BULLETIN

December 2020

SGSMP
SSRPM
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Schweizerische Gesellschaft für Strahlenbiologie und Medizinische Physik
Société Suisse de Radiobiologie et de Physique Médicale
Società Svizzera di Radiobiologia e di Fisica Medica
Swiss Society of Radiobiology and Medical Physics

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Editorial

Letter from the Editors

Dear SSRMP members,

I'll be brief as many of you have already contributed a lot for this last Bulletin issue of this strange year. Indeed I only would like to underline the lively bustle of these past months by simply mentioning the content of this issue. Just reading the president's letter and the chairs' annual reports one can notice that a lot has been going on, many things have been adapted and changed (working groups completed their tasks, new ones are seeing the light, agreements with BAG have been pursued regarding both the basics and the continuous education in radiation protection, the questions for the written certification exam were updated and translated ...); even the board itself and the people committed to SSRMP are constantly "on the move" and you can discover more about the new faces and assigned tasks by reading through the SSRMP News. TLDs Intercomparisons for Linacs and Tomotherapy units were carried out and the results together with a special follow-up for the Tomotherapy part are reported also in the SSRMP News.

Despite Covid, its impact and the paralysis that it has brought on our personal and professional lives and the media's terrorism that sometimes made it seem like everything must come to a complete stop, the urgency of life kept pressing on all of us. In fact, again despite Covid, students needed their lectures and teachers, cancer patients needed their treatment care and physicists needed to carry out their research and development. So, you'll see that four Varian prizes were awarded this year, and also that the scientific brains' figured out how to keep (at least the most significant) conferences up and running, as well as the SSRMP certification exams, in a way that fulfills the BAG requirements for social distancing. You'll find the first few reports from virtual conferences in this issue. Please, don't stop to come forward with your impressions from conferences and meetings. Don't be shy!

Finally you'll see that - yet again despite Covid - someone went ahead doing an incredible job with his PhD (see PhD platform), and quite incredibly people have been moving around different institutions even more than usual. The rich Personalia session and the incredibly dynamic number of job posts in the Biweekly News are testimony.

As usual, we hope you'll enjoy reading through this issue. Let's look with re-newed hope for social bonding (rather than distancing) and “in-vivo meetings” for the forthcoming year!

Francesca Belosi,
On behalf of the Editorial Team.

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Cover Image-Top: how most of the offices probably look like nowadays; bottom: picture taken by myself and a friend on the skii-slopes in Andermatt in Feb 2019

SSRMP News

Issues of Interest

PRESIDENT'S ANNUAL REPORT

Dear colleagues,

Initially, everything looked great…In November last year our SSRMP general assembly took place at PSI during the annual meeting. Sibylle Bollhalder, Sairos Safai and Tony Lomax organized the meeting at PSI and put together a very exciting program – a big thank you to all of them. The meeting offered a broad range of presentations and posters, which led to stimulating discussions, and meeting the industry sponsors made the breaks very enjoyable. Furthermore, in three excellent presentations the invited speakers Rob Coppes, Gunther Dissertori and Thomas Bortfeld shared their experiences and opinions from tissue resembling organoids over a personal travelogue to the democratizing of proton therapy.

During the general assembly, it was also announced to hold the next annual meeting in Thun. However, as you all know, the Covid-19 emergency has impacted our lives quite significantly and we are challenged daily with new rules including ways to interact with each other. This also impacts our society. While many activities were postponed or cancelled, some activities remained the same in terms of content, but obviously were amended or have to be amended in their form. One example is this year's general assembly, which was entirely carried out over zoom along with the elections organized via polyas.ch. I thank all of you for your personal efforts and your understanding during this special pandemic time.

Within the last year the board held 5 meetings (mostly virtual). Many different topics were discussed and can be summarized as follows:

- One AMP meeting
- Support of SSRMP working groups
- Discussions with BAG
- Collaborations with other societies
- SSRMP continuous education day
- SSRMP member salary survey
- Research grant
- Varian prize
- Annual meeting in Thun

In December 2019 the last **physical AMP meeting** took place where Janita van Timmeren and Raphaël Moeckli presented excellent introductions into radiomics and artificial intelligence, respectively, followed by a stimulating discussion on practical applications. Also, there are currently several working groups active in generating reports and recommendations. I not only appreciate the efforts and engagement of the working group members, but also the efforts of the science committee for their support in reviewing the drafts.

PRESIDENT'S ANNUAL REPORT

Based on many discussions over the last years, the "**Concept for the acquisition of the evidence of radiation protection expertise for SSRMP certified Medical Physicists in Switzerland**" was composed and discussed with the BAG. This concept has been recognized by BAG and was officially introduced for all new accepted candidates for the board certification from July 1st 2020. I would like to thank especially Peter Manser and Frédéric Corminboeuf for their huge efforts spent on this topic. Personally, I am very happy that we now have such a clear concept for the radiation protection training in place. In addition, we currently are in discussions with BAG about a concept for the acquisition of the continuous education for radiation protection for SSRMP certified medical physicists.

Further, I would like to mention the collaboration with other societies. Based on the experience of SCR'19 in St. Gallen, we continued the excellent collaboration for the **SCR'20** as mentioned already last year. Several interesting joint sessions with other societies (SGR, SGNM, SSVIR, SVMTRA) were organized, however, due to the pandemic situation the congress has been postponed and is now scheduled for June 2021 in Davos. I want to point out the very supportive and constructive collaboration with these societies, which I think is an important aspect for our SSRMP. So, I look forward to this conference next year. Additionally, also the "**Winter School: Dosimetry-Guided Treatment Planning for Radionuclide Therapy**" was postponed and is now rescheduled for January 2021 with online access.

In addition, there were also several exchanges with DGMP and ÖGMP. One topic is related to our society journal "***Zeitschrift für Medizinische Physik***" (ZMP). The publisher Elsevier would like to offer ZMP as an open access journal. Based on the survey to all members of the three societies, also the members are in favor of this transition. Thus, the boards of the three societies mutually agreed to negotiate with Elsevier about a new contract for ZMP as open access journal. Negotiations are still ongoing. A second topic is related to discussions in the context of the next **Dreiländertagung** in September 2021 in Vienna. Although currently planned as a physical meeting, the options for a virtual meeting are also considered.

Other potential SSRMP event highlights in 2020 would have been the **continuous education day** and the **annual meeting 2020**. For the continuous education day with the topic "*Challenges of medical physicists in the operating theatre*" Stefano Gianolini had everything prepared and ready to go before it had to be cancelled due to the pandemic situation. Similarly, Daniel Frauchiger and Silvan Müller did a

PRESIDENT'S LETTER

lot of work in order to prepare the annual meeting in Thun. For now, I would greatly thank all of them for their efforts and engagement for the preparation of these events.

Apart from the activities already mentioned, there were many more going on over the last year and I would like to point to the dedicated **reports by the three permanent committee chairs** for more information about further SSRMP topics. However, I would like to express my sincere gratitude to Regina Seiler, who acted as chair of the education committee ad interim, to Jean-Yves Ray (professional chair) and to Raphaël Moeckli (science chair). All of them are doing an incredible job besides their regular work and I am very thankful to have them on board for these tasks. So again, a great thank you!

In addition, I also would like to thank all the board members for their continuous support and responsiveness to my calls, emails, requests, meeting invitations, etc. This is by far not self-evident! Especially this is the case for Regina Seiler. She is not only taking care of all financial aspects as our treasurer, but also getting everything for the education committee ready is a huge amount of work. A particular challenge has been the **exams for the board certification**. In an exceptional team work together with Stephan Klöck and Peter Manser the exams were successfully carried out in an online format due to the Covid related restrictions applied to the candidates as well as the examiners. I think it is outstanding that we were able to perform such a smooth exam! So, thank you again for jumping in for the education chair for the last two years. Stefano Gianolini and Gerd Lutters deserve another special thank you, as they both served as SSRMP **delegates to EFOMP** for many years and now stepped down from their position. It is important to care about the international network of medical physicists, which both of them did with great commitment.

The society's new EFOMP delegates will be Sara Alonso and Eleni Samara. I also like to thank Roman Menz for his enormous support as secretary, Yvonne Käser for her great work in representing SSRMP in the steering committee for **clinical audits**, Stefano Presilla for his strong support of the professional committee and organizing the **salary survey** earlier this year and Markus Notter for supportive responses providing a different point of view.

It is clear that many more members actively support our society and deserve a big thank you: working group members, editorial of the bulletin, mentors, lecturers, delegates etc. However, there could not be enough members to support the society, so feel encouraged to serve SSRMP. Thank You All.
Finally, I hope to meet you soon personally again and until then stay healthy and take care of yourself, your families, friends, neighbors and colleagues.

Michael K Fix,
SSRMP president

PROFESSIONAL AFFAIRS

Professional Affairs Committee Annual Report

This year, you did not receive the **Bulletin** in August because the editorial board had to make the sad decision to cancel the issue. That incident reflects the unprecedented situation we experienced with the pandemic. We lacked your enthusiastic congress reports as the latter were postponed or cancelled in the emergency. However, don't let the actual difficulties completely stop us. The editors were on deck to prepare a December issue worthy of these previous ones. Share your original experiences and feelings of the virtual online meetings. On behalf of the editor team, Francesca Belosi, Shelley Bulling, Nathan Corradini, and I thank all of you who have contributed to the Bulletin with an article or more and encourage the others among you who haven't yet.

Replaced by the Newsletter launched in June 2019, the former SSRMP mailing list came to its end and has been finally discontinued. All data, including personal contact details have been completely deleted. In that context, the committee for professional affairs launched **Biweekly News** which complements the Newsletter. While the latter distributes dedicated contents primarily focused on your society activities, Biweekly News regularly replicates the recent job posts published on the website and the latest news. The society wants to give more light to employment opportunities for their members. The committee has improved the procedure to post a job offer on the website. Requests can be made online and the job posts will then be grouped and distributed to the members within biweekly news. The job market was very attractive this year with more than 30 ads posted.

Building on PSI's experience in managing the previous year's annual meeting, we have developed a **website model** for our annual congresses based on the open source software indico developed at CERN. It facilitates all organizational aspects of the congress, from registration and abstract submission to their evaluation to establish a scientific program. Special thanks to Martin Grossmann from PSI who supported us to set up that platform and for his enthusiastic coaching of the local organizers, Daniel Frauchiger and Silvan Müller. Although the congress in Thun had to be cancelled, I am sure that all this work will not have been in vain and can be applied appreciably for our next congresses.

The survey on professional information for medical physicists in Switzerland, namely **the salary survey**, was conducted by the committee of professional affairs in May. The main aim of the survey is to assess the salary of medical physicists in relation with descriptive criteria of the profession. The survey was announced by Stefano Presilla in the April Issue of the Bulletin. As an effort to convince everyone of you to complete the survey, the FAQ, the questionnaire and the previous report were provided beforehand to invite you to participate; as the higher the participation, the more representative the data are on your

professional situations. The target group included 211 medical physicists. The analysis could be completed in a relatively short period of time in order to provide you with the final report in early September. The participation rate slightly increased to 57% as well as the rate of no response to 37%. Many thanks to you and all contributors to this 6th national survey.
Again, the committee invites you, but in particular if you did not participate, to share any of your restraints. We will make our best to include your inputs and try this way to further improve the relevance of this survey.

Our two **SSRMP delegates to EFOMP**, Stefano Gianolini and Gerd Lutters, stepped down from their position after many years of notable service. The executive board warmly thanks both of them for their strong commitment to the society. Mid September, the committee for professional affairs called for candidates to take over the positions. The board has designated Sara Alonso and Elina Samara to serve as an important communication and membership link with EFOMP. The delegates are key sources of information on activities, programs and policies of the EFOMP and are also a direct contact for the individual member to communicate with. We wish them every success in their new position.

The composition of the professional affairs committee has remained stable with the six former colleagues still highly motivated to commit themselves to your society. If you are interested to join us, get in touch with me.

Let me finish with warm thanks to my committee team.

