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DERMATOLOGICA HELVETICA

22
Dermato-Pathology
Typical and representative histological pictures

Société Suisse de Dermatologie et Vénéréologie
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SKINTEGRITY.CH – Interdisciplinarity moves

Vivianne Fuchs-Molitor. *SKINTEGRITY.CH is an interdisciplinary Swiss research network. The goals: To understand wound healing and skin diseases mechanistically, to develop new approaches to diagnose and treat wound healing disorders, inflammatory skin diseases and skin cancer, and to provide interdisciplinary training for the next generation of basic researchers, engineers, and clinicians.*

SKINTEGRITY.CH brings together major experts in basic and clinical research, (bio)engineering and bioinformatics from different institutions. Skin injury and repair, skin cancer and inflammatory skin diseases form SKINTEGRITY.CH's three main research topics (Figure 1).
Co-initiator of SKINTEGRITY.CH is Sabine Werner. «Thanks to SKINTEGRITY.CH, projects could be realised that I have only dreamed of so far,» Sabine Werner describes her greatest motivation and adds directly: «And we have the chance to train young scientists with versatile skills.»

The Flagship Project

Flagship projects of «Hochschulmedizin Zurich» combine the strengths of several research institutions in a future-oriented cooperation with correspondingly great potential for innovation, and for the development of the numerous young researchers at ETH Zurich, the University of Zurich, and the University Hospitals of Zurich. The flagship project SKINTEGRITY.CH was extended to additional research institutions in Switzerland and abroad after successful evaluation (Figure 2).
Sabine Werner is a professor at the Institute of Molecular Health Sciences at ETH Zurich and, among other things, heads - together with Prof. Lukas Sommer from the University of Zurich - the flagship project SKINTEGRITY.CH, which involves over 40 research groups from several universities and research institutions in Switzerland as well as some foreign institutions (Figure 2). The idea to specifically promote interdisciplinarity in dermatology was born in 2015 at a lunch shared by Sabine Werner and Edoardo Mazza, professor at the Institute of Mechanical Systems. «Almost everyone working on skin in Zurich was brought together in the initial SKINTEGRITY project, with the aim

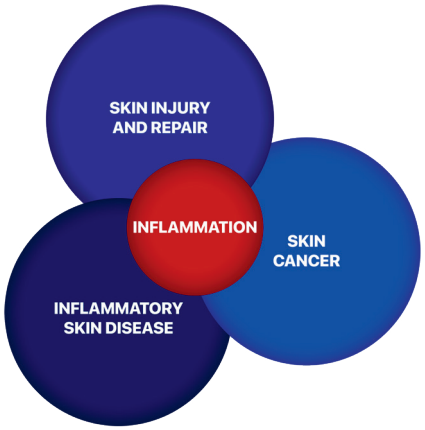


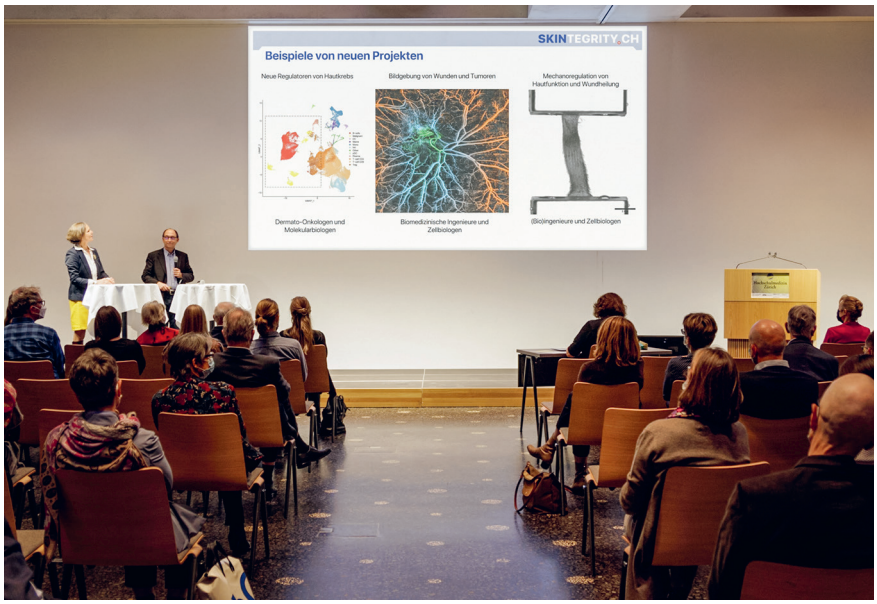
Figure 1: Chronic non-healing skin ulcers, excessively scarring wounds, inflammatory skin diseases, and skin cancer are very common pathologies associated with excessive/chronic inflammation. Unfortunately, the therapeutic options are still limited, and morbidity/mortality remains high. Remarkably, crucial pathogenic mechanisms of these three groups of skin diseases overlap, making their combined analysis highly promising (www.skintegrity.ch).

