

## D5.2 – Report of the 1st Summer School

ECRIN

12 APRIL 2023

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## Executive summary

Objective number 5 of the EU-Africa PerMed project is “To carry out capacity building and training activities addressing relevant PM issues for Africa” and it is addressed in WP5 – Capacity building. The “Summer Schools” are specific training events that are meant to allow young professionals to acquire new knowledge and skills in PM research, providing a platform for sharing insight and experiences in PM research and for networking in light of future EU – Africa PM collaborations.

The first Summer School focusing on “**Adoption and integration of standards in PM research**” took place in Cape Town, South Africa on February 22 & 23, 2023 and online. It covered the key stages of PM research from data collection to the translational process, covering regulatory aspects. This allowed participants to understand the importance of integrating standards for quality research at each stage and its relevance for international collaborations in PM. Through a dedicated session focusing on research teams with ongoing Africa – EU collaborations, participants were able to discuss with the representatives of research teams, on opportunities and challenges for bi-regional collaboration.

A total of 55 attendees from 28 countries (including grantees, in-person participants, online participants, speakers and consortium representatives) participated in the Summer School, in Cape Town or online. Seventeen lectures and talks were facilitated by experts from Africa and EU, who illustrated their lectures with use cases and examples. Participants worked on the analysis of case studies and questionnaires in breakout groups and exchanged with lecturers on their perspectives.

The overarching objectives of the first Summer School were attained and the anonymous feedback obtained was positive and constructive. Participants in-person and online obtained new knowledge on PM research, the existing standards for each stage of the research pipeline and the importance of their use and their further development. The Summer School also provided a useful platform for networking for future collaboration.



## 1. Objective

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Objective number 5 of the EU-Africa PerMed project is “To carry out capacity building and training activities addressing relevant PM issues for Africa”. This objective is intricately linked with all other project objectives and is essential for the overarching success of the project. It is addressed in WP5 – Capacity building. Having defined capacity building as a key area for collaboration, a series of training activities are planned within the EU Africa PerMed project to build bridges between the PM research communities in Africa and the EU, including webinars and in-person interactive training events or “Summer Schools”.

The “Summer Schools” are meant to allow young professionals to acquire new knowledge and skills in PM research. Lectures on key topics, illustrated by use cases and examples of current and past work of the lecturers, are followed by group work where participants analyze a case study, respond to a questionnaire or perform other interactive work with their peers. Prior to the training event, participants are provided with bibliography on the topics to be covered. At the end of the event, participants must pass a short exam on the content of the lectures to obtain their certificate of attendance.

These training events are a platform for sharing insight and experiences in PM research in both regions, and for sharing and discussing examples of EU – Africa PM collaborations. The Summer Schools also aim to foster collaboration in PM research between EU and African research teams, providing an opportunity for networking among participants and lecturers.

The first Summer School focusing on “Standards in personalised medicine research” took place in Cape Town, South Africa on February 22 & 23, 2023 and online. It covered the key stages of PM research allowing participants to understand the importance of integrating standards for quality research at each stage and its relevance for international collaborations in PM. Through a dedicated session focusing on research teams with ongoing Africa – EU collaborations, participants were able to exchange with the representatives of research teams, on opportunities and challenges for bi-regional collaboration.

Originally open to 20 early career professionals working on PM research from EU and African countries for in-person participation, it was expanded to 15 additional online participants. All participants were evaluated and admitted on a competitive basis. The ten highest ranked participants were selected to receive a travel grant, covering their flight and accommodation, after ensuring a balanced geographical representation. Participation in this training event was free of cost.

This deliverable reports on the planning and organization, the content and the outcomes of the first Summer School of the EU Africa PerMed project.

## 2. Methodology

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From the conception of the EU Africa PerMed project, the focus of the first Summer School was defined, as “**Adoption and integration of standards in PM research**” in order to fully advance Objective number 5 of the project: To carry out capacity building and training activities addressing relevant PM issues for Africa, including the wider adoption of PM standards and taking into account the social, cultural, ethical and legal aspects of the African context.

The planning of the Summer School took place within the framework of WP5, and engaged the WP5 partners, as well as the South African Medical Research Council (SAMRC), who hosted the event, and supported all logistical planning.



### 2.1. Planning and organisation

Planning of the first Summer School began in the summer of 2022 within the regular coordination meetings of WP5. ECRIN coordinated the organization, and was supported by ItMoH, APHRC, INNOVATEC, IRESSEF, all WP5 members.

Having selected the central topic of the Summer School, potential dates and locations were discussed. As the 2<sup>nd</sup> Stakeholder Workshop of the project would be organized by WP3 and held in Cape Town from 20 & 21 February, 2023 it was decided to hold the first Summer School back-to-back to this event. This would help to reduce travel costs, and to maximize the presence of consortium representatives, advisory board members and to mutualize speakers. Furthermore, the 2023 International Congress of Human Genetics would be taking place on in Cape Town on 22 – 26 February, which would also bring potential speakers and participants to the city.

All logistical planning was done in collaboration with SAMRC, who identified and contracted the meeting venue, the accommodation for the grantees and speakers, and all catering. Bi-weekly logistical planning meetings, hosted by SAMRC, allowed the coordinated planning of the Summer School, with the Stakeholder Workshop and the consortium meeting in Cape Town.

### 2.2. Program

A concept note and preliminary program were drafted. The program would follow the stages of the PM research pipeline allowing participants to follow each of the stages from discovery to clinical research, and to understand the importance of standards in each of these stages. The lectures would be provided by experts from European and African countries, who could present the concepts and illustrate them with use cases from their own work. Additionally, a session of the Summer School would focus on existing EU-Africa research collaborations in PM. This would give participants an opportunity to learn on the advantages and challenges of establishing such collaborations, helping to foster future bi-regional projects.

All WP5 partners provided suggestions on experts who could facilitate the lectures. Advisory board members, and the SAMRC were also consulted for suggestions. Geographical and gender balance was sought when selecting the experts who were invited to give the lectures.

The final programme for the summer school is included in **Annex I**

### 2.3. Participant selection

Selection criteria for the participants were defined prior to the launch of candidate registrations, by the partners of WP5. Participants would need to be citizens of African or EU countries, be early career professionals in PM and would need to be able to provide a recommendation letter, along with the application form and a copy of their CV. They would be evaluated on their academic potential, their experience in PM, and their personal motivation by the partners of WP5. The ten highest ranking candidates having requested the travel grant would be awarded the grant.

The selection criteria were explained in a document (see Annex II) that was made available on the project website, for interested applicants to consult. The registration period for interested candidates was open from 9 December, 2022 to 8 January, 2023.

Initially foreseen as a fully in-person event for 20 participants (including 10 grantees), the WP5 partners jointly decided to transform the event into a hybrid event, and to select 15 additional participants for online participation.



### 3. Results

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#### 3.1 Participants

A total of 56 candidates, from 24 countries submitted applications.

The selection criteria were applied by the selection committee, formed by the partners of WP5. Each institution provided a note for each of the participants, on the criteria of academic potential, their experience in PM, and personal motivation. The notes were then weighted as has been defined, and averaged. The candidates were then ranked according to their notes. The final selection was made correcting for gender distribution and balance.