On behalf of the committee for professional affairs
Jean-Yves Ray
November 19th, 2020

PROFESSIONAL AFFAIRS

Results salary survey 2020

In May 2020, SSRMP conducted a web-based salary survey following the 2017 inquiry. The committee for professional affairs presents hereafter a brief summary of the detailed report that each participant who contributed to this survey received in September 2020.

The survey was conducted using a web-based system that allows anonymous and encrypted filling out of the survey by all participants. The period of concern was **01.01.2019 to 31.12.2019**.
The target group of the survey were known medical physicists with and without SSRMP certification working in Switzerland in the clinical framework: data from colleagues working either as self-employed or in an industry/company are not included in the analysis.

The total number of survey invitations sent was: 211
- completed surveys: 121 (**57.3%**)
- opted out: 13 (**6.2 %**)
- no responded: 77 (**36.5%**)

The completion rate is slightly higher than the previous survey conducted during 2017 and concerning 2016 data, which resulted in 50%. The rate of no response is slightly higher (34% in 2016). One survey was partially filled in but most data were missing. One case was excluded because not realistic: declared salary per year 3'650 CHF. Therefore, definitive salary statistics is based on 119 persons' data, 27 more compared to 2016 (92 persons' data).

To get a high participation rate, the survey consisted of few questions. The survey was announced in April in the Bulletin n°97, and the questionnaire was attached to the invitation email to let colleagues know what to expect before starting answering the questions.

For each item of the questionnaire, the distribution of answers is described and analysed by applying descriptive statistics, like frequency, mean, standard deviation and so on. The full report provides an assessment of the salary of medical physicists in relation to descriptive criteria of the profession. The goal was to isolate interesting facts using descriptive statistics.
Salary statistics is presented here on a yearly basis, without bonus and extra income, without extra pays e.g. for family. In case of partial employment degree, the salary (brutto) is recalculated on a full time basis.

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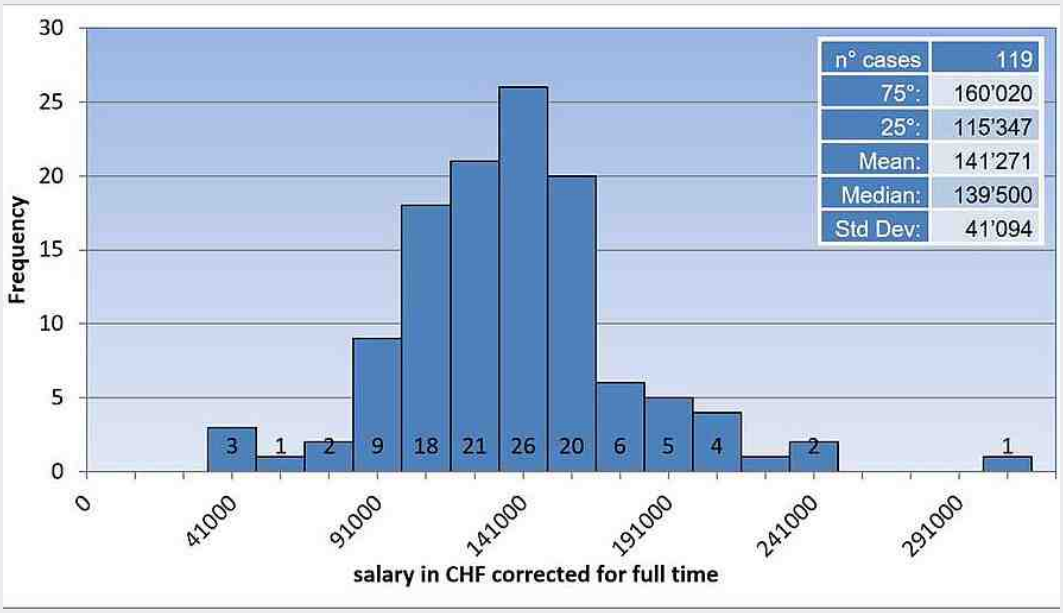
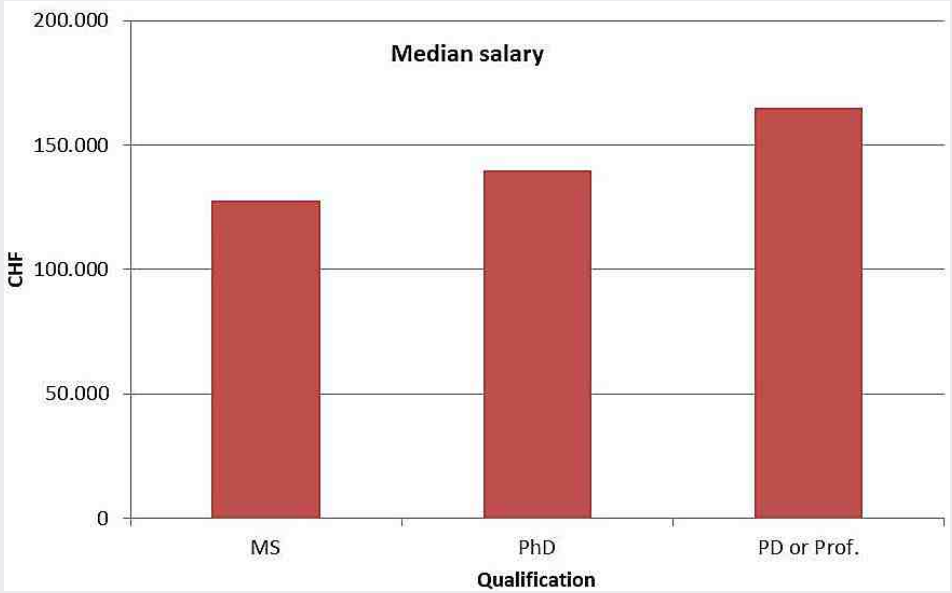
In the histogram underneath showing the salary, "*corrected for full time*" means: for 100 % working rate, whatever weekly working hours this corresponds to.



Annual salary



Annual salary vs. academic qualification

All medical physicists have a MS degree or higher. The actual distribution of academic qualification does differ significantly from that of 2016:

· MS 47% - PhD 46% (2016);
· MS 36% - PhD 60% (2019).

Having a qualification to teach at university level results in a higher salary than other titles. There is a salary difference between PhD and MS too.

PROFESSIONAL AFFAIRS

Having the SSRMP certification results in a higher salary for colleagues that are not going under education. This fact is not proved by a robust statistics: the group of colleagues not having certification and not going under education is small (only 5 colleagues) and with a wide range of salary (50'000-160'000).

Annual salary vs. SSRMP certification

The actual distribution does not differ significantly to that of 2016:

· SSRMP certification 84% - in acquisition 10% (2016);
· SSRMP certification 86% - in acquisition 8% (2019).

Nine colleagues are acquiring certification: 6 of them at a university hospital, 2 at a public hospital, 1 in a research institute clinic. Four of these 9 colleagues have a professional experience longer than 4 years.
About 49 % of the surveyed persons have less than 10 years of professional experience.
The salary increases with years of professional experience as expected.

Years of experience	Mean Salary	Median Salary	20° percentile	80° percentile	Min Salary	Max Salary	Frequency
1-10	115'506	115'667	94'682	138'260	47'000	182'000	59
11-20	147'057	145'600	130'000	158'840	110'000	223'387	37
>20	186'329	180'661	154'774	204'508	130'000	310'000	23

Statistics of annual salary vs. professional experience

On behalf of the committee for professional affairs,
Stefano Presilla

SCIENCE

Scientific Committee Annual Report

The scientific Committee is composed of S. Bulling, M. Jaccard, P. Manser, M. Pachoud, S. Scheib, S. Tanadini-Lang and R. Moeckli.

Working groups (WG) have been particularly active during this year. The **SRS WG** (A. Mack) is about to finalize a recommendation for stereotactic treatments, **a sub-WG** (N. Saltybaeva) **of the medical imaging WG** finalized a report on "*radiation shielding in radiological procedures*" and the **RPO2MPP WG** (P. Manser) issued quality handbooks for radiation therapy, nuclear medicine and CT use. The latter WG also prepared a recommendation about IGRT doses that will be finalized soon. I would like to express my gratitude to the chairs of the WG and all the participants for the time they spend to contribute to our society. I also warmly invite anyone who is interested in joining a working group to contact the chairperson of the relevant group. The list of working groups and chairpersons is on our website (www.sgsmp.ch).

Only one **AMP meeting** took place this year due to COVID pandemic situation. It remained as usual the place for discussions concerning different topics of medical physics. As a reminder, the AMP meetings are open to any member.

The **2020 SSRMP intercomparisons** showed good global results concerning the photons beams and less satisfying results for tomotherapy units due to a systematic error that is still under evaluation (see the reports in the Bulletin). I thank T. Buchillier and C. Bailat for their work in the "conventional" intercomparison, as well as S. Heinze for the tomotherapy intercomparison (which is also the result of the SSRMP research grant 2019-2020).

One application for the **research grant 2020** has been submitted to the committee but it has not been granted.

P. Jorge (University Hospital Lausanne) received the Varian "*Hauptpreis*".
M. Jaccard (University Hospital Geneva), **L. Nenoff** (Paul Scherrer Institute) and **R. Moeckli** (University hospital Lausanne) received the Varian "*Anerkennungspreis*".

Raphaël Moeckli,
Chair of the scientific committee

Results of the TLDs Intercomparison for Megavoltage Units 2020

1. Introduction

The Institute of Radiation Physics (IRA) in Lausanne is mandated by the Swiss Society for Radiobiology and Medical Physics (SSRMP) to organize an annual dosimetry intercomparison for the gantry driven linacs. The 2020 intercomparison followed the same procedure and used the same equipment to carry out the measurements as previous years. The aim was also the same i.e. to check the absolute dosimetry. This year, again, we focused only on static photon beams.

Thirty institutions took part to the 2020 intercomparison with a total of 138 beams checked, including 93 conventional beams with flattening filter (FF) and 45 flattening filter free beams (FFF).

Similar to past audits, the requirement was to check each photon energy used in the institution only once. For example, if two machines are matched, only one machine had to be checked. Similarly when two machines are equipped with a 6X beam, only one has to be checked.

2. Material and methods

The same TLD discs (4.5 mm diameter, 0.9 mm thickness, Harshaw Inc.) and solid water phantoms as those for the photon dosimetry intercomparisons of 2011 to 2019 have been used. The solid phantom was composed of two stacked Perspex phantom frames. The inner square was 4 cm in length, the outer square 10 cm x 10 cm. The frames have been filled with five plain RW3 (PTW Freiburg) slabs, and one slab containing three TLD. The slab dimensions are 40 mm x 40 mm x 10 mm. The phantom was placed on Perspex or water equivalent material (at minimum 5 cm). This arrangement is shown schematically in Figure 1. Each TLD slab contains 3 TLD chips located on a circle 5 mm away from the center.

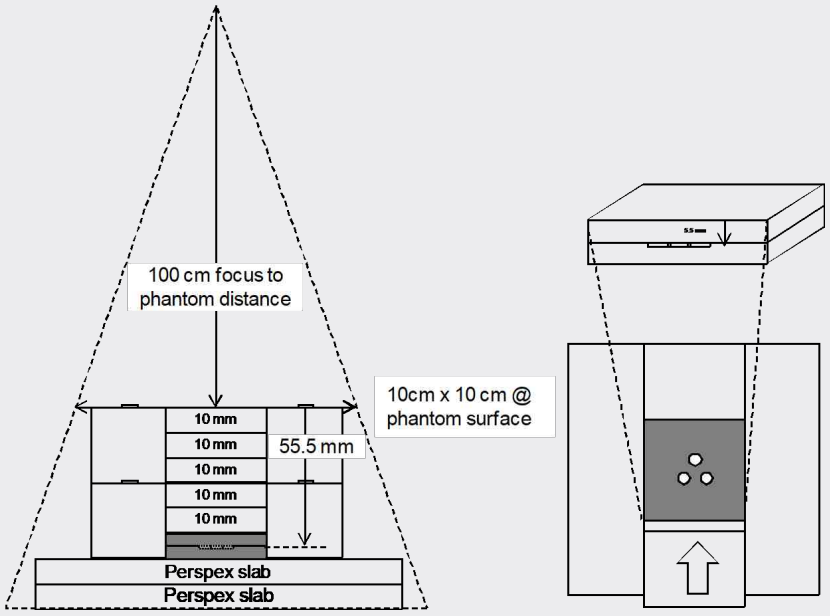


Figure 1. Assembly of the measurement equipment for photon beams: phantom and (closed) phantom frame

The measurement depth in solid water was 5.55 cm. A correction was applied on the TLD reading to account for the slight difference between solid water and water. For this reason the user was asked to assume that the phantom was fully water equivalent and provided for sufficient scatter, as it would be the case in a large water phantom.