Figure 2: SKINTEGRITY-CH Partners (www.skintegrity.ch)

The annual meeting of the consortium, here in Spiez in June 2022. *Photo: Maarten Schledorn*

of better understanding, better diagnosing and better treating wound healing disorders and skin diseases,» says Werner. «Zurich has a great know-how on the subject of skin, but this know-how has only been bundled to a limited extent,» Werner explains. Only three years after its foundation, the project was expanded nationwide and now runs under the name SKINTEGRITY.CH. Since then, Maarten Schledorn has also been part of the flagship project, which at the time called for a «full-time coordinator», as he describes his work himself. Schledorn did his doctorate in the Department of Chemistry and Applied Biosciences at ETH Zurich and then took over the scientific coordination of SKINTEGRITY.CH. In doing so, he also takes care of the legal and financial contracts of the programme. «The will to cooperate among the various expert groups and institutions is huge and the greatest source of motivation for me,» says Schledorn.

The consortium of Principal Investigators (PIs) consists of experts in cell and molecular biology, immunology, bioinformatics, clinical dermatology, rheumatology and surgery, chemistry, pharmaceutical sciences / imaging, systems biology and (bio)engineering. Many SSDV members are represented in the consortium as well as in the steering committee of SKINTEGRITY.CH and thus provide their support to the flagship project (www.skintegrity.ch).



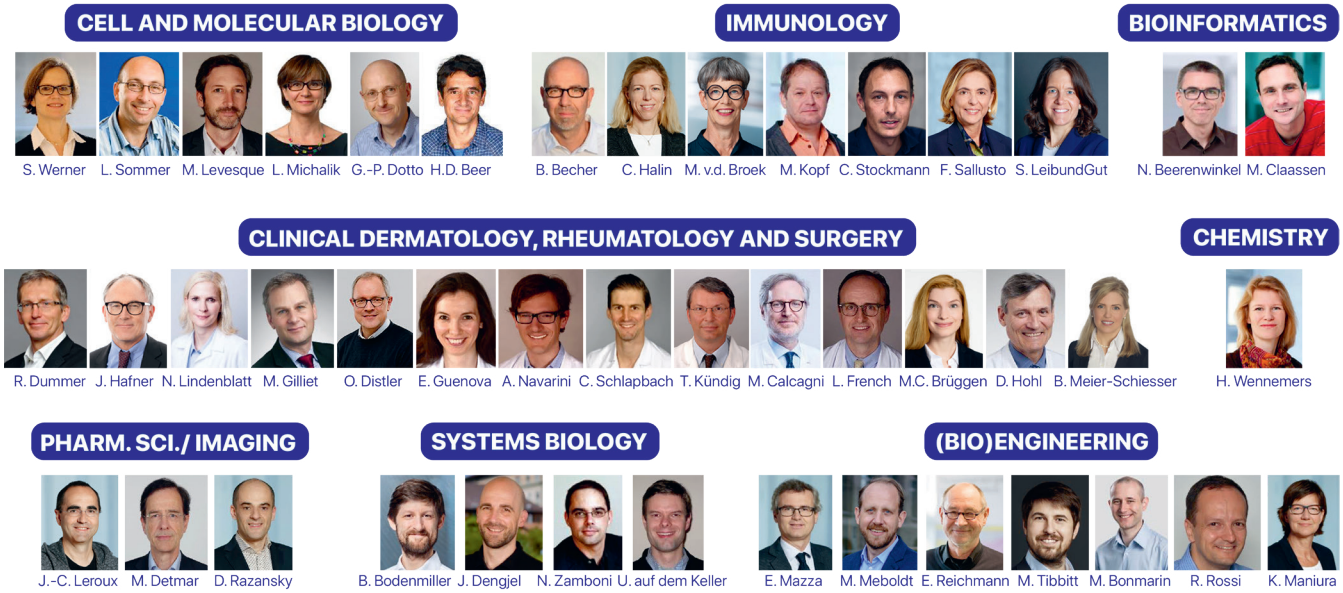
Prof. Dr Werner and Prof. Dr Sommer present SKINTEGRITY.CH at an evening event in Zurich in November 2021. *Photo: Heinz Hönger*