The ten highest ranking participants who had requested the travel grant were awarded the grant, and were notified of the award. Only one participant turned down the award, and this award was therefore transferred to the next highest-ranking participant.

Participants having been selected for in-person participation but who did not receive the travel grant were contacted, and asked to confirm their participation. If they were unable to cover their travel expenses they were invited to join online, and the next highest ranking candidate on the list was invited to join in-person.

The final list of participants was composed as follows (see full list in **Annex V**):

- 10 grantees from: Italy (1), South Africa (1), Kenya (2), Burundi (1), Egypt (1), Nigeria (2), Ethiopia (1), Tunisia (1). With 5 male and 5 female grantees.
- 11 in-person self-funded participants from: Egypt (2), Sudan (1), Morocco (1), Lesotho (1), South Africa (2), Somalia (1), Senegal (1), Nigeria (1), Italy (1). With 6 female participants and 5 male.
- 13 online participants from: Poland (1), Israel (1), Kenya (4), South Africa (1), Democratic Republic of Congo (1), Tanzania (1), Uganda (1), Mali (1), Central African Republic (1), Nigeria (1). With 6 female and 7 male participants.

Unfortunately, in the week prior to the event, 3 participants having received the travel grant and 3 participating in-person did not receive their visas on time, while one participant had a sick family member, and therefore participated online. One additional self-funded participant was able to join, given that in-person spots had become available. The final attendance was as follows:

- 7 grantees from: Italy (1), South Africa (1), Kenya (2), Egypt (1), Ethiopia (1), Tunisia (1), With 2 male and 5 female grantees.
- 8 in-person self-funded participants from: Egypt (2), South Africa (2), Sudan (1), Senegal (1), Italy (1), Ghana/The Gambia (1). With 6 female participants and 5 male.
- 20 online participants from: Poland (1), Israel (1), Kenya (4), South Africa (1), Democratic Republic of Congo (1), Tanzania (1), Uganda (1), Mali (1), Central African Republic (1), Burundi (1), Nigeria (4), Morocco (1), Lesotho (1), Somalia (1)
- 3 online male lecturers from Germany (2) and Kenya (1)
- 11 in-person lecturers from: Senegal (1), South Africa (2), Luxembourg (1), Netherlands (1), France (1), Germany (1), Zimbabwe (1), Tanzania (1), Tunisia (1), with seven female lecturers and 4 male.
- 13 consortium members

In total, the attendees represented 28 different African and EU countries.





**Figure 1.** Family picture of the 1<sup>st</sup>. EU-Africa PerMed summer school, 22-23 Feb 2023 Cape Town, South Africa,

All participants and speakers were provided access to a restricted digital drive, where bibliography suggested by the lecturers was made available. Also, each participant was asked to prepare and share a 4 minute voice-over presentation (following a harmonized template), to introduce themselves, their ongoing work and their interests in PM.

### 3.2 Lectures

After the words of welcome and official inauguration of the Summer School by the SAMRC and the project coordinator, the Summer School began with a quick round of introductions by all attendees, including participants, speakers and members of the consortium. Then, the first session focused on setting the scene, by providing an introduction to PM research, and to the importance of developing standards and promoting best practices in PM research.

The speakers' biographies can be seen in **Annex III**, and the Abstracts of lectures in **Annex IV**

#### DAY 1

##### **Lecture 1: Understanding Personalised Medicine – Rizwana Mia - SAMRC, South Africa**

This lecture provided the attendees with an overview of the PM research pipeline, its different stages and the different actors and stakeholders involved in PM research. It explained how the rapidly advancing field of genomics and the drop in costs has expanded opportunities for PM, changing not only research, but also healthcare systems. The lecture also highlighted the importance of the genetic diversity in the African context for the future of PM, and concluded on the opportunities that this presents both for Africa and Europe.

##### **Lecture 2: Data and metadata standards for personalised medicine research / A European standardization framework for data integration and data-driven in silico models for personalized medicine – EU-STANDS4PM - Martin Golebiewski - HITS gGmbH (Heidelberg, Germany) Marc Kirschner - Forschungszentrum Jülich GmbH (Jülich, Germany)**

This lecture was composed of two complementary presentations. The first part, presented by Martin Golebiewski focused on the importance of harmonized practices and standards for metadata. It introduced the FAIR principles and explained the importance of using common standards to allow the use of different datasets. The lecture covered some of the main standards used today, and explained how these are developed



by different scientific communities, zooming in on how ISO standards and technical specifications are developed.

The second presentation focused on the experience of the EUStands4PM project, which focused on developing an ISO technical specification for computational models as well as clinical decision support systems in personalized medicine research. It allowed participants to understand the rationale behind such a project and the different stages that were followed to reach the submission of the proposed technical standards to ISO, which are under review and awaiting formal publication.

**Lecture 3: Developing recommendations for personalised medicine research methodologies – the PERMIT project experience and the ICPeMed best practice recognition program - Paula Garcia – European Clinical Research Infrastructure Network (ECRIN) (Paris, France)**

This brief lecture focused on two initiatives that aimed to promote harmonization of PM practices. It first presented the PERMIT project (GA n° 874825) which developed methodological recommendations for all stages of the PM research pipeline. The rationale for developing such a project was presented, highlighting the particular challenges that funders, scientific journals, regulators, investigators, and other stakeholders have faced when developing and evaluating PM research programmes. The main steps for the development of the PERMIT recommendations were explained, as well as an overview of its outcomes and outputs.

The second part of the lecture focused on the ICPeMed best practice recognition program. It introduced the ICPeMed, presented the aims of this program, provided examples of initiatives that have been recognized and invited attendees to participate and disseminate the 2023 call for proposals.

The second session of the Summer School focused on Data collection and management for PM research and was composed of two lectures.

**Lecture 4: Generating data - standards in genomics - Rokhaya Ndiaye Diallo – Univeristy Cheik Anta Diop (Dakar, Senegal)**

Professor Ndiaye's lecture focused on the steps that must be followed to generate genomics data, and what standards must be applied to ensure that quality data is generated. It covered the different techniques for data generation and the particular importance of the FAIR principles for genomic data. The lecture covered the important aspects to consider when designing a genomic study as well as the different platforms that can be used to generate genomic data, and what should be considered when selecting a platform.

Following the lecture participants were split into groups to work on a practical use case that was presented by Prof Ndiaye on a population genomics study in Senegal. A representative from each group, in-person and online, presented their suggestions on how they would approach the use case that was proposed.



**Figure 2.** Participants in working groups



**Lecture 5: Standards for Data Management in Personalized Medicine: Opportunities, Challenges, and Possible Solutions - Damazo Kadengye - African Population and Health Research Center (APHRC) – (Nairobi, Kenya)**

This lecture focused on the following stage of the PM research pipeline, i.e. managing the data once it has been generated. It covered general principles for data management standards in health research, the particular implications of PM for Data Management, the specific challenges and hurdles for data management in PM, points to consider for PM data management and the implications for data driven analytics in PM. The lecture concluded by highlighting the importance of understanding that there is no “one size fits all” for the management of PM data, and that upholding the safety and the integrity of the data is essential. Following the lecture Dr Kadengye provided the participants with two articles for analysis.