A TLD annealing oven and a Harshaw 5500 reader have been used, similarly to earlier intercomparisons. Thanks to the cobalt-60 irradiation facility available at IRA in the calibration laboratory, we could use a less time consuming procedure insuring the appropriate metrological traceability. We calibrated the cobalt irradiator directly in terms of absorbed dose to water for a given radiation quality against the reference dosimeter for photons calibrated at METAS.
The cobalt irradiator calibration was achieved by means of two series of TLD. One series were irradiated in the solid water phantom in the intercomparison conditions using the 6, 10 and 18 MV beams of the Elekta at CHUV, while the reference value of the absorbed dose to water was determined with the reference dosimeter in a water phantom in the same geometrical conditions. The other series of TLD were irradiated in the calibration laboratory with the cobalt irradiator at IRA for a known time duration. Then these two series of TLD have been read in a same batch and this provides the link between absorbed dose to water in a water phantom and the exposure time on the cobalt irradiator (for each radiation quality). This allows us to prepare reference TLD at IRA for each series of measurements in the participant's beams. The procedure was adopted in agreement with Dr. Ch. Kottler from METAS.
The absolute dosimetry with TLD requires several corrections: non-linearity of the TLD response with dose, dependence of photon energy and fading effect. The non-linearity and fading corrections have been carefully determined at IRA. The energy dependence of the TLD response is included in the calibration of the cobalt irradiator. The correction associated to the replacement of the water phantom by the solid water phantom is also included in the calibration of the irradiator.
For the intercomparison irradiations, the measurement conditions in the solid phantom were as follows: source to surface distance 100 cm, field size 10 cm x 10 cm at the surface of the phantom, dose to the TLD close to 1.00 Gy.
The participants were expected to provide their own value of dose (stated dose), specified at the measurement depth (555.5 mm).

Four runs of measurements were necessary for the 30 participants. A calibration of all the TLD was carried out before and after each run, in order to determine precisely the individual sensitivities of all the TLD chips. For each run, a series of 10 TLD ("reference TLD") in each group of 50 TLD were irradiated to the reference dose of 1 Gy at the cobalt irradiator on the irradiation date recommended to the participants. Then these 50 TLD were all read in one batch and the dose delivered to every chip was calculated from the ratio of its indication to the mean indication of the 10 reference TLD. Finally, the corrections mentioned above were applied.

3. Results

The agreement between the stated dose and the TLD measured dose is evaluated with the ratio "stated/measured" (noted D_s/D_m) and taking into account the TLD measurement accuracy. For photon beams, an agreement within 4% is considered a satisfactory check.

We checked 93 conventional beams with flattening filter (FF) and 45 flattening filter free beams (FFF). The obtained average ratio for the different photon beam types and energies is given in Figure 2 with the standard deviation. This repartition seems to show that all deviations from the unity can be attributed to statistical fluctuations with the exception of 18 MV.

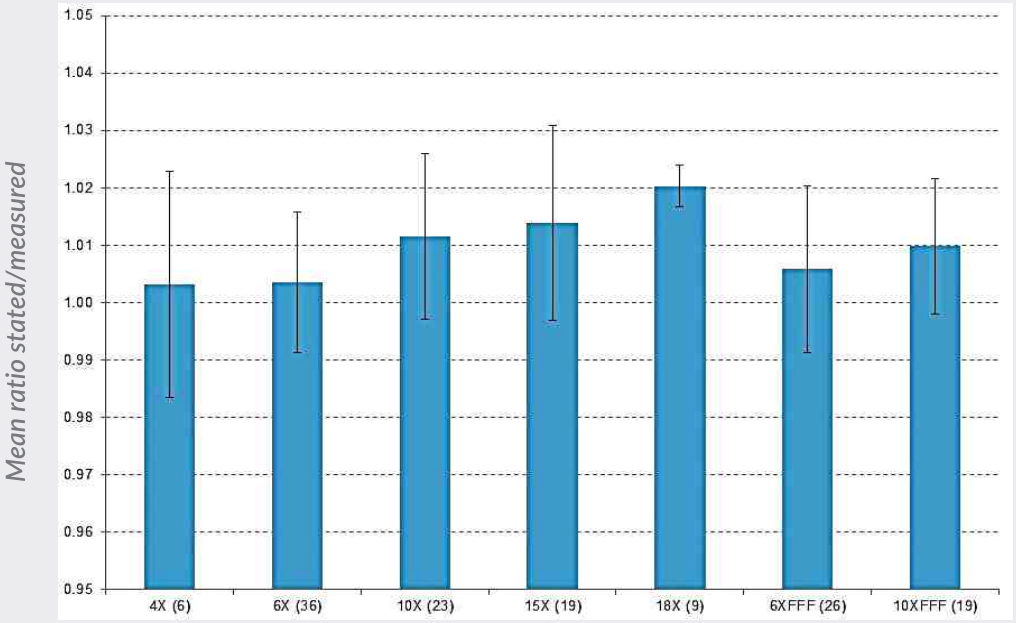


Figure 2. Mean D_s/D_m values for the different radiation qualities. The number of beams is given in brakets. Errors bars=std dev.

The distribution of the D_s/D_m ratio for all the photon beams is illustrated in Figure 3.

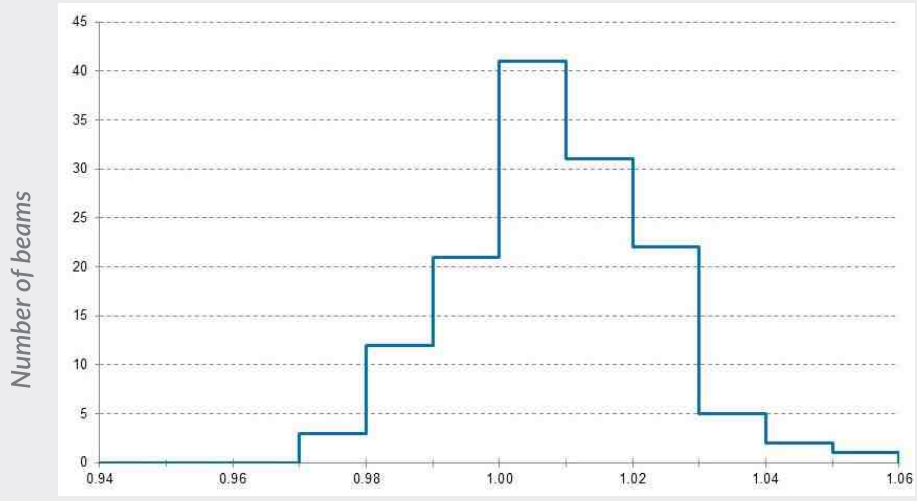


Figure 3. Histogram of D_s/D_m values for all 138 photon beams

The statistics of the D_s/D_m ratio for all the photon beams are given in Table 1.

Parameter	FF Beams	FFF Beams	Both types
Beam number	93	45	138
Mean	1.009	1.008	1.009
St. Dev.	1.5%	1.3%	1.4%
Minimum	0.973	0.975	0.973
Maximum	1.051	1.029	1.051

Table 1. Ratio "stated dose/measured dose" (FF=conventional beams with flattening filter, FFF=flattening filter free beams)

The mean value of D_s/D_m for all beams is 1.009. There is no significant difference between the mean values of D_s/D_m for FF beams (1.009) and FFF beams (1.008).

For 135 tested beams (98%), the value of D_s/D_m is in the interval 0.96-1.04, i.e. within 4%, which is judged satisfactory. In addition, 76% of the results are in the interval 0.98-1.02, i.e. within 2%.
For three tested beams, the value of D_s/D_m is beyond ±4%. One of them was checked again with TLD and the result was satisfactory. No problem was discovered in the dosimetry. The origin of the initial discrepancy could not be explained. The probability is low that the discrepancy is due only to the normal fluctuations of the TLD signal. Indeed these fluctuations have been investigated for the uncertainty evaluation and the observed standard deviation was low.

Uncertainties

The uncertainty on the dose measured using TLD includes the contributions due to positioning of the phantom in the beam, the reading procedure of TLD with all influencing quantities and reference in absorbed dose traceable to METAS for the cobalt irradiator at IRA. The uncertainty budget is given in Table 2. The contribution coming from the procedure with reference TLD and measurement TLD was determined using a statistical method. The fluctuations of the ratio of three measurement TLD over ten reference TLD were analyzed for six irradiations of 300 TLD.

The combined standard uncertainty is obtained by quadratic summation. For photons, it amounts to 1.23% for each measurement with one slab containing three TLD, and 1.16% for the mean of two such measurements.
For the expanded uncertainty we adopted only one figure of 2.5% (k=2) for simplicity.

Contribution	Comment	Photons std. unc.
Positioning	± 1 mm	0.2%
Co-60 irradiator calib.	-	1.05%
Energy response of TLD	-	0.1%
Stat. fluctuations of meas.TLD/ref.TLD	Type A eval.	0.6%
Non-linearity	all doses 1 Gy	0.05%
Fading	t < 3 days	0.10%

Table 2. Uncertainty budget for the absorbed dose measurement with TLD. The contributions are given at the level of one standard uncertainty

Dosimetry protocol

All participants carried out the reference dosimetry using the SSRMP recommendations No. 8, or the IAEA TRS-398 protocol, with the exception of the CyberKnife, the Novalis and a linac dedicated to total body irradiation.

Reference dosimetry for FFF beams

The participants were asked if they corrected the dosimeter value for the effect of volume averaging during the reference dosimetry at the beam commissioning. According to IAEA TRS-483 protocol, the corrections to apply for FFF beams include in fact two contributions: the correction factor for the difference in water to air stopping-power ratio and the volume averaging correction factor. Three participants applied such corrections, two for a conventional linac and one for a CyberKnife, both of them for a PTW 30013 chamber. For conventional linacs, the first correction factor amounts to 0.9990 for 6XFFF and to 0.9966 for 10XFFF beams, and the second one amounts to 1.0016 and 1.0037 (mean values). One can see that these two corrections almost cancel out.

4. Discussion and conclusion

The dosimetry of 138 beams has been checked. The results of the 2020 TLD dosimetry intercomparison are good. 98% of the checked beams met the satisfactory criteria of ±4% and 76% were within ±2%.

We thank all the medical physicists for their participation and for their excellent collaboration.

Thierry Buchillier and Claude Bailat,
CHUV - Institut de radiophysique (IRA)
Rue du Grand-Pré 1
1007 Lausanne

SCIENCE

Results of the SSRPM Tomotherapy Dosimetry Intercomparison 2020 and the "SSRPM Research Grant 2019" supporting a first step towards plan class specific dosimetry for modulated arc treatments.

1. Introduction

The primary aim of the intercomparison exercise was to check the absolute dosimetry of the Swiss tomotherapy machines with thermoluminescent dosimeters (TLDs), inserted in the "*Cheese*" phantom. The additional goal was to test the same measurement methodology on both a tomoterapy unit and a linear accelerator ("linac") of each participating institution with a similar treatment plan. The plan was based on the same phantom and the same set of optimisation goals in the inverse planning approach for the modulated arc treatment. The test of this measurement setup with different therapy devices was intended to take a first step towards plan class specific dosimetry, as modulated arc treatment is utilized in most of the current photon radiation therapy treatments. To fund the additional cost of this additional research question the intercomparison was supported by SSRPM within the "SSRPM Research Grant 2019". All Tomotherapy sites in Switzerland were therefore able to participate in the extended intercomparison. The responsible institution for the dosimetric evaluation was the PTW Freiburg.