Motivated young researchers wanted

44 PIs are currently on board and the flagship project is constantly receiving reinforcements from new experts. «The SKINTEGRITY.CH consortium should be large, but not grow exponentially,» says Werner, which is why the selection of PIs is also very selective. Werner also immediately reveals the most important consideration a PI must make when joining the consortium: «What does the person expect from SKINTEGRITY.CH and what can they contribute to SKINTEGRITY.CH» She goes on to say: «In addition to attracting experienced PIs, however, it is equally important to bring in younger candidates who will drive the project forward in the future.» SKINTEGRITY.CH's Young Investigator Programme aims to support doctoral students and postdocs from the consortium's research groups in their academic and personal development and to enable them to have extended exchanges with experts from academia and industry. This new generation currently consists of 64 Young Investigators nominated by the PIs. The Young Investigators form their own Steering Committee, organise presentations and workshops, and found start-ups in which scientific ideas or products come directly from the lab. «It is impressive to see how committed these young people are,» says Schledorn. The best collaborative publication by the Young Investigators is rewarded annually with an award in which interdisciplinarity is a main criterion.

Successful collaborations of PIs

«We have already been able to achieve many of the goals we set ourselves at the beginning,» says Werner, citing a good consortium and outstanding



SKINTEGRITY.CH-Consortium

publications in addition to young researchers with interdisciplinary training. «LymphMonitor» and «Nimble» are, according to Werner, two great examples of projects that could be realised thanks to a collaboration between SKINTEGRITY.CH PIs. The LymphMonitor is based on the development of a fluorescent tracer that penetrates through the skin using a minimally invasive method and is used to evaluate the function of lymphatic vessels. Nimble is a device that uses a vacuum to measure the elasticity of the skin, helping to improve the examination of scars. «Nimble is based on a great collaboration between engineers and clinicians,» says Schledorn, «but these are only two of many projects that could be realised thanks to SKINTEGRITY.CH». Table 1 shows a list of the founded projects, divided into SKINTEGRITY.CH's three main research topics (skin injury and repair, skin cancer and inflammatory skin diseases) and central projects.

Successful publications help SKINTEGRITY.CH gain international visibility, as do PIs who get involved with the programme outside of Switzerland. Some PIs, who have been with the project from the beginning, have moved to Germany or Denmark and now continue to support the project from abroad. SKINTEGRITY.CH has also been presented at international meetings, e.g. in Cologne and Singapore. «Without the support of the various universities and institutions, SKINTEGRITY.CH would not be where it is today, and for this support we would like to say a big thank you to everyone,» Werner adds.

Exchange at the annual meeting

In June, the annual SKINTEGRITY.CH retreat could be held in Spiez with a great number of participants. «Highlights were once again the scientific exchange and the feeling of solidarity without any sense of competition,» Werner explains the two-day event. «In addition to the presentations, the coffee breaks are also of great importance each time,» says Schledorn, adding: «Ideas, enquiries and opportunities for collaboration arise during such breaks, which makes this annual meeting all the more important.» One secret to the success of SKINTEGRITY.CH is the together-we-are-stronger mentality, which has proven to be very rewarding so far. Sabine Werner continues to drive the flagship project forward with a lot of energy and concludes: «My hope is that this great commitment of SKINTEGRITY.CH will live on in the future.»