The final lecture of the day opened Session 3, which focused on Data analysis for biomarker identification and stratification.

**Lecture 6: Biomarker Identification and Risk Stratification - Maritha Kotze & Elouise E Kroon - Stellenbosch University (Stellenbosch, South Africa)**

This lecture began with an online questionnaire on genetic counseling that allowed participants to gauge their baseline knowledge on this topic.

The lecturers shared their personal experience in the development and implementation of a pathology-supported genetic testing (PSGT) platform at the intersection of research and service delivery. They presented the existing challenges in the development process, and explained to participants how they can be overcome, and how discoveries can be transformed into life-changing solutions for patients. Examples were provided from the field of familial hypercholesterolemia and breast cancer, allowing participants to consolidate learning of the first day of the Summer School around concrete success stories. Participants were then invited to resubmit their responses to the initial questionnaire, and to assess how their responses changed with the lecture.

The first day of the Summer School closed with a social networking event that allowed participants to continue exchanging on their ongoing and future work.

**DAY 2**

The second day began with the second part of Session 3, focusing on Data analysis for biomarker identification and stratification.

**Lecture 7: AI for patient stratification: Challenges and recommendations - Enrico Glaab – University of Luxembourg (Luxembourg)**

This lecture began by providing an introduction to AI for personalized medicine explaining its uses and added value in particular for the stratification of patients. Then, the current limitations and gaps in the field were explained and illustrated. Participants were then provided with an overview of general recommendations to address common challenges in AI for stratification developed within the framework of the PERMIT project, including example use cases from previous successful diagnostic biomarker development projects. To help participants ground the concepts, they split into working groups and responded to an online questionnaire. Then, both online and in-person groups discussed the responses to these questions.





**Figure 3.** Participants in working group

A single lecture made up Session 4 on Translational medicine.

**Lecture 8: The translational process in personalized medicine - Sara Zullino - European Infrastructure for Translational Medicine (EATRIS) (Amsterdam, The Netherlands)**

An introduction to the field of translational medicine and to EU research infrastructures (RI) was provided as an opening to this lecture. Before diving into the second part of the lecture, the participants split into working groups and discussed the main challenges that hamper the effective translation of preclinical research findings into prediction of treatment outcome for human patients. The lecture then continued and focused on these existing challenges, allowing participants to confirm or discard their proposals, and the recommendations that were developed to address them within the framework of the PERMIT project. Before ending the lecture, opportunities for further training and for support from EU RIs was shared with the participants.

The 5<sup>th</sup> session focused on clinical research and was composed of three complementary lectures.

**Lecture 9: Clinical trial designs in personalised medicine - Raphaël Porcher – Université de Paris (Paris, France)**

Dr Porcher began his lecture by framing the concept of personalised medicine and shedding light on the different definitions, terms and approaches to PM. He reviewed the limitations of some commonly used clinical trial designs in personalised medicine, and present some specific designs that have gained attention in PM, namely basket, umbrella, and platform trials, as well as adaptive enrichment designs. Dr Porcher illustrated the advantages that these designs can have, and highlighted the aspects that must be taken into consideration when designing a clinical trial for PM, as identified in the PERMIT project.

Time was insufficient for a working group activity, but participants were provided with an additional research article illustrating PM trial designs for further reading.

**Lecture 10: Regulatory aspects of personalized medicine: the need for regulatory research - Julia Stingl - Institute of Clinical Pharmacology, University Hospital of RWTH Aachen (Aachen, Germany)**

This lecture began by providing an overview of the regulatory framework under which PM operates, and what the key areas of the regulation are for the protection of patients and citizens. Then, Dr Stingl zoomed in on the particular aspects of pharmacogenomic, what information it can provide, and what the regulatory



obligations are. She illustrated the process for developing pharmacogenomics evidence and subsequent recommendations, highlighting the importance of regulatory research for a robust and adequate regulatory framework, in particular in the rapidly evolving landscape of PM.

Two different case studies were discussed by the participants in small groups, which then reported their conclusions.



**Figure 4.** Participants working on case studies

**Lecture 11: Pharmacogenetics in Personalized Medicine – an overview and comparison of current clinical guidelines - Collen Masimirembwa - African Institute of Biomedical Science and Technology (AiBST) (Harare, Zimbabwe)**

For this final technical lecture, Dr Masimirembwa, provided a complementary perspective on the importance of pharmacogenetics for PM. The lecture began with an overview of the basic concepts of pharmacogenetics and the most common CYP polymorphisms that affect drug metabolism. He then explained where public information can be found on important pharmacogenetic biomarkers of common drugs and the existing limitations to routine genetic testing for these known markers. Dr Masimirembwa then presented the existing initiatives to develop and implement clear guidelines for the implementation of pharmacogenetics into routine care, their differences and the remaining gaps to be overcome by additional research. The lecture finished with examples of ongoing studies that aim to tackle these gaps.

The final session of the Summer School focused on ongoing Africa – EU PM collaborations, allowing participants to exchange first hand with the investigators carrying out these initiatives. A final presentation allowed participants to learn of ongoing and upcoming opportunities for funding and collaboration with EU teams.

**Lecture 12: SALAMA Study: Studying acute Leukemia mutations in Africa (Tanzania – Ireland - Dr Koga Luhulla – Muhimbili National Hospital, (Dar es Salaam, Tanzania)**

This collaboration between the Children’s Health Hospital in Crumlin, Ireland and the Muhimbili National Hospital has given way to the SALAMA research project, on acute pediatric leukemia. It aims to understand the genetic profile of acute leukemia in Tanzania and to do parallel analysis with a cohort of acute leukemia patients in Ireland, to identify the difference in disease biology between these two countries.

**Lecture 13: Collaboration between EU (Italy- Istituto Oncology Romagnolo) and AFRICA (Tanzania - Bugando Medical Centre)- Dr Nestory Masalu - (Mwanza, Tanzania)**

Since 2004, an important and continuous cooperation has been developed between the Istituto Romagnolo per lo Studio dei Tumori (IRST) of Meldola - Italy and the Bugando Medical Center (BMC) of Mwanza - Tanzania. Together IRST and BMC assisted in the establishment of the oncology Department in 2008, several Italian Medical Oncologists have visited the Oncology Department in BMC, and physicians from Bugando have



received a complete and extensive training in Oncology in several Italian Institutions. This collaboration today is continuous through almost weekly communication exchange between Italian and Tanzanian physicians and it's leading to implement research projects in retinoblastoma and Wilms tumors.

**Lecture 14: PerMediNA: The North African Experience in Personalized Medicine Implementation – Yosr Hamdi - Pasteur Institute Tunis (Tunis, Tunisia)**

PerMediNA (Personalized Medicine in North Africa) is a project funded by the French Ministry of European and Foreign affairs, aiming to implement a North African Precision Medicine consortium and ecosystem that includes all engaged stakeholders including health care providers, clinicians, pathologists, radiologists, geneticists, academic researchers, IT and bioinformaticians, Biotech and Pharma companies, policy makers, advocacy groups and patients. It involves three North African countries (Tunisia, Algeria and Morocco) but includes outreach and scientific collaboration activities with Europe and with Sub-saharan countries.