2. Material and methods

As in the previous years, the measurements were performed in the onsite "*Cheese*" phantom. In analogy to the 2014, 2015 and 2017 intercomparisons, we used a helical calibration plan with the high-dose area in the center of the phantom - field width 2.5 cm - for Tomotherapy. For the linac-based irradiation, a volumetric modulated arc therapy (VMAT) plan was calculated based on CT slices of the "*Cheese*" phantom, where the PTV in the center (6 cm diameter) was covered by a homogeneous dose of 2 Gy/fraction, similar to the Tomotherapy calibration plan.

A single TLD measurement system consisted of six TLDs which were arranged side by side. Together, they outlined a cylinder of 6 mm length and 4.5 mm in diameter (Fig. 1).

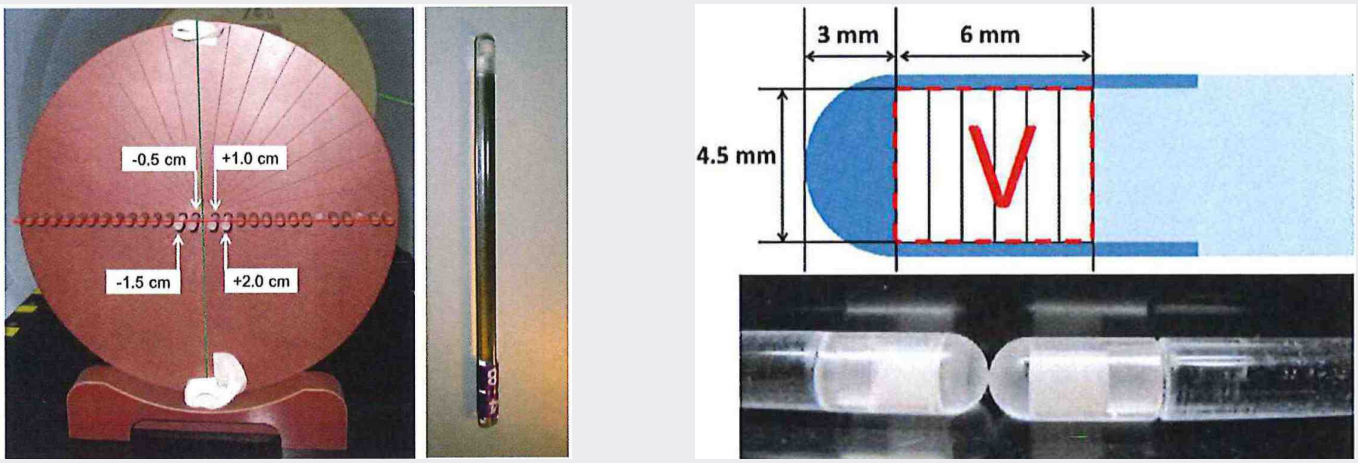


Fig. 1-Left: The four most central holes of the cheese phantom were used for measurements in the high dose range. The effective measuring point of the TLD dosimeters coincided with the effective measuring point of the ionisation chamber. Right: Arrangement of the TLDs in the TLD stick. The integral volume of all TLDs (V) is indicated with a red dotted line.

The effective point of measurement was identical to the effective point of measurement of the ionisation chamber in the same boring. In order to state the planned TLD doses, four structures which cover the TLD cylinders were used to calculate the TLD mean dose. For each institution, 8 TLD sticks (4 for Tomotherapy and 4 for linac) were made available. A dose point evaluation was specified as a good result when the stated calculated (D_s) and the measured (D_m) doses coincided within 3%. It was satisfactory when the coincidence was better than 5%.

3. Results

All five tomotherapy institutions in Switzerland participated in the intercomparison. Four of them performed a similar linac-based irradiation with a 6XFFF beam as comparison. The mean deviation between measured dose (D_m) and stated dose (D_s) was 3.5% $\pm$ 0.8% for Tomotherapy and 3.7% $\pm$ 1.6% for the Linacs, as illustrated in Fig. 2a.

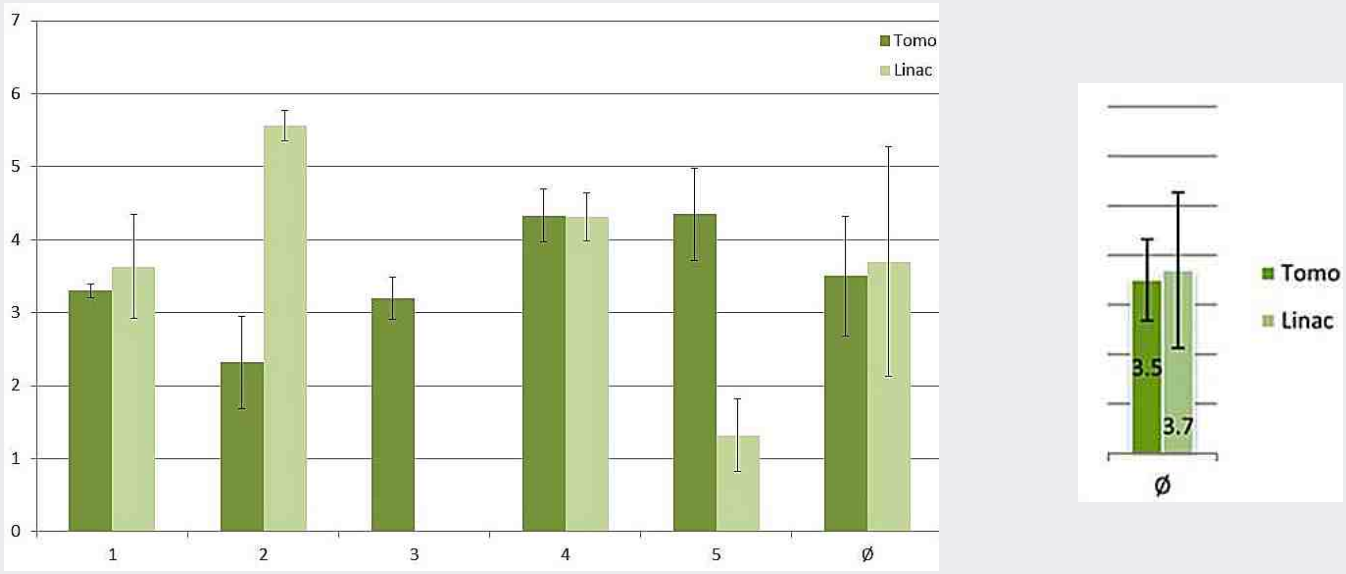


Fig. 2: a.) D_m/D_s ratios for the TLD measurements for five institutions. b.) mean and standard deviation of average measurements of four institutions on a Linac compared with a Tomotherapy unit.

Regarding the second part of the examination, the application of the same measurement methodology for two very different treatment devices (Fig. 2b.) illustrates the main finding that the agreement of measurements of similar treatment plans, generated on basis of similar optimisation goals, but utilizing totally different planning systems and totally different treatment devices is 3.5% vs 3.7%.

4. Discussion and conclusion

The dosimetry of 9 beams was measured. The aforementioned results can be grouped into two main findings. The results in absolute dose are not satisfactory. The results of the individual institutions all deviated in the same direction. The dosimetry setup utilizing the Tomotherapy cheese phantom and the custom TLD sticks developed at KSSG were used for the first time by PTW. As all results deviated in the same direction, it was assumed that there was a systematic error present. This is especially the case for the linac results, which deviate from the results of the SSRMP dosimetry comparison that our colleagues at CHUV performed. This gave rise to further measurements.

The second research goal of this examination was to make a first step towards plan-class specific dosimetry for modulated arc treatments. A Tomotherapy unit has directly been compared with a Linac on the basis of dosimetry performed with a similar treatment plan. The statistical power of the finding is clearly limited, but still one conclusion can clearly be drawn. Based on the measurements of this study, one Gy on a linac equals one Gy on a Tomotherapy device within the uncertainty of the described results.

We thank all the participants for their participation in this intercomparison. A special thanks goes to Dr. C. Pychlau, PTW Freiburg, and his co-workers for the dosimetric evaluation of the TLDs and, of course, a big thanks to the SSRPM for the support with the 2019 Research Grant.

Simon Heinze,
KSSG

Follow up measurements to the Tomotherapy Dosimetry Intercomparison

1. Starting position

In the "Tomotherapy Dosimetry Intercomparison 2020" all measurements of the individual institutions deviated in the same direction. It was assumed that there was a systematic error present. After PTW had reviewed its internal dosimetric evaluation, the most probable cause for the deviation was identified as the cheese phantom, which is unknown to PTW. Another special feature of the measurements in the cheese phantom is that the radiation is not applied vertically to the TLD but laterally. The particular differences in the setup of a PTW reference geometry and the setup in the Tomotherapy intercomparison are summed up in Table 1.

	PTW Calibration	Tomotherapy Intercomparison 2020
Field	static field 0°	rotation
MLC	None	Modulated
Phantom	Water traceable PMMA calibration phantom	Cheese Phantom
Depth of measurement	10 cm	13-17 cm
Dose	1 Gy	2 Gy
Beam incidence on TLD	vertical	lateral

Tab 1: differences between PTW calibration and Tomo Intercomparison 2020

In order to narrow down possible causes for the unexpected dosimetric findings, PTW proposed to perform comparative measurements in the company's proprietary calibration phantom.

Fig 1: PTW calibration phantom

Therefore an additional insert was manufactured for this phantom, allowing to place the TLD-sticks used in the dosimetry intercomparison, in the reference depth of this phantom. In addition, an insert is available for this phantom that allows to measure with a PTW chamber (PTW 0.125 cm^3, chamber of type 31010), as well as an insert for PTW's own TLD. Measurements with different phantom set-ups were performed.

2. Measurement setup

Four different phantom setups with the PTW calibration phantom were used to distinguish different possible influencing effects on the measurements. Horizontal geometry corresponds to the standard positioning of the PTW phantom. While an open reference field was applied to the linac (setup 1), a plan with two modulated ap-fields ($\pm$0.1°) was calculated for tomotherapy (setup 2), as a Tomo-Direct plan always requires at least two fields.

A plan with laterally opposing fields was calculated in the second step (setup 4). In order to continue to irradiate vertically on the TLD, the phantom was tilted by 90° for this measurement series (lateral position). The comparison measurement at the linac consisted of 2 open fields with the same weighting, so that both contributed the same dose to the TLD (setup 3).

Overall, each measurement was repeated to obtain a more stable result. The reference measurement was performed with an ionisation chamber provided by PTW.

In order to be able to better interpret the results, KSSG timely took part at the SSRPM Dosimetry Intercomparison with the linac (IRA) and the IROC to have additional comparison to the Tomotherapy dosimetry.

4. Results

After adaption and testing of the used dosimetric methodology, the results showed a smaller deviation. The mean deviation for the linac measurement went down to -1.7% in contrast to the -5.4% in the intercomparison. For tomotherapy, the mean deviation was reduced from -2.3% to -0.9%. A phantom correction factor could be determined in comparison to the PTW calibration phantom with direct measurement in the cheese phantom.

According to the results, it seems to have no influence if the TLD are irradiated laterally or vertically. The results now lie within the stated expanded uncertainty of 2.5% (k=2) of the SSRMP dosimetry intercomparison.