Table 1: List of funded projects of SKINTEGRITY.CH (source: www.skintegrity.ch)

Skin injury & repair **Work package 1** (Main PIs are in bold)	WP1-1: Control of wound repair by environmental and mechanical cues	Prof. Edoardo Mazza, ETH Zurich; Prof. Sabine Werner, ETH Zurich
	WP1-2: Perturbed homeostasis in fibroblasts from chronic wounds contributes to impaired wound healing	Prof. Jörn Dengjel, University of Fribourg; Prof. Jürg Hafner, University Hospital Zurich; Prof. Sabine Werner, ETH Zurich
	WP1-3: Exosomes as powerful vehicles for drug and siRNA delivery to the wound site	Prof. Jean-Christophe Leroux, ETH Zurich; Prof. Nicole Lindenblatt, University Hospital Zurich; Prof. Sabine Werner, ETH Zurich
	WP1-4: Functionalized synthetic collagen peptides for wound repair	Prof. Helma Wennemers, ETH Zurich; Prof. Jörn Dengjel, University of Fribourg; Prof. Edoardo Mazza, ETH Zurich; Prof. Sabine Werner, ETH Zurich
	WP1-5: Mechanobiological factors influencing the production of skin substitutes	Prof. Edoardo Mazza, ETH Zurich; Prof. Ernst Reichmann, Children`s Hospital Zurich
	WP1-6: In vivo imaging of wound repair	Prof. Daniel Razansky, University of Zurich and ETH Zurich; Prof. Michael Detmar, ETH Zurich; Prof. Sabine Werner, ETH Zurich
Inflammatory skin disease **Work package 2** (Main PIs are in bold)	WP2-1: Targeting the epigenetic stromal cell memory in skin inflammation	Prof. Michael Detmar, ETH Zurich; Prof. Cornelia Halin, ETH Zurich; Prof. Alexander Navarini, University Hospital Basel
	WP2-2: Immune and molecular mechanisms of adverse cutaneous cancer drug Reactions	Prof. Bernd Bodenmiller, University Zurich; Prof. Reinhard Dummer, University Hospital Zurich; Prof. Burkhard Becher, University of Zurich
	WP2-3: The role of PPARγ in skin resident Th2 cells and other immune cells in allergic skin inflammation and wound healing	Prof. Christoph Schlapbach, Insel Hospital Bern; Prof. Manfred Kopf, ETH Zurich; Prof. Liliane Michalik, University of Lausanne
	WP2-4: Autoreactive T cells, antimicrobial peptides and the skin microbiota in psoriasis	Prof. Michel Gilliet, University Hospital of Lausanne; Prof. Manfred Kopf, ETH Zurich
	WP2-5: Immune responses to commensals and pathogens in skin homeostasis and inflammation	Prof. Federica Sallusto, ETH Zurich and IRB Bellinzona; Prof. Michel Gilliet, University Hospital Lausanne
	WP2-6: The functional implication of nerve cells in skin fibrosis	Prof. Oliver Distler, University Hospital Zurich; Prof. Lukas Sommer, University of Zurich
	WP2-7: Biomechanical quantification of skin fibrosis	Prof. Oliver Distler, University Hospital Zurich; Prof. Edoardo Mazza, ETH Zurich
Skin cancer **Work package 3** (Main PIs are in bold)	WP3-1: An in vitro "field-cancerization" model	Prof. Gian-Paolo Dotto, University of Lausanne; Prof. Niko Beerenwinkel, ETH Zurich
	WP3-2: Role of lymphoid structures and lymphatic vessels in skin cancer	Prof. Cornelia Halin, ETH Zurich; Prof. Maries van den Broek, University of Zurich; Prof. Emmanuella Guenova, University Hospital Lausanne
	WP3-3: CINDER: Cancer Immunotherapy in Dermatology	Prof. Burkhard Becher, University of Zurich; Prof. Manfred Claassen, University of Tubingen; Prof. Mitchell Levesque, University Hospital Zurich
	WP3-4: Functional identification of melanoma neoantigens and their use for the development of personalized therapeutic vaccination regimens	Prof. Manfred Kopf, ETH Zurich; Prof. Reinhard Dummer, University Hospital Zurich
Central Projects (Main PIs are in bold)	P1: (Bio)Engineering approaches for generation of complex substitutes for normal and diseased skin	Prof. Mitchell Levesque, University of Zurich, Prof. Mirko Meboldt, ETH Zurich; Prof. Ernst Reichmann, Dr. Thomas Biedermann, Children`s Hospital Zurich; Prof. Mark Tibbitt, ETH Zurich
	P2: Skin Biobanking	Prof. Mitchell Levesque, University of Zurich; Prof. Jürg Hafner, University Hospital Zurich; Prof. Reinhard Dummer, University Hospital Zürich