**Lecture 14: Overview of research collaboration opportunities for Personalised Medicine - Maria José Alvarez Ruiz – Italian Ministry of Health (Rome, Italy)**

Participants were provided with an overview of the research initiatives linking health collaborations between Europe and Africa. A brief overview of the Horizon Europe programme and its different elements was provided, as well as explanations on how to access the different sites and tools that allow interested researchers to identify potential funding calls. The ICPeMed and ERA PerMed were also introduced, as well as the upcoming European Partnership for Personalised Medicine. Participants were encouraged to consult and explore these different opportunities.

**Final exam**

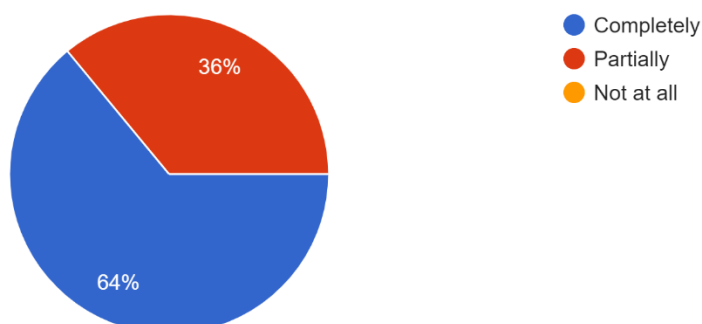
All participants completed an online exam, which contained 2-3 questions from each session of the Summer School. Only participants having successfully completed the final exam were awarded a certificate of participation.

**3.3 Results of the post-event evaluation**

An anonymous online feedback form was shared with all speakers, participants and consortium members who attended the Summer School, who were asked to provide feedback that would allow the organizing team to improve future training events, and to identify topics of interest. Twenty six responses were received. The responses are presented below

Did this event meet your expectations?

25 responses

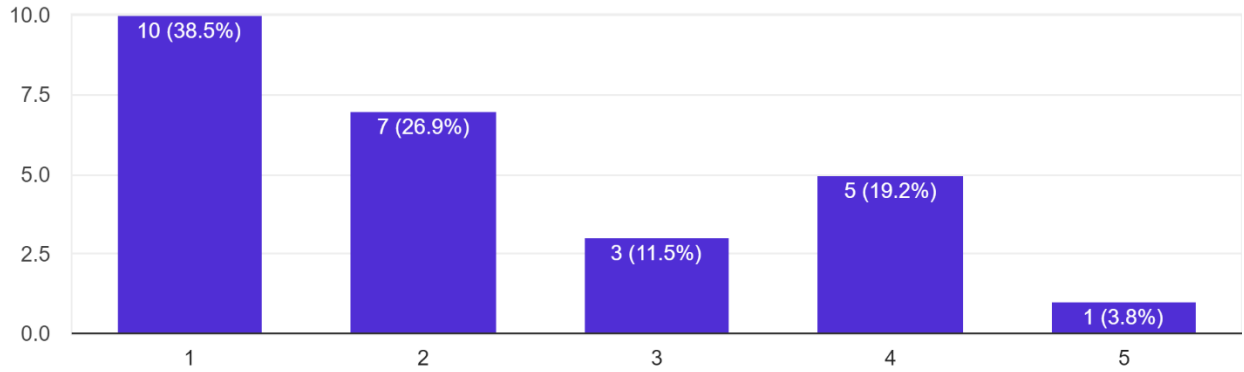


**Figure 5.** Percentage of respondents considering the level to which their expectations were met



How useful was the Summer School for your current work?

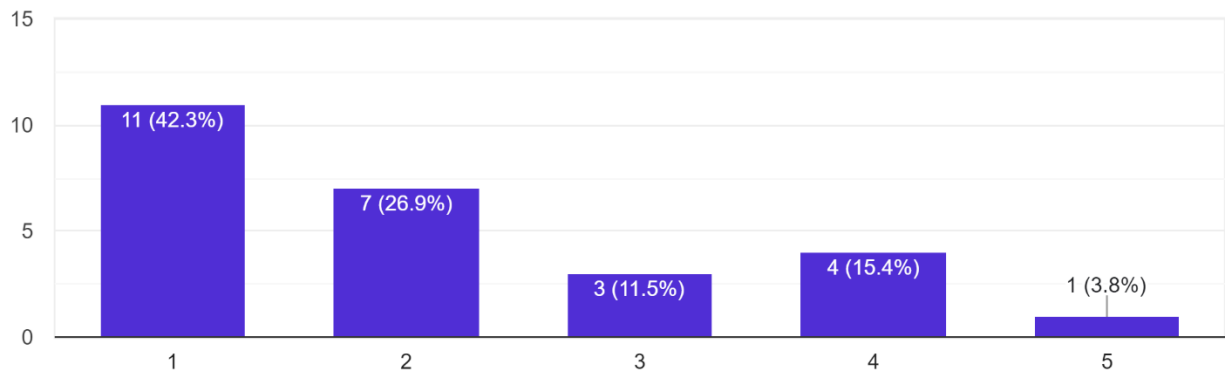
26 responses



**Figure 6.** Percentage of respondents considering how useful was the summer school to their current work. Scale of 1 – 5 with 1= very useful; 5= not useful at all

How useful was the Summer School for your future professional projects?

26 responses

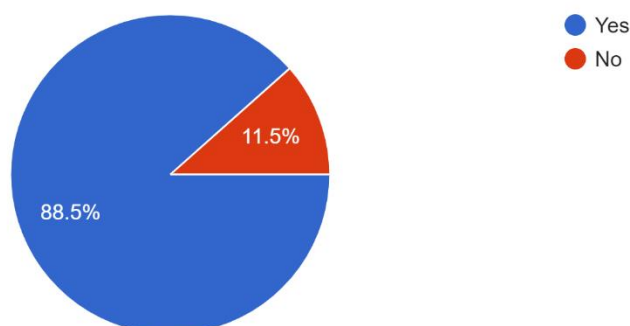


**Figure 7.** Percentage of respondents considering how useful the summer school was for future work. Scale of 1 – 5 with 1= very useful; 5= not useful at all



Was the program sufficiently balanced between presentations and time for discussions?

26 responses



**Figure 8.** Percentage of respondents considering if the time for presentations and discussions was balanced. Yes or no question

When participants were asked for suggestions on topics that could be covered in future Summer Schools and/or webinars the following topics were suggested:

- Other omics (beyond genomics), including lipidomics
- Implementation of PM into care and clinical applications
- PM and Public Health
- Data interpretation
- Clinical trials in PM, including N of 1 trials and trials on pharmacogenetics
- Gene therapy and functional genomics
- Genomics and cancer

The following suggestions on aspects that could be improved were provided:

- Enrich lectures with more case studies and clinical cases as well as cases of implementation at a local, regional or national level in Africa
- Have more in-person participants
- Provide more time for un-structured interaction between participants and speakers
- Have a longer duration of the Summer School to provide more time to each topic
- Having a simpler exam, or no exam
- Share more experiences

#### 4. Conclusions

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The overarching objectives of the first Summer School were attained, and the anonymous feedback that confirmed this achievement. Participants, in-person and online, obtained new knowledge on PM research, the existing standards for each stage of the research pipeline and the importance of their use and their further development.