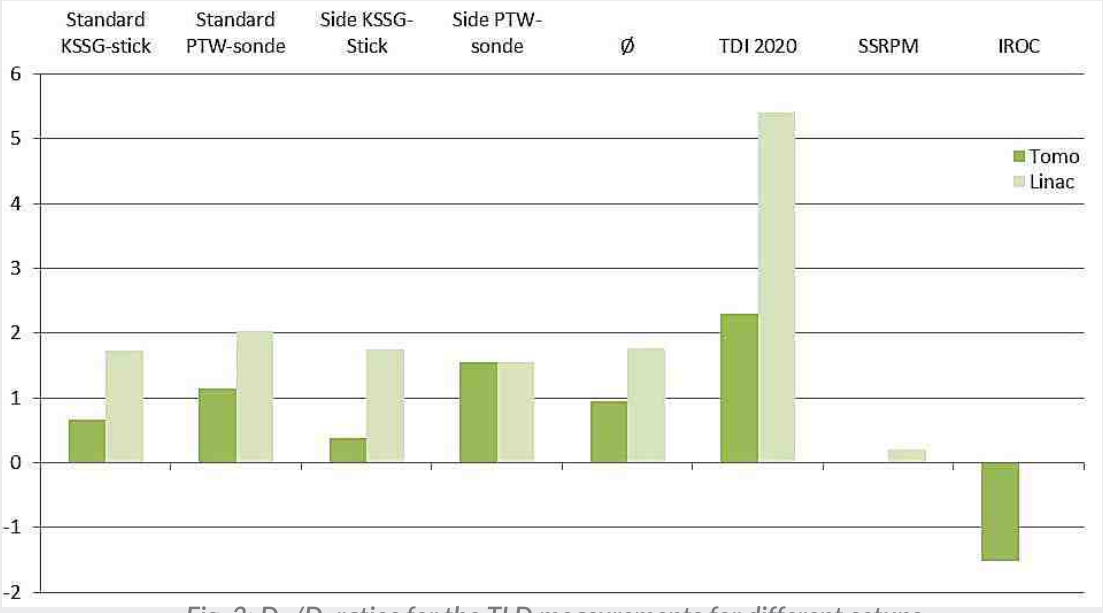


Fig. 2: D_m/D_s ratios for the TLD measurements for different setups

5. Conclusion

The follow-up measurements have shown that the dosimetry for both the linac and the tomotherapy are within the tolerances of the reference laboratories (PTW/IRA/IROC). A more detailed investigation of the differences between the separate reference laboratories was not performed.
Furthermore, it was found that the direction from where the TLD were irradiated does not appear to have any influence on the results.

Simon Heinze,
KSSG

SCIENCE

Varian Award 2020

At the virtual general assembly on November 19, 2020, four publications were awarded. One publication received the **Varian Main Award of Radiation Oncology** of SSRMP:

and three publications received the **Varian Recognition Award of Radiation Oncology** of SSRMP:

We congratulate the winners and thank them for the important work. In addition, we thank Varian Medical Systems for their support.

Raphaël Moeckli, IRA, Lausanne
President of the Varian Prize Committee

SCIENCE

SSRMP Research Grant 2021

In order to support and promote the scientific activities of our members in Switzerland active in all fields of Medical Physics, a research grant is provided by SSRMP. As in the last years, a financial grant of maximum **7'000 CHF** is offered for research projects fulfilling proper eligibility criteria.

The projects should:

- be promoted by at least one regular member of SSRMP
- be conducted entirely in Switzerland in one of the private or public institutes active in the field
- preference will be given to projects involving more than one institute aiming to a trans-linguistic and trans-cultural cooperative model
- be strictly linked to a field of interest of SSRMP
- be completed within the time span of one year from grant assignment.

The group that will be awarded with the grant will have to provide the SSRMP Science Committee with a detailed report (inclusive of costs justification) at the end of the one-year period and will guarantee the publication of a scientific report in the SSRMP Bulletin. The scientific report should be, pending scientific committee's review and approval, submitted for oral contribution to the annual SSRMP meeting.

Deadline for submission of proposals is June 30th 2021.

Proposals should not exceed four A4 pages and should contain:
- project title, duration and financial request
- principal investigator's and co-investigator's names and responsibilities in the project
- short description of the scientific background
- short but detailed description of the project
- short description about current state of the art in the field.

Proposals should be submitted via email to the chair of the SSRMP Science Committee:
raphael.moeckli @chuv.ch

SCIENCE

Varian Award for Radiation Oncology of SSRMP 2021

Deadline for submission to the president of SSRMP (michael.fix@insel.ch):
March 31st 2021

Award rules:

1. SSRMP can award during the annual general assembly up to three Varian prizes. The maximum amount for a single Varian prize is SFr. 3'000.-. Varian Medical System Inc. donate to SSRMP each year SFr. 3'000.- for the Varian prize.
2. The prizes are given to single persons or to groups, which have made an excellent work in radiobiology or in medical physics. Only members of SSRMP or groups with at least one member of SSRMP are legitimate to apply with a manuscript or with a published or unpublished paper of special importance, special originality or special quality. The size of the work should not exceed the normal size of a paper. A thesis normally exceeds this size. The person, who enters a paper written by more than one author, should have contributed the major part to this paper. The consent of the co-authors must be documented.
3. The winner gets the prize amount, as well as a diploma with an appreciation.
4. The invitation for the Varian prize is published in the bulletin of SSRMP. Direct applications or recommendations of other persons can be sent to the President of SSRMP. The documents should be entered in four specimens not later than six months before the annual meeting.
5. A prize committee judges the entered works. It consists at least of three members of SSRMP and is elected or re-elected for 2 years by the SSRMP board. At least one member of the prize committee should be member of the SSRMP board.
6. The prize committee constitutes itself. The decision of award together with the appreciation should be sent to the board for approval.
7. Varian Medical Systems Inc. is indebted to announce in written form each change of the prize amount or a termination of the contract to the president of SSRMP at least one year in advance.
8. This regulation was accepted by Varian Medical Systems Inc. (Switzerland) on September 27th, 2006 and renewed by the annual assembly of SSRMP September 27th, 2007. It can be changed only with the approval of Varian Medical Systems by a decision of the annual assembly of SSRMP.

Note that there will be an award ceremony during the general assembly in 2021 and a publication of the Varian prize recipients is then taking place in the SSRMP bulletin and on the SSRMP website.

Raphaël Moeckli, IRA and CHUV - Lausanne,
President of the Varian Prize Committee

SCIENCE

Winter School Announcement: Dosimetry-Guided Treatment Planning for Radionuclide Therapy

20th-22nd of January 2021

This Dosimetry School targets medical physicists, physicians, technologists and researchers involved and interested in the workflow of clinical dosimetry in support to personalized radionuclide therapy. The aim of this winter school is to present bases of quantitative imaging and dosimetry methodologies to support patient-based treatment planning and verification in clinic. The school also aims to promote a common/shared knowledge and cooperation of different partners involved (physicians, physicists, technologists, researchers). Research and commercial solutions to assist quantitative imaging and dosimetry workflows will be also presented and discussed.

Venue
HS Maurice E. Müller-Haus,
Murtenstrasse, 35
Inselspital, Bern

Registration
The registration fee is 150 CHF.
Send name, affiliation and address to:
dosimetrywinterschool2020@gmail.com

Organizers
Prof. Kuangyu Shi, Bern
Dr. Silvano Gnesin, Lausanne
Dr. Thiago V.M. Lima, Luzern

Credits
SGNM/SSRMP: 17 credit points
BAG: 24 educational hours
DGMP: 22 credit points (21 no. N7, 1 no. 14)

EDUCATION

Education Committee Annual Report

This past November fifteen medical physicists were newly certified, bringing the total number of medical physicists with a currently valid certification to 203. Since its creation in 1988, a total of 247 people were certified, initially only a handful per year. But in recent years the pool of certified medical physicists increased considerably every year, bringing along new challenges, whether it's maintaining a proper overview or dealing with the influx of applications. Our guidelines might not always be favorable from the perspective of an interested individual, in particular if said individual does not have a physics background. It is becoming increasingly difficult with the wide spectrum of intermixed degrees these days. In order to be fair to all applicants, past and present, we need to enforce the **guidelines and their annexes** in a strict and consistent manner or revise them altogether, which is no easy feat. To have guidelines and not apply them would mean losing all credibility. It would also mean creating a discrepancy with what's in the radiation protection training ordinance and that simply cannot be in our best interest.

Much has already been said and written about the changes in the **radiation protection training**. Since 1st of July the "new way" is now the official way to ensure that enough hours have been spent on various issues of radiation protection, especially situations that a certified medical physicist undoubtedly will come across, but that are not covered in one of the official workplace B and C courses. Annex II (syllabus) of our guidelines has received a supplement, outlining the learning objectives and content of the training which does not have to be taught by the mentor, but coordinated and supervised by him/her, see also annex III (mentor's responsibilities). In a similar way to the above, the Federal Office of Public Health and SSRMP are planning to cooperate when it comes to the accreditation of courses and conferences which will count towards the mandatory number of units of instruction during a time span of five years. As our certification needs to be renewed every five years, it seems practical to tie the two together. This will incur some additional work for the education committee, but will be of great benefit for the society's members, as SSRMP will at the same time gain the right to decide what will be accredited. The basics have already been agreed on; we are now working on the fine print.

I didn't actively seek the position of the chair of the education committee and I admit that at times I struggled with the double work load just within the society, but it has also been very interesting for me to see a completely new aspect of your society's dealings and to "see behind the scenes" on so many different levels. I would like to thank all the people who are so engaged and helped me with this task, but also the various people who contacted me with their applications and renewals and were very patient and understanding when I wasn't able to respond as quickly as I myself would have preferred. A final thank you goes to Angelika Pfäfflin and Jérôme Krayenbühl who both answered my call for a successor. I trust that Jérôme will be met with equal good will and support.

On behalf of the Education Committee,
Regina Seiler

EDUCATION

Results of the Certification Exams in Medical Physics (SSRMP)

In the exams for the certification in medical physics SSRMP 2020 (28.10-03.11), the following colleagues succeeded:

First line (from left to right):
Marta Bogowicz, Zürich (USZ)
Tommaso Stefano Carzaniga, Bern (Inselspital)
Nanta Fachouri, Villigen (PSI)
Stefanie Nicole Garni, Allschwil (ro amsler AG)
Maude Gondré, Lausanne (IRA)

Second line:
Martin Härtig, Basel (Claraspital)
Niels Icken, Zürich (Triemli)
Lorentzos Mikroutsikos, Villigen (PSI)
Silvan Müller, Bern (Inselspital)
Marie Nowak, Lausanne

Third line:
Eleonora Paulicelli, Bellinzona (EOC)
Nicolas Perichon, Rennes (France)
Térence Risse, Basel (Unispital)
Olaf Sommer, Winterthur (Kantonsspital)
Anne-Laurène Wenger, Zürich (USZ)

On behalf of the examination committee and the SSRMP board, I want to congratulate the candidates for their certification and the new position in the community connected to that.

Stephan Klöck,
Chair of the exam committee,
Allschwil 10.11.2020.

EDUCATION

Performing an exam with 16 candidates and 16 experts on the peak of a pandemic wave

Every year, the certification exams of SSRMP in medical physics are done in early November.
In April, when starting the organization of the exam 2020, the first Covid-19 wave was about to drop off. Anticipating that the lockdown will lead to a situation where a regular exam can be performed, everything was prepared as usual.
Over the summer, we kept an eye on the numbers as probably everybody did, and it looked quite calm.
In early October everything was prepared: several candidates took leaves of one or more weeks in order to better prepare, the presentations were defined and practiced (at least in part).
However, the infection rate started to increase again. The Insel Hospital, which has been hosting the exams for several years in the rooms of the medical physics group, became a little bit concerned about that. Considering our complex rules and the necessity of handling all candidates in a fair manner, we were favoring to cancel the exam in case of an escalation (no externals at Insel, traveling restrictions, ...).

Peter Manser, head of Medical Physics in Berne, had to perform the lectures and exams at ETH in Zürich already remotely and was positive regarding his experience. Nevertheless, the lecture or exam structure at ETH is quite simple with one group of students or one candidate and two experts in one session. The certification board exam is structured in phases and needs five parallel sessions with three candidates giving their talks in a plenum one after the other and later on, moving simultaneously with their accompanying person around three sub-committees, changing roughly every 15 minutes.
One important piece in the puzzle of mid October was an introductory video explaining breakout sessions within one master Zoom™ session, which seemed to address all issues. Peter organized a rehearsal, which was pretty successful. Nevertheless, we were hesitant. The prerequisites were still challenging: each candidate would need an exam theater at home with stable internet connection, a writing board and an appropriate audio and video communication. We would have to specifically restrict access of the candidates of each specific block... and we would have to handle 12-15 experts distributed into sub-specialties.

On the weekend 10 days before the exam, the infection numbers continuously rose and the exam probability continuously dropped. Most of the involved persons were thinking about the situation. Some of the candidates already assumed that the exam would be cancelled.

In the morning of Monday, October 26th, I had a short phone call with Regina Seiler, chair of the education committee. We decided to give the candidates a chance to perform their exams after months of preparation and to give e-exam a chance to happen. Within two hours the whole exam committee with 16 experts gave its *OK* for this exceptional operation. The same evening, all candidates were informed and invited to decide between two options: postponing their individual exam to November 2021 without additional fees, or accepting special challenging conditions and participating in 2020. By next morning, they all accepted to take the exam roughly one week later.

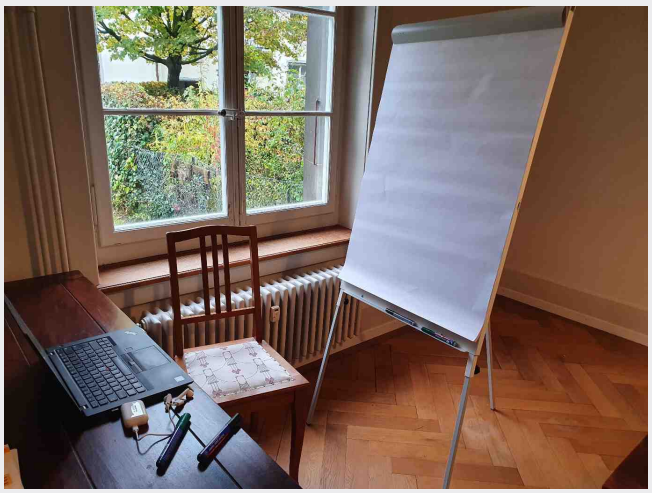


Figure: "exam theater" at home (picture: Silvan Müller)

Finally, it was a great experience about passion and engagement of all persons involved: Peter Manser and Michael Fix took over the ungrateful "*master of puppets*" job of manually operating the 5 parallel sessions and moving all participants according to a script, describing the who, where and when for more than 30 individuals and two full days. All candidates purchased equipment and set up their theaters at home (figure) or in a private office. We tried and practiced the online operation in several rehearsals. A backbone communication system for experts and candidates was created based on WhatsApp™ to tackle situations in case somebody suddenly disappeared.

On Monday morning the 2nd of November, everything was ready to start. The day after at 6 pm, after asking 16 candidates several hundreds of questions remotely, we successfully concluded. The *masters of puppets* started to enjoy pushing around colleagues and candidates, the chair challenged the committee with several spontaneous changes in the procedure (as usual) and only two experts disappeared for a short period and luckily showed up again.

It's done… Many thanks to all the passionate candidates and experts and the helping hands in the background – it was really an impressive experience … and I have to remind all of you: it was a unique exception!!!!!! I'm really looking forward to meeting you in person and to perform exams like the one described in a face-to-face manner.

Stay healthy!
Stephan Klöck.

On this special occasion, I would like to disclose the composition of the exam committee 2020:

Stephan Klöck (chair, medical radiation physics)
Florian Angst (radiology)
Michael Fix (medical radiation physics)
Yvonne Käser (medical imaging physics)
Götz Kohler (medical radiation physics)
Peter Manser (medical radiation physics)
Michaela Medova (radiation biology)
Raphaël Moeckli (medical radiation physics)
Oliver Riesterer (radiation oncology)
Regina Seiler (medical radiation physics)
Johannes Slotboom (medical imaging physics)
Pierre-Alain Tercier (medical radiation physics)
Reto Treier (radiation protection)
Philipp Trueb (radiation protection)
Véronique Vallet (medical radiation physics)
Daniel Zwahlen (radiation oncology)

EDUCATION

Review of multiple choice questions for written part of the certification exam

2020 is a special year for the written part of the certification exam as well. As you probably know, a certain number of candidates have to sit this part of the exam.
Our society has aggregated a lot of multiple choice questions over the last three decades. Switzerland has three (four indeed) official languages and we have colleagues born and educated all over Europe. To be prepared for this situation, we offer the questions in German, French, Italian and English. As the embedded expertise and the wording is not trivial, it was decided to update the questions both regarding content and proper translation; a challenging task worth to be addressed in a separate campaign finished in October 2020.

This and many other tasks of our society would not work without all the support and help of many passionate colleagues, investing parts of their leisure time. For this project, I would like to thank the following colleagues for their work on roughly 200 changes and their translations:

Francesca Albertini, Enrico Barletta, Alessandra Bolsi, Cécile Chatelain, Alessandro Clivio, Nicolas Hanauer, Sylvain Jaquet, Andreas Joosten, Götz Kohler, Jérôme Krayenbühl, Giulia Lucconi, Julien Ott, Angelika Pfäfflin, Sairos Safai, Regina Seiler, Johannes Slotboom, Dario Terribilini, Mariangela Zamburlini and Paolo Zucchetti.

Stephan Klöck,
Chair of the exam committee.

24th SASRO Annual Meeting

virtual, 24th-25th of September 2020

This year I attended SASRO from a comfortable sit in my living room. For sure the virtual venue of this year constituted a huge and unusual challenge for the organizers. I can hardly imagine the effort needed to construct such a virtual IT infrastructure, ensuring all speakers can have a proper connection from their remote location, offering to everyone the possibility to easily interact during the meetings and creating dedicated virtual booths for the exhibitors. Nevertheless, not everything went smoothly and several hickups along the way generated frustration while following this event remotely. For instance, the presenters couldn't run their presentations themselves. This rendered the speaches less smooth and, though funny at times, I think it made the presenters quite uncomfortable, even stealing some precious time from their already very short 10-minute allotted window. So, in case of an eventual next virtual meeting … mouse to the speakers??

As concerns the scientific program, it nicely alternated 15 to 30 minute talks on dedicated topics (*what's in the next 10 years' picture of radiation therapy*, *how to handle toxicity*, *adaptive RT*) and short presentations of proferred papers. Participants were about 150 to almost 200 per session. This year's focus was definitively on RT-induced toxicity and possible measures to prevent or reduce it as much as possible, be it by using biological predictive models, radiomic features or other biomarkers, adaptive RT with MR-linac, or proton therapy. The new model-based approach of the Dutch community has definitively been in many occasions under the spotlight. Many interventions transpired the need for more and also more reliable clinical data for predicting toxicity, or understanding the most suited radiation modality (and even radiation dose) for each individual. With the latest technological advancements (Artificial Intelligence, MR-Linac, compact Proton facilities …) we really seem to have reached the potential to do almost anything from the technical and mechanical point of view. And the question „*Who can benefit from what*" remains the burning question. Is it maybe time also for Switzerland, a small country, with a tight network within its small RT community, and with enough money and technological development, to launch itself in a project similar to what Netherlands has already been doing since couple of years? As it seems that we are in a good place with technology, could we unite our forces and drive towards national standardized protocols, naming, prescriptions and homogeneous treatment methods for the new technologies, so to be able to start gathering useful clinical data?

Thank you to the organizers of SASRO for putting together an inspiring program and the IT infrastructure necessary to support it. Nevertheless, I - a person who still would rather carry a 5000-page book in her purse than buying a kindle – sincerely hope that these virtual conferences won't be in the „*next 10 years of RT*" picture. I definitely missed the real human interaction with colleagues from other institutions, the feeling and atmosphere of being reunited somewhere with people who share my same daily goals, struggles, and open questions . I hope to go back to live-meetings soon.

Francesca Belosi,
University Hospital Zürich

European Annual Congress in Nuclear Medicine 2020

Wien (virtual), 22nd-30th of October 2020

This year the EANM congress 2020 planned in Vienna took place virtually from the 22nd to the 30th of October because of the present COVID international crisis.

My personal highlights

The first plenary session of the congress was devoted to technological innovation, which this year was marked by the introduction of the total-body PET scanners [1-2] which field of view covers for the first time the entire patient body in a single acquisition step. This technology offers the possibility to acquire simultaneous total-body PET with unprecedented system sensitivity. This makes possible acquisition protocols with the potential for dramatic reduction in dose exposure and/or acquisition time with a direct impact in the patient management, and very importantly it opens the possibility to unprecedented detailed dynamic and parametric studies. New commercial devices with superior detection sensitivity are available with an axial detector ring extension ranging from 1 to 2m. An important step forward compared to the present PET generation that employs ~ 25cm long detector rings.

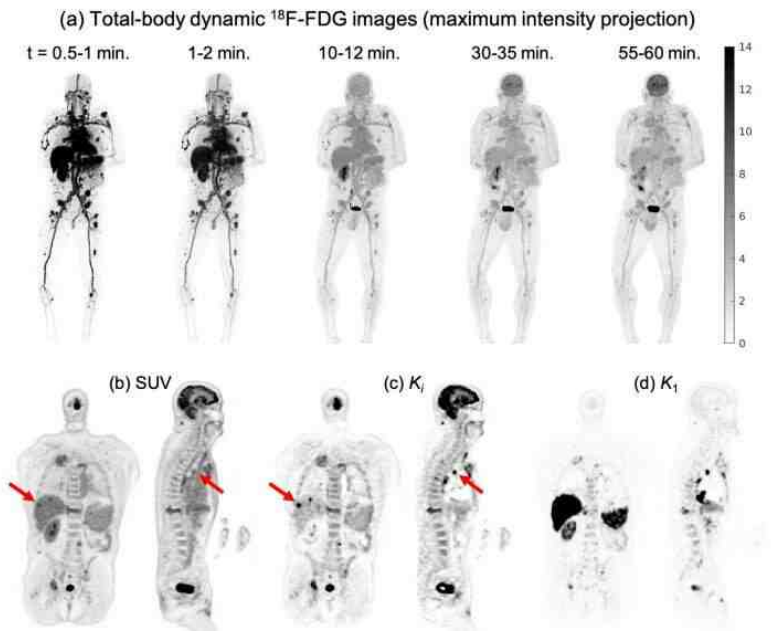


Figure 1: Total-body dynamic 18F-FDG PET imaging with the uEXPLORER scanner allows us to monitor the spatiotemporal distribution of glucose concentration in metastatic tumors in the entire body (a). As compared to a typical clinical standardized uptake value image (b), the parametric image of FDG influx rate (Ki) can achieve higher lesion-to-background (e.g., the liver) contrast. In addition to glucose metabolism imaging by Ki, total-body dynamic PET also enables multiparametric characterization of tumors and organs using additional physiologically important parameters, for example, glucose transport rate K1 (d), across the entire body. Credit: G.B. Wang, M. Parikh, L. Nardo, et al., University of California Davis, CA

https://medicalxpress.com/news/2020-07-total-body-dynamic-pet-successfully-metastatic.html

The benefit and use of dosimetry to support Lu-177 Peptide Receptor Radionuclide Therapy (PRRT) and Prostate-Specific Membrane Antigen (PSMA) treatments was the topic of an interesting session on dosimetry as a part of patient care (scientific session 607). Here Dr. Marta Cremonesi and Dr. John Violet exposed background, main results, perspective, and limitations of the use of quantitative imaging and personalized dosimetry in support of Lu-177 based radionuclide therapy. In this field, the dose-response relationship has been documented for tumor while no clear toxicity threshold for Lu-177 was established for nearby organs, namely the kidneys and the bone marrow. This fact suggests that activity administration/number of treatment cycles escalation assisted by patient specific dosimetry has the

potential to further improve the outcome of patients in these therapies. Potential and limitations of SPECT/CT as the reference quantitative imaging tool in radionuclide therapy were also the topic of the joint symposium 26.

Wide and continuous interest in the development of new radio-tracers for both diagnostic and therapeutic purposes. The beta emitters are no longer the only weapon used to treat malignancies. New alpha particle emitters (Ac-225 and Bi-213 in addition to At-211 and Ra-223, [3]) and auger emitters [4] are in the pipeline to foster therapeutic and curative strategies (see sessions 1201/plenary 3 on next generation radiopharmaceuticals and 1501/CME-12 on alpha particle therapy).

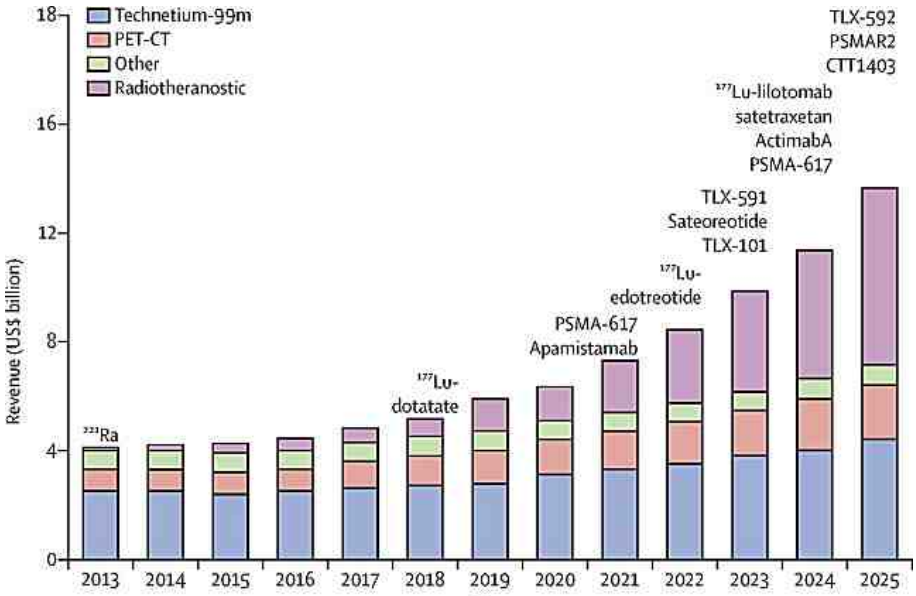


Figure 2: Revenue growth of the radiotheranostics field. Adapted with permission from Paul-Emmanuel Goethals and Richard Zimmermann (Nuclear Medicine MEDraysintell Report & Directory, July 2019). New radiotheranostics that are not yet approved, but whose approval is expected in the future are indicated after 2020.

https://doi.org/10.1016/S1470-2045(19)30821-6

References:

[1] *J Nucl Med 2018; 59:3–12 DOI: 10.2967/jnumed.116.184028.*

[2] *J Nucl Med February 7, 2019 jnumed.119.226498.*

[3] *Morgenstern A, Apostolidis C, Kratochwil C, et al. An Overview of Targeted Alpha Therapy with 225Actinium and 213Bismuth. Current Radiopharmaceuticals. 2018 ;11(3):200-208. DOI: 10.2174/1874471011666180502104524.*

[4] *Ku, A., Facca, V.J., Cai, Z. et al. Auger electrons for cancer therapy – a review. EJNMMI radiopharm. chem. 4, 27 (2019). https://doi.org/10.1186/s41181-019-0075-2.*

Silvano Gnesin,
IRA, Lausanne

PhD platform: Patrik Gonçalves Jorge

Physical and dosimetric challenges for FLASH radiotherapy

Recently, some of the established concepts governing the effects of radiation on healthy tissues were questioned by a new treatment modality called FLASH radiotherapy (FLASH-RT). This treatment modality is characterized by dose-rates generally several orders of magnitude higher than those used in routine clinical practice. Multiple studies identified a striking protection of healthy tissues as compared to conventional dose-rate radiotherapy (CONV-RT), thus increasing the differential response between healthy tissues and tumors. This tolerance could allow better tumor control while limiting the toxicity to the surrounding tissue, which in turn makes it possible to deliver higher curative doses and opens new avenues for curing radiation-resistant tumors. In addition, the patient's comfort could be increased thanks to the opportunity to reduce the number of fractions. Another clear clinical advantage derives from the short delivery time: any effect of organ and tumor motion is eliminated. At the biological level, this reduced normal tissue toxicity has been named the FLASH effect and was observed over several biological models such as zebrafish embryos, mice, cats and mini-pig and led to the first treatment of a human patient in 2018 (*Bourhis et al, 2019*).
For a proper interpretation of the biological results, a traceable, accurate and repeatable dose delivery associated with a robust dosimetry is crucial. For that, we need adequate reference dosimetry as well as relative dosimetry systems. However, the lack of primary traceability is still a strong issue and national metrology institutes need to develop adequate reference beams in order to provide dosimetric standards for the FLASH community as well as traceable active dosimeters. Due to saturation effects induced by the high beam intensity necessary to trigger the FLASH effect, the use of common clinical monitoring systems, such as transmission chambers, is impossible. Therefore, irradiations are performed without dosimetric monitoring, which increases the related uncertainties. Up to now, preclinical irradiations are relying on passive dosimetry to reach the traceability, accuracy and robustness of dose delivery.

The overall aim of this PhD thesis is to establish passive dosimeters for absolute dosimetry at ultra-high dose-rate (UHDR), develop dosimetric procedures suitable in the context of FLASH preclinical studies and investigate the parameters of importance that trigger the FLASH effect. For this purpose, I used a prototype linear accelerator (Oriatron eRT6, PMB-Alcen, France) delivering a pulsed electron beam with dose-per-pulses ranging from conventional (~ mGy) to ultra-high (>10 Gy). The work is carried out at the University Hospital of Lausanne (CHUV) and consists of the three following parts:

Part 1: My first aim was to extend and validate the use of several passive dosimeters such as TLDs, Gafchromic films and alanine at UHDR based on a redundant methodology. I also participated in a study optimizing alanine reading at low doses for FLASH-RT (*Gondré et al, 2019*). This allowed me to develop procedures to accurately irradiate biological samples at UHDR in the context of FLASH preclinical studies. Thanks to these procedures, we are able to determine the delivered dose for biological experiments with an uncertainty of 3%. The methodology was presented during the annual SSRMP meeting in 2019 and published in Radiother. Oncol. (*Jorge et al, 2019*).

Part 2: Then, I am investigating monitoring tools to improve the dose delivery reproducibility. For example, an ionization chamber was placed out-of-field and its response as a monitoring tool was analysed. This study showed that out-of-field measurements can be used for reference dosimetry on the primary beam and that saturation effects can be minimized thanks to greatly reduced dose-rates. The conclusions were presented during the annual SSRMP meeting in 2018.

Part 3: Finally, FLASH-RT is often defined in the literature by the mean dose-rate but this is misleading. Indeed, the accurate definition of FLASH-RT should be based on the observation of a biological effect. In practice, we could demonstrate that the physical description should not be limited to the mean dose-rate. This is especially important considering our beam temporal structure, which is pulsed over some µs separated by several ms. Furthermore, the analysis of the current literature supports the idea that a mean dose-rate threshold is not a representative metric to predict the appearance of a FLASH effect. This is why I am studying the impact of beam parameters on the biological endpoint in order to investigate the underlying causes of the FLASH effect.

All these studies are necessary for the preclinical investigations, but, more importantly, necessary for a safe clinical transfer.

Interview with the Doctor

from left to right: Carola Romero, Jonathan Ollivier, Marie-Catherine Vozenin, Benoît Petit, myself and Pierre Montay-Gruel.

What led you to choose this topic for your PhD?
I have always been interested in medicine and my passion for science and astronomy led me to study physics. Therefore, it was only natural that I came to know about medical physics. Then, I had the opportunity to do an internship at CHUV to work on the implementation of a convolution algorithm on the GammaKnife. At that time, my office colleagues were working on FLASH-RT and the results they were discussing were surprising, which strongly aroused my curiosity and convinced me to embark on the FLASH adventure.

What part of the project have you enjoyed the most?
I like the multidisciplinarity present in our team and the permanent exchanges between us. I do not think there are many research teams where biologists, chemists and physicists work closely together as we do. This creates a unique dynamic that allows me to have an overall vision of the project while deepening my knowledge in all those fields.

Which part of the project was the most challenging?
The team from Lausanne is one of the leading teams in FLASH research. When I arrived, I had to adapt very quickly to the workflow that was in place by familiarizing myself with the eRT6 and the measuring tools, supervising irradiations for the users while dealing with my work for my thesis, which was not easy at first.

What kind of impact do you think your results will bring to the med phys society/world etc.?
I hope that my results will consolidate the basis of dosimetry at UHDR, facilitate and extend preclinical studies on the FLASH effect. Without robust and comfortable dosimetric tools, I think it will be a long and complicated process to explain the origin of this intriguing effect. One thing is sure: there are still many years of research ahead of us about the FLASH effect.

What are your prospects for the future?
After these years where I was immersed in research, I would like to explore new horizons and find new challenges in the field of medical physics.

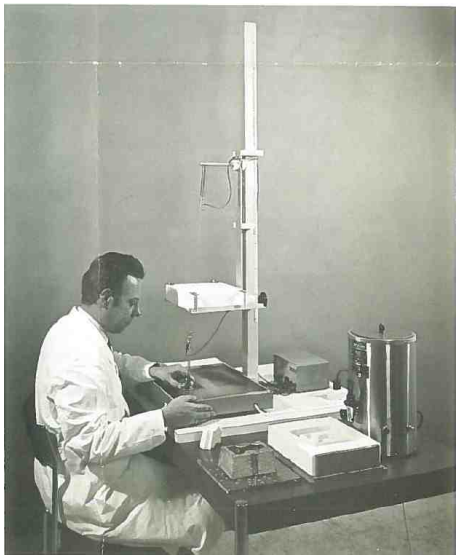
What would you advise to someone starting a PhD tomorrow?
In my case, having a multidisciplinary team also expanded the research horizon. The possibilities for project development then become infinite and it is dangerous to get lost in your project. This is why you should try to have an idea of the evolution of your project within the framework of the team and follow this guideline as best you can. Also, do not hesitate to speak with your supervisors if you have any doubts or questions. Good communication is a key component for a good thesis.

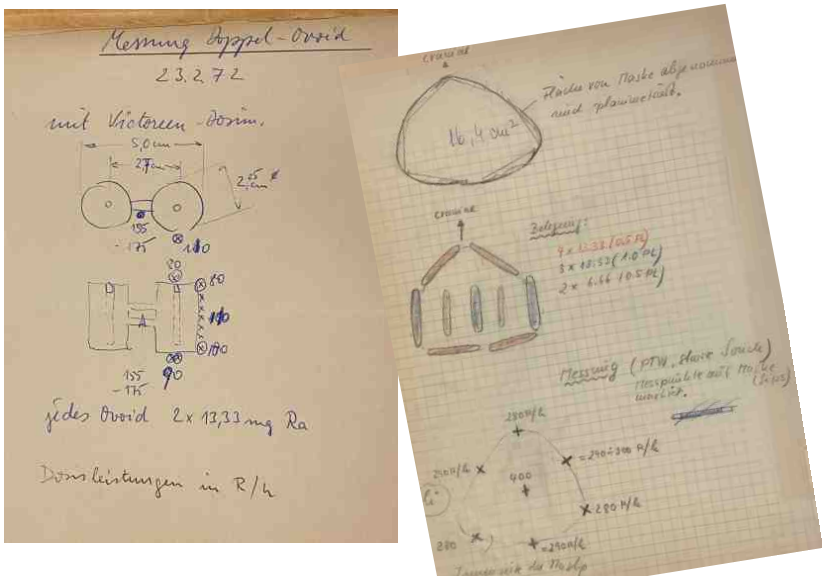
Klinik für Radio-Onkologie, Stadtspital Triemli

This year, on 1st of September, Triemli City Hospital celebrated its 50th birthday. Due to Corona, the anniversary passed without much fuss. Triemli City Hospital was built in 1970, 17 years after the Stadtspital Waid, as the second hospital in the city of Zürich. The location on the left bank of the Limmat was chosen to ensure optimal health care for the residents of this part of the city. In those days, there were little thoughts of radiotherapy or even medical physics. To be precise, when the hospital was planned in the 1960s, no premises were planned for this specialty!

Triemli in 1970

Finally, a place for a simulator and a cobalt device was found – you will guess it – in the basement. And it is exactly there, in the "archive", that we discovered many interesting things. Thank God, the information had been written on paper such that we could still read it today. However, it was not surprising that we could not understand some calculations and even Google could not help us :) .
On September 23rd, 1971, the first patient was irradiated with a surface dose of 220 R. With much luck, we could reconstruct the dose. From then on, the medical physicist and the medical engineer had looked after two sites and three specialist areas: nuclear medicine, radiotherapy, and radiology. And all this under one chief physician. Impressive! Radiology became independent in 1988, nuclear medicine in 2012.





Chief Physicist W. Müller-Duysing at work and medical physicist's dose calculation in the early 70s

In the early 1990s, the modernization of radiotherapy required some support from the population and the press. They were not very amused that a *cobalt bomb* was still ticking in Triemli city hospital.

Im Triemli-Spital tickt die Kobalt-Bombe

Krebspatienten im Keller: Veraltete Geräte, unzumutbare Arbeitsbedingungen – Erneuerung kostet 28 Millionen

Triemli-Spital: Strahlenschutz nicht gewährleistet

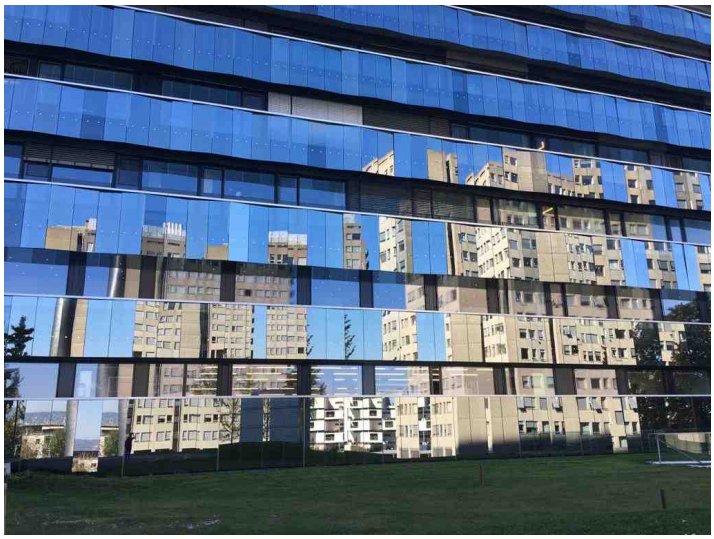
It was not until 1995, when the first generation of linear accelerators was put into operation in a building specially constructed for radio-oncology, that radiotherapy at the Stadtspital Waid was closed. The cobalt unit at Triemli followed in 2003. Although the processes at a municipal hospital seem to be slower than elsewhere – ok, they are slower - they are running anyway. Over the years, the clinic has been continuously modernized and medical physics has been supplied with toys..., toys ..., and even more toys. Since 2018 we are operating two TrueBeam accelerators with all the accessories you may think of - name one, we have it! We also take care of the brachytherapy of the clinic (HDR and prostate seeds), the X-ray therapy unit of the dermatology department, and, from time to time, the radiation protection of the entire hospital.

We are five physicists and five dosimetrists (8.3 full-time equivalents) with different specializations.

Our Dynamic Medical Physics Team: A. Tini, V. Vlachopoulou, G. Rüthemann, T. Buchsbaum, C. Erckes, D. Bernhardt, T. Dossenbach and P. Pemler (F. Hasenbalg and S. Khan in quarantine)

In addition to the traditional fields of activity such as dosimetry, QA, radiation protection and treatment planning, Medical Physics also takes care of the IT landscape, the ROKIS and the optimization of workflows in the entire department.
The size of the clinic allows a very interactive collaboration with the other professional groups and two of the authors of this article can claim having been friends with technicians and medical colleagues for over 25 years. Not a bad place for medical physicists :)

In 2018 the two hospitals merged and the official name is now *Stadtspital Waid and Triemli*. And in the future, who knows, there might be radiotherapy at the Waid site again…



The old in the light of the new – Stadtspital Triemli 2018 (K. Zaugg)

Peter Pemler,
Claudia Erckes,
Thomas Buchsbaum.

"Welcome!"

Eleonora Paulicelli

My journey in the Medical Physics field has started in 2008 as an employee of a specialised consulting company for hospitals and private clinics, and after 3 years of this experience, I decided to enrol in the Medical Physics School at La Sapienza (Rome).
After the graduation in 2014, I started working at "*Mons. Dimiccoli*" (Barletta), close to my hometown, but in 2016 I felt that my career needed an extra challenge. Since then I had the opportunity to gain experience in different countries like Ireland and Germany. Those were inspiring times for me, as I needed to adapt not only to different working environments, but also to different cultures.

Working in radiotherapy is an everyday challenge because each patient demands an effort to our knowledge and our understanding in order to translate its clinical need into a dose distribution. Radiotherapy is an evolving field where technology has a big impact and where not only a proper and a consistent education to become medical physicist is needed, but also a life-long learning continuous education is fundamental. Moreover, I believe that nowadays medical physicists need to have a proactive approach to the profession and promote their role in the landscape of clinical medicine.

As for July 2020 I work at Ente Ospedaliero Cantonale in Bellinzona and I can't be happier to work in a really motivated team that is passionate about our job. I value the unique aptitudes that each of my colleagues brings into our daily routine and when issues occur. Everyone has a different valuable perspective and I'm pleased to bring my experience and knowledge at the disposal of the team.

Eleonora Paulicelli,
Ente Ospedaliero Cantonale (EOC) Bellinzona

“People on the move”

Nicolas Pitteloud

My path to becoming SSRMP certified was rather atypical, including two national languages, spanning three cantons, and four institutions. Each experience was enriching. Not only did I explore the various topics in medical physics, but I was able to do so with the help and guidance of many different professionals working in various fields, each with their own perspective and knowledge. Indeed, no two radio-oncology departments work in exactly the same way, and it’s been exciting for me to learn and develop by incorporating contrasting ideas into my practice.
I’ve since become a medical physicist, and have worked as one for almost a year at the cantonal hospital in Fribourg. I had never stepped foot in the city before the interview, but immediately felt a draw to it, the hospital and the team. I’m lucky to have joined a dynamic physics group with which I can hone my skills and continue learning.

Under normal circumstances, outside of work, you can find me playing with my band at your local gig or festival, enjoying various cuisines in the city, or travelling the world to satisfy my wanderlust.
I look forward to meeting you all very soon!

Nicolas Pitteloud,
Hôpital cantonal Fribourg
Nicolas.Pitteloud@h.fr.ch

“People on the move”

Riccardo Dal Bello

December is a special month. I am very happy to introduce myself to the SSRMP in this bulletin. Exactly one year ago, at the beginning of the month, I was studying to complete my *Weiterbildung Medizinische Physik für Physiker* (German equivalent of the MAS), rushing through my latest PhD results to prepare the defense and travelling for the first time to Zürich for an interview at USZ. You can imagine the stress. Each of the three was on the top of my priority list and I am very glad that by the end of the month I could celebrate with three cups of mulled wine.

I am Italian (with some Swiss roots) and I approached medical physics at the end of my bachelor studies in physics at the University of Trieste, Italy. There I had the chance to work on phase contrast x-ray imaging at the Elettra Synchrotron Light Laboratory. I then moved on to Heidelberg, Germany, where I completed my master studies in physics with a thesis analyzing the behavior of ion beams in inhomogeneous lung tissue. I almost came to Switzerland for a doctoral project at the EPFL, but back then I decided to continue with a PhD at the DKFZ in collaboration with the Max Planck Institute. As every doctorate, I spent many sleepless nights. Some of them were good fun exploiting the research beam time at HIT outside patient treatment to run my experiments on prompt gamma. I was trying to catch were the ions would stop and at least one, I got it correctly (see picture). During all these projects, I was always obsessed by a thought: “nice physics results, but what about clinical impact?”. Therefore, I attended the *Weiterbildung*, assisted the HIT physics team in the clinical routine and now I am glad to be a trainee at the USZ. The team here is great and there are plenty of chances to reverse my previous obsessing thought.

Unluckily it was not possible to meet you all at this year’ SSRMP meeting. I am looking forward to the good news that the end of this December will bring and hopefully meet fellow SSRMP members soon next year.

Riccardo Dal Bello,
University Hospital Zürich

“People on the move”

Francesca Belosi

After more than five exciting and adventurous, but also tough, years in the world of proton therapy, specifically in the proton department of the Paul Scherrer Institut (PSI, Villigen), I made the quite (emotionally) difficult decision to move back to the “photons world”. The emotions are not particle- related, but rather familial, regarding the great and caring group and environment that I had the luck of meeting and working with at PSI.

All started during my Master in Applied Physics at the University of Bologna. Thanks to many unforeseen circumstances, I ended up doing my master thesis at PSI, having a wonderful and extremely educative and mind-opening experience. My weekly intake of *tagliatelle*, *piadina* and *gnocco fritto* decreased with inverse proportionality to my weekly intake of cheese-fondue and rösti. Most important, I discovered that I could have a very profound fulfillment by using a portion of my physics notions to help carry out and improve cancer patient treatment care. And so, I engaged myself in the Fachanerkennung to obtain the Swiss certification as medical physicist. I carried out 2 years of training at the Ente Ospedaliero Cantonale (EOC) in Bellinzona meanwhile attending the MAS in Medizinphysik in Zürich. I’ll always be grateful to the people in Bellinzona at the time for teaching me with a lot of patience and iterations the fundamental aspects and know-how of radiation therapy and for transmitting me their experience and knowledge without reservation.
I completed my Fachanerkennung with a 3rd year of training back at PSI in 2015, where I worked until recently.

In June this year, I moved to the University Hospital of Zürich with the goal of catching up with many techniques and tools I never had the chance to work with during my education. So far I have been welcomed by yet another wonderful team. I’m happy of the new bend my life has taken, and hope I can still give a useful contribution in the field of medical physics.

Francesca Belosi,
University Hospital Zürich

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- Reports of conferences, working group meetings, seminars, etc.
- Reports on the work of various committees and commissions
- Succinct results of surveys, comparative measurements etc.
- Short portraits of individual institutions (E.g. apparatus equipment, priorities of work, etc.)
- Reports on national and international recommendations
- Short Press Releases
- Photos
- Cartoons & caricatures
- Announcement of publications (E.g. books, magazines)
- Announcement of all kinds of events (E.g. conferences, seminars, etc.)
- Short articles worth reading from newspapers or magazines (if possible in the original)
- Member updates (E.g. appointments, change of jobs, etc.)

The easiest way to send your document is as a MS Word document via email to one of the editor addresses above.

Deadline for submissions to Bulletin No. 99 (01/2021): 03.2021

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Conference Calendar

CALENDAR 2021

January 20
Berne
Winter School: Dosimetry Guided Treatment Planning for Radionuclide Therapy
January 20 - January 22
http://www.nukmed.insel.ch/de/ueber-uns/kontakt/winter-school-dosimetry-guided-treatment-planning-for-radionuclide-therapy

February 16
Online
International Conference on Advances in Radiation Oncology (ICARO-3)
February 16 - February 19
https://www.iaea.org/events/icaro-3

March 3
Wien, AT
European Congress of Radiology 2021
March 3 - March 7
https://www.myesr.org/abstracts

March 23
Groningen, NL
7th International Conference on Education and Training in Radiation Protection
March 23 - March 26
https://www.etrap.net/

April 19
Heidelberg, DE
8th MR in RT symposium
April 19 - April 21
https://www.dkfz.de/en/medphys/MRinRTHD2021/MRinRTHD2021.html

May 21
Taipei, Taiwan
PTCOG 59
May 21 - May 26
http://www.ptcog59.org/

June 16
Torino, IT
3rd European Congress of Medical Physics
June 16 - June 19
http://www.ecmp2020.org/

June 24
Davos
Swiss Congress of Radiology 2021
June 24 - June 26
https://www.radiologiekongress.ch/

August 27
Madrid, ES
ESTRO 2021
August 27 - August 31
https://www.estro.org/Congresses/ESTRO-2021

September 19
Wien, AT
Dreiländertagung SGSMP-DGMP-ÖGMP 2021
September 19 - September 22
https://ssrpm.ch/event/dreilandertagung-sgsmp-dgmp-ogmp-2021/

And please, if you participate in any conference or meeting, think of writing a few lines or sending a picture for the Bulletin.

THANK YOU!