118 050.– | Duration: 1. 1. 2021 – 30. 6. 2022 | HSR-5223-11-2020

Scheinemann Katrin | LENTIL – quaLity critEria iN paediaTrIc oncoLogy
Pädiatrische Onkologie / Hämatologie, Kantonsspital Aarau AG, Aarau
CHF 245 300.– | Duration: 1. 1. 2022 – 31. 12. 2024 | HSR-5219-11-2020

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