The geographical scope of the attendees was very diverse, with the representation of 28 EU and African nations, and a wide variety of professional backgrounds, all linked to PM research. Participants and speakers exchanged knowledge and experiences, as the Summer School provided a platform for networking. Furthermore, the presentations on the ongoing EU-Africa collaborations, allowed participants to learn and exchange on the challenges and the opportunities that can come from these collaborations. The



complementary presentation on funding and collaboration opportunities directed participants to the relevant resources that they can consult and make use of in their future collaborations.

During the preparation of this report we were informed that following the Summer School, two different proposals for calls under the Cancer Mission and Horizon Europe have been submitted by research teams of IRST of Meldola in Italy with collaborators in the Bugando Medical Center in Tanzania and with the SAMRC.

## 5. Next steps and recommendations

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The recorded presentations will be made available online through the project's YouTube channel. A dissemination campaign will be launched to promote the videos, to ensure that a broader audience can learn from the lectures of the First EU-Africa PerMed Summer School, and to maximize the resources invested in the development and preparation of the lecturers.

All participants and speakers who have provided their consent for future project events will continue to be contacted and invited to join these events. In particular, additional communication and dissemination efforts will be mobilized for the second Summer School, to ensure more candidates from EU countries apply and participate in the event. Furthermore, the difficulty of obtaining visas in a timely manner will be an important consideration for the second summer school.

The recommendations and suggestions provided through the feedback survey will be taken into consideration for the organization of future training events in WP5, in order to ensure that these events will be successful and will respond to the needs and interests of the research communities.



## 6. Annexes

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### Annex I – Summer School Program





## EU Africa PerMed “Summer School”

### Standards in personalised medicine research

Breakwater Lodge - Cape Town South Africa

22 & 23 February 2023

The [EU Africa PerMed](#) project, funded by the European Commission’s Horizon Europe programme, aims to build bridges between African and European countries in the field of personalised medicine (PM). In order to achieve its objectives a series of activities are planned within the project, such as webinars and in-person interactive training events or “Summer Schools”, which allow young professionals to acquire new knowledge and skills in PM research. Lectures on key topics, illustrated by case studies and examples of current and past work of the lecturers, are followed by “working groups” where participants analyze a case study, respond to a questionnaire or perform other interactive work with their peers. Prior to the training event, participants are provided with bibliography on the topics to be covered. At the end of the event, participants must pass a short exam on the content of the lectures to obtain their certificate of attendance.

The Summer Schools provide a platform for sharing insight and experiences in PM research in both regions, and to share and discuss examples of EU – Africa PM collaborations. They also aim to foster collaboration in PM research between EU and African research teams, providing an opportunity for networking among participants and lecturers

The first Summer School focusing on “Standards in personalised medicine research” will cover key stages of PM research and will allow participants to understand the importance integrating standards for quality research at each stage and its relevance for international collaborations in PM. It will also have a session focused on research teams with ongoing Africa – EU collaborations to allow participants to exchange with research teams on opportunities and challenges for bi-regional collaboration.

The organization of this first summer school of the EU Africa PerMed consortium, is led by the European Clinical Research Infrastructure Network (ECRIN), in collaboration with the African Population and Health Research Center (APHRC), the Italian Ministry of Health, the Institute for Health Research Epidemiological Surveillance and Training (IRESSEF) and Innovatec. It is hosted by the South African Medical Research Council.



<b>DAY 1: Wednesday 22 February, 2023</b>	
<b>TIME</b>	<b>AGENDA ITEM</b>
<b>8h30 – 9h00</b>	<b>Registration</b>
<b>9h00 – 9h20</b>	<b>Welcome and opening</b> South African Medical Research Council – Rizwana Mia – Senior Program Manager Innovatec - Erika Sela - EU Africa PerMed Project Coordinator
<b>9h20 – 9h40</b>	<b>Introduction to the project and the training event’s objectives</b> Paula Garcia, European Clinical Research Infrastructure Network (ECRIN) (Paris, France) <b>Round of introductions</b>
<b>SESSION 1 - Introduction to Personalised Medicine Research and research standards</b>	
<b>09h40 - 10h40</b>	<b>Understanding Personalised Medicine</b> <b>Working groups</b> Rizwana Mia – South African Medical Research Council (SAMRC) (Cape Town, South Africa)
<b>10h40 – 11h00</b>	<b>TEA &amp; COFFEE BREAK</b>
<b>11h00 – 12h00</b>	<b>Data and metadata standards for personalised medicine research / A European standardization framework for data integration and data-driven in silico models for personalized medicine – EU-STANDS4PM</b> Martin Golebiewski - HITS gGmbH (Heidelberg, Germany) Marc Kirschner - Forschungszentrum Jülich GmbH (Jülich, Germany)
<b>12h00 - 12h30</b>	<b>Developing recommendations for personalised medicine research methodologies – the PERMIT project experience and the ICPeMed best practice recognition program</b> Paula Garcia – European Clinical Research Infrastructure Network (ECRIN) (Paris, France)
<b>12h30-13h40</b>	<b>LUNCH</b>

SESSION 2 - Data collection and management for PM research	
13h40 – 14h40	<b>Generating data - standards in genomics</b> <b>Working groups</b> Rokhaya Ndiaye Diallo – Univeristy Cheik Anta Diop (Dakar, Senegal)
14h40 – 15h40	<b>Standards for Data Management in Personalized Medicine: Opportunities, Challenges, and Possible Solutions</b> <b>Working groups</b> Damazo Kadengye - African Population and Health Research Center (APHRC) – (Nairobi, Kenya)
15h40-16h00	<b>TEA &amp; COFFEE BREAK</b>
SESSION 3 – Data analysis for biomarker identification and stratification	
16h00-17h00	<b>Biomarker Identification and Risk Stratification</b> <b>Working groups</b> Maritha Kotze & Elouise E Kroon - Stellenbosch University (Stellenbosch, South Africa)
17h00 – 17h10	<b>Closing remarks of the day</b>
19h00	<b>SOCIAL EVENT - DINNER</b>

## DAY 2: Thursday 23 February, 2023

TIME	AGENDA ITEM
8h45 – 9h00	<b>Welcome and agenda for the day</b> EU Africa PerMed Project coordinator /Summer School coordinators
SESSION 3 – Data analysis for biomarker identification and stratification - continued	
9h00 – 10h00	<b>AI for patient stratification: Challenges and recommendations</b> <b>Working groups</b> Enrico Glaab – University of Luxembourg (Luxembourg)

SESSION 4 - Translational research – preclinical stages	
10h00 - 11h00	<p><b>The translational process in personalized medicine</b></p> <p><b>Working groups</b></p> <p>Sara Zullino - European Infrastructure for Translational Medicine (EATRIS) (Amsterdam, The Netherlands)</p>
11h00-11h10	<b>TEA &amp; COFFEE BREAK</b>
SESSION 5 – Clinical research	
11h10 – 12h10	<p><b>Clinical trial designs in personalised medicine</b></p> <p><b>Working groups</b></p> <p>Raphaël Porcher – Université de Paris (Paris, France)</p>
12h10 – 13h10	<p><b>Regulatory aspects of personalized medicine: the need for regulatory research</b></p> <p><b>Working groups</b></p> <p>Julia Stingl - Institute of Clinical Pharmacology, University Hospital of RWTH Aachen (Aachen, Germany)</p>
13h10-14h00	<b>LUNCH</b>
14h00-14h10	<b>GROUP PHOTO</b>
14h10 – 15h10	<p><b>Pharmacogenetics in Personalized Medicine – an overview and comparison of current clinical guidelines</b></p> <p><b>Working groups</b></p> <p>Collen Masimirembwa - African Institute of Biomedical Science and Technology (AiBST) (Harare, Zimbabwe)</p>
15h10-15h20	<b>COFFEE BREAK</b>
SESSION 6 – International collaborations for personalised medicine research	
15h20-16h30	<p><b>EU – AU collaboration experiences</b></p> <ul style="list-style-type: none"> <li>- <b>SALAMA Study: Studying acute Leukemia mutations in Africa (Tanzania – Ireland)</b> - Dr Koga Luhulla – Muhimbili National Hospital, (Dar es Salaam, Tanzania)</li> <li>- <b>Collaboration Between EU (Italy- Istituto Oncology Romagnolo) and AFRICA (Tanzania - Bugando Medical Centre)-</b> Dr Nestory Masalu - (Mwanza, Tanzania)</li> <li>- <b>PerMediNA: The North African Experience in Personalized Medicine Implementation</b> – Yosr Hamdi - Pasteur Institute Tunis (Tunis, Tunisia)</li> </ul> <p>Q&amp;A and general discussion on challenges and opportunities</p>

<b>16h30-17h00</b>	<b>Overview of research collaboration opportunities for Personalised Medicine</b> Maria José Alvarez Ruiz – Italian Ministry of Health (Rome, Italy)
<b>17h00 – 17h45</b>	<b>Final Exam</b> Participants will complete a brief exam with questions from the lectures.
<b>17h45-18h00</b>	<b>Closing remarks</b> South African Medical Research Council – Rizwana Mia – Senior Program Manager Innovatec - Erika Sela - EU Africa PerMed Project Coordinator

**Annex II – Applicant instructions and criteria**



**Submission deadline – Sunday 08 January 2023 23h59 (Central European Time).**

### **Background**

[EU Africa PerMed](#) is a project funded by the European Commission’s Horizon Europe programme that aims to integrate African institutions into the International Consortium for Personalised Medicine ([ICPerMed](#)) and enhance collaborations between African and European countries in the field of personalised medicine (PM).

In particular, a series of activities is planned within the EU Africa PerMed project to build bridges between the PM research communities in both regions. These activities include training and capacity building activities, such as webinars and in-person interactive training events or “Summer Schools”.

The “Summer Schools” are meant to allow young professionals to acquire new knowledge and skills in PM research, through dynamic lectures and collaborative group exercises. These training events are a platform for sharing insight and experiences in PM research in both regions, and to share and discuss examples of EU – Africa PM collaborations. The Summer Schools also aim to foster collaboration in PM research between EU and African research teams, providing an opportunity for networking among participants and lecturers.

### **First EU-Africa PerMed Summer School**

The first Summer School focusing on “Standards in personalised medicine research” will take place in Cape Town, South Africa on February 22 & 23, 2023 in person. It will cover key stages of PM research and the importance integrating standards for quality research at each stage. It will also showcase research teams with ongoing Africa – EU collaborations.

It is open to 20 junior researchers, policy makers and health care workers from EU and African countries working in PM research, who will be selected on a competitive basis. Four participants will represent European countries, while sixteen will represent African countries. There will be ten travel scholarships available. Applicants who are not funded by the program but who meet the selection criteria, may attend the workshop covering their own travel and lodging expenses. There is no registration fee to attend this training.

Organized by the EU Africa PerMed consortium and hosted by the South African Medical Research Council, the Summer School will take place “back to back” with the 2<sup>nd</sup> EU-Africa PerMed Stakeholder Workshop.

### **Application process**

- 1- Read this document in detail
- 2- Fill out the following **application form**: [EU Africa PerMed Summer School Registration Form \(ecrin.org\)](#)
- 3- Upload your CV (max 2 pg + relevant publications) and recommendation letters in PDF format to the application form or send it via email to [paula.garcia@ecrin.org](mailto:paula.garcia@ecrin.org)

### Evaluation process and selection criteria

Each eligible applicant will be evaluated according to three criteria: academic potential; experience in the Summer School topics; personal motivation (including the applicability of the training material in their current and upcoming research).

The weight of each evaluation criterion is as follows: academic excellence (50%); experience in the topic (30%); personal motivation (20%).

Criteria are weighted as specified in the table below.

Criteria	Weight (%)	Min. rank required
1.-Academic potential	50	3 out of 5
2.- Past relevant experiences in Summer School topics	30	3 out of 5
3.- Personal motivation	20	3 out of 5

### Eligibility

Candidates must be citizens of EU or African countries, must hold a graduate degree or be carrying out graduate studies in a relevant field (Biology, Bioinformatics, Statistics, IT, Public Health, Computer Sciences, Bio-imaging, Clinical Research, Pharmacy, Medicine, Medical Studies, etc.) and must have experience in the field of personalised medicine research. Applicants must explain (in the application form) with sufficient detail how the learnings of the training will be applied in their current or future research work.

### Evaluation

Applications will be evaluated by an interdisciplinary panel of the EU Africa PerMed consortium. Candidates will be selected according to the rank list created by the total criteria score but also aiming at having a balanced audience from diverse regions/countries and a gender balance.

### Timeline

**Application Period:** 09 December 2022 – 08 January 2023

**Selection process:** 08 - 20 January 2023

**Announcement of selected participants and grantees:** 20-24 January 2023

### Participation fee

Participation in the Summer School is free of cost.

### Travel grant

Ten travel grants will be awarded to the highest ranking applicants. Geographic and gender balance will also be considered for selection. The travel grant will include a round ticket from the city of residence of the grantee to Cape Town, South Africa for the dates of the Summer School and two nights of accommodation, as well as meals during the days of the event.

EU Africa PerMed This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 964333





## Summer School – Standards in personalised medicine research Applicant instructions and criteria for evaluation

### Disclaimer

The Summer School is organized to take place in an in-person format. The organizers of the event may cancel or transform the event into a fully online event if the sanitary regulation does not allow participants and organizers to safely travel and meet face-to-face. The cancellation or modification of the event's format will not entitle accepted participants to any compensation or reimbursement of any fees incurred.



**Annex III – Speaker biographies**



## **SUMMER SCHOOL STANDARDS IN PERSONALISED MEDICINE SPEAKER BIOS**

[Collen Masimirembwa - African Institute of Biomedical Science and Technology \(AiBST\) - Harare, Zimbabwe](#)



Prof. Collen Masimirembwa is the founding President and Chief Executive Officer of the African Institute of Biomedical Science and Technology (AiBST) in Zimbabwe. AiBST is a research and education institute with a vision to discover, develop and deploy life transforming healthcare solutions for Africa. Collen is a Distinguished Professor at the University of the Witwatersrand working at the Sydney Brenner Institute for Molecular Bioscience (SBIMB) and a fellow of the Zimbabwe Academy of Sciences (ZAS) and the African Academy of Sciences (AAS). He is a highly published

researcher with a focus on Genomics and Precision Medicine. Collen developed the first registered clinical pharmacogenetic testing panel and dosing algorithm in Africa, GenoPharm<sup>R</sup>, that is inclusive of genetic variations unique to people of African ancestry. He has initiated a successful MSc degree program in Genomics and Precision Medicine which enrolls students from across Africa. To promote international collaboration in precision medicine, Collen is the Chair of the Global PGx Committee (South America, Africa & Middle East and South East Asia) in the Pharmacogenomics Global Research Network (PGRN) and is a member of the Advisory Board of the Eu-Africa PerMed initiative and a member of the EDCTP Scientific Advisory Committee. His work has won several awards including the Human Genome Organisations (HUGO) Award for Africa and the Gauteng Accelerator Program (GAP) for Health in South Africa. Collen has recently been awarded the Bill and Melinda Gates Foundation (BMGF) Calestous Juma Science Leadership Award (2021-2025) to expand clinical pharmacogenetic testing in Africa and build an ecosystem for drug discovery and development. To achieve these objectives, he has established the Consortium for Genomics and Therapeutics in Africa (CGTA) under which he directs the SPARK AFRICA program for translational research and the iPROTECTA program for the implementation of pharmacogenomics guided precision medicine.

[Damazo Kadengye - African Population and Health Research Center \(APHRC\) – Nairobi, Kenya](#)



Damazo Kadengye (PhD) is an Applied Biostatistician and Public Health Research Scientist interested in making effective use of data and data systems to enhance evidence-informed policy-making. He serves as the Head of Data Synergy at the African Population and Health Research Center (APHRC), Nairobi, Kenya. Previously, Damazo served as the Head of Data, Measurement and Evaluation at APHRC, a Senior Lecturer of Epidemiology and Biostatistics at Mbarara University of Science and Technology (MUST), Uganda, and as an Implementation Research Specialist/Epidemiologist with U.S. Centers for Disease Control and Prevention

(CDC), Kampala.

He received a PhD in Educational Sciences (dir: Applied Statistics) from the University of Leuven, Belgium; a Master of Statistics (dir: Biostatistics) from Hasselt University, Belgium; and a Bachelor of Statistics from Makerere University, Kampala. He is a 2017 Impact Evaluation Fellow of the Center for Effective Global Action (CEGA) at UC Berkeley, USA; and a member of the Network of Impact Evaluation Researchers in Africa (NIERA).

[Elouise E Kroon - Stellenbosch University - Stellenbosch, South Africa](#)



Dr Kroon is a medical doctor and transitioned from clinical medicine to research in November 2016. She was appointed as the Research Clinician on a NIH-funded international collaborative project (ResisTB). The study aimed to identify the underlying genetic and immunological mechanisms that protect persons who are living with HIV from infection with Mycobacterium tuberculosis (Mtb) and developing TB (HITIN). During this time, she was awarded a South African Medical Research Council (SAMRC) Clinician Researcher M.D PhD Scholarship in Clinical /Health Research and a European and Developing Countries Clinical Trials Partnership (EDCTP) Career Development Fellowship. Her PhD entitled 'Neutrophils as effector cells in resistance to Mycobacterium tuberculosis in HIV-infected persons' explored the gene expression differences between Mtb infection responses in neutrophils from HITIN compared to neutrophils from persons with so called latent Mtb infection (HIT) using bulk RNA sequencing. The key to successful implementation of genomic medicine in Africa lies in the education of the healthcare workforce as well as the public. Technology is advancing rapidly and developing countries are at risk to fall behind. With effective utilization of resources and directed genetic testing her hope is to contribute to the appropriate and successful implementation of personalized genomic medicine in Africa.

[Enrico Glaab – University of Luxembourg – Luxembourg](#)



Enrico Glaab is Deputy Course Director for the Master in Integrated Systems Biology and Principal Investigator of the Biomedical Data Science group (Glaab Lab). As a member of the Research Team in the National Centre of Excellence in Research on Parkinson's Disease (NCER-PD) he works on the sub-projects Data & Analytics and Biomarkers & Mechanisms. His research is centered around the development and application of software tools for the analysis of molecular, clinical and neuroimaging data for complex diseases, in particular for the neurodegenerative disorders Parkinson's and Alzheimer's disease. Key focus areas cover the design of graph-based algorithms to identify disease-associated perturbations in cellular processes and molecular sub-networks (software tools EnrichNet and GenePEN), machine learning methods to discover robust discriminative features for diagnostic biospecimen classification (software tools ArrayMining , PathVar , RepExplore, and approaches for network-guided candidate disease gene prioritization (software tools PathExpand and TopoGSA).

[Julia Stingl - Institute of Clinical Pharmacology, University Hospital of RWTH Aachen - Aachen, Germany](#)



University professor in clinical pharmacology, Julia Stingl is director of the Institute of Clinical Pharmacology at the University hospital of RWTH University Aachen, Germany. Before her move to the University RWTH Aachen, Dr. Stingl worked for seven years in drug regulation and research as vice president at the German drug regulatory authority, BfArM. Her research mostly focuses on Personalized Medicine and individual pharmacogenetic diagnostics. She pioneered the systematic development of personalized dose adjustments based upon differences in drug clearances caused by pharmacogenetic polymorphisms promoting the way of pharmacogenetics from bench to bedside. She explored individual variability in molecular or genetic influences on drug response and also worked on characterization of the physiological role of genetic polymorphisms in cytochrome P450 enzymes such as the brain expressed CYP2D6. She integrated new methods into pharmacogenetic research such as brain imaging techniques for visualization of individual drug effects and pharmacogenetic modulation. She is involved in several European projects on pharmacogenetics and personalized medicine, and is currently coordinator of the EraPerMed project Artipro on Artificial Intelligence methods for the prediction of response to antidepressant drugs involving multimodal biomarkers in several European countries and Israel. She has authored more than 270 publications in peer-reviewed scientific journals, has been cited more than 10,000 times with an average citation of 30 per article and an H-index of 54 (ISI web of science, July 2022).

[Koga Luhulla - Muhimbili National Hospital - Dar es Salaam, Tanzania](#)



Dr Koga Luhulla is a haematologist at Muhimbili National Hospital in Tanzania, She obtained her medical doctor and Masters of medicine in Haematology at Muhimbili University of Health and Allied Sciences (MUHAS). She has special interest in Paediatrics haematology . She is also heading blood transfusion unit in the hospital.

She works in both clinical and laboratory haematology. Her role includes reviewing patients in the ward, clinic and reporting the slides (peripheral smear, cerebrospinal fluid cytospin , bone marrow and trephine biopsies). She is passionate about improving diagnosis and treatment of acute leukemia patients.

[Marc Kirschner - Forschungszentrum Jülich GmbH - Jülich, Germany](#)



Dr Kirschner obtained his Ph.D. in Biology from the Institute for Molecular Cell Biology of the Johann-Wolfgang-Goethe University in Frankfurt-Main, Germany in 2000. Since 2010 he is a Scientific Officer at the Forschungszentrum Jülich GmbH, Project Management Jülich office in Jülich, Germany. Prior to this he was the Research Group Leader of the Institute for Virology and Immunobiology at the University of Würzburg in Germany. Dr Kirschner also held postdoctoral positions at the Department of Microbiology and Immunology of the Weill Medical College of Cornell University in New York City and the Department of Gene Therapy and Molecular Medicine of the Mount Sinai School of Medicine also in New York City.

[Martin Golebiewski - HITS gGmbH - Heidelberg, Germany](#)



Martin Golebiewski has studied biochemistry at the University of Tübingen (Germany) and works since 2005 at the Heidelberg Institute for Theoretical Studies (HITS: <https://www.h-its.org/en/>), a private non-profit research institute in Heidelberg (Germany). His main interests are data management and data integration for systems biology and systems medicine, as well as data and model standards in the life sciences. He chairs the 'data processing and integration' working group (ISO/TC 276/WG 5) of the ISO technical committee for biotechnology (ISO/TC 276) and is part of the board of coordinators of the COMBINE network (Computational Modeling in Biology Network: <http://co.mbine.org/about>). As leader of the task area "Standards for FAIR data" of the German National Research Data Infrastructure for Personal Health Data (NFDI4Health) he leads the standardization efforts for health study data. Within the European standardization framework for data integration and data-driven in silico models for personalised medicine (EU-STANDS4PM) he co-leads the work package for data sources and standards. Moreover, he is involved in the reaction kinetics database SABIO-RK (<http://sabio.h-its.org>) and in the data management initiative FAIRDOM (<https://fair-dom.org>). Over the years he also was responsible for data management in different large-scale systems biology and systems medicine networks, like the Virtual Liver Network and its successor the Liver Systems Medicine network (LiSyM: <http://www.lisym.org>) and others.

[Maritha Kotze - Stellenbosch University - Stellenbosch, South Africa](#)



Prof Maritha Kotze is a Principal Medical Scientist jointly appointed by Stellenbosch University and the National Health Laboratory Service of South Africa since March 2016. She has an H-index of 33 and serves on the editorial board of *Frontiers in Genetics*. She is also a director and the founder (April 2007) of Gknowmix, a spin-out company of the South African Medical Research Council that patented her first invention in the field of cardiovascular genetics in July 2001. The test concept evolved into a multi-assay pathology-supported genetic testing platform used in translational research projects aimed at the development of genomic solutions that add value to standard laboratory tests. This foundational model was recognized as best practice in breast cancer genomics by the International Consortium of Personalised Medicine in 2020. Insights gained from a needs assessment survey informed the development of a non-communicable diseases database at the intersection of genomic research and service delivery. This resource is governed by an institutional material and data sharing agreement that allows for return of research results to eligible study participants. Advancing point-of-care genetic testing to whole genome sequencing positioned her as an innovation enabler. In 2021 she formed part of a selected Cape Health Tech Sector expert group featured by the Western Cape Tourism, Trade and Investment Promotion Agency. Her publications include more than 150 invited reviews, original articles, editorials and book chapters.

**[Nestory Masalu – Bugando Cancer Center – Mwanza, Tanzania](#)**



Dr Nestory Masalu serves as the Director of the Bugando Cancer Centre. Dr Masalu is a medical doctor from the University of Dar-es-Salaam, and specialized in Oncology at the University of Ferrara, in Ferrar, Italy. Since 2009 he is Head of Department of Oncology Bugando Medical Centre, the second cancer center in Tanzania. He is also, since 2014 Assistant Professor/Senior Lecturer at the Catholic University of Health and Allied Science in Mwanza, Tanzania. Dr Masalu is member of the Tanganyika Medical Association, the Italian Medical Oncology Association-IAOM, the European Society of Medical Oncology –ESMO and the African Organization for Training and Research in Cancer-AORTIC.

Through a public-private partnership, Dr Masalu and team established the Oncology Bugando Medical Centre which provides specialized cancer care, through its unique facilities in Tanzania. The center has built the infrastructure for research with a tumor registry and a biobank. This biobank houses Burkitt's, retinoblastoma and Wilms' tumor samples. Dr Masalu has assembled a team of physicians, physicists, pathologists, nurses, social workers and data technicians fully dedicated to research efforts.

**[Paula Garcia – European Clinical Research Infrastructure Network \(ECRIN\) – Paris, France](#)**



Paula Garcia holds a Bachelor's degree in Chemistry Pharmacy and Biology from the Universidad Autonoma de Guadalajara (Mexico) and an International Masters of Public Health from the Ecole des Hautes Etudes en Santé Publique (France). Paula has extensive experience in international scientific cooperation and in the field of development aid. She previously worked as a project manager for the pharmaceutical industry, for the French research agency on HIV/AIDS and viral hepatitis (ANRS) and for a public health consulting firm, managing projects in developing countries.

Paula joined ECRIN as a project manager in 2019. She is focused on infrastructure development projects in Europe and beyond, helping ECRIN to liaise and cooperate with other existing and upcoming research infrastructures and networks. She managed the Horizon2020 PERMIT project, and collaborates in the EULAC PerMed and EU Africa PerMed projects. She is also involved in a series of EU-funded projects focusing on infectious diseases.

**[Raphaël Porcher – Université de Paris – Paris, France](#)**



Raphaël Porcher is a Professor of Biostatistics at Université Paris Cité, and senior statistician at Hôtel-Dieu hospital in Paris. He is a member of the METHODS team of CRESS-UMR1153 research center, and co-director of the Centre Virchow-Villermé Paris Berlin. Raphaël is an established investigator with expertise in innovative statistical methods for causal inference and personalized medicine, in particular using clinical prediction models. As PI or co-investigator on several nationally-funded (e.g., French National Research Agency - ANR) or European Union-funded (e.g., H2020 programs) projects. His research focuses on methods, with the development of new

statistical approaches for personalized medicine, and guidance, with the mapping and comparison of potential designs and applications. His interests are both methods-oriented (e.g. clinical trial designs

for personalized medicine in the PERMIT project) and disease-oriented (for instance in chronic diseases such as primary Sjögren's Syndrome in the NECESSITY project).

Dr. Porcher also has long-lasting experience in both the design and analysis of clinical trials, and more generally, statistical analysis of outcomes of patients with chronic diseases, including cancer, incorporating the course of evolution of their disease. His research on the use of causal statistical methods for observational studies tackles the use of real-world data—or evidence—to estimate the effect of interventions and determine who benefits more from those. This has also fostered interest for federated learning approaches, which allow training models without requiring data to be stored in a unique database. When the data consist of electronic health records, for instance, this limits the risk of data de-identification and the associated threats to privacy. More recently, he has also been involved as the lead statistician of the CORIMUNO platform, which hosts a series of randomized controlled trials for COVID-19, among other COVID-19 projects.

#### [Rokhaya Ndiaye Diallo - Univeristy Cheik Anta Diop - Dakar, Senegal](#)



Pr Rokhaya Ndiaye Diallo is a professor of Human Genetics at the Faculty of Medicine, Pharmacy and Odontology of University Cheikh Anta Diop of Dakar, Senegal. After a PharmD training at University Cheikh Anta Diop, Pr Ndiaye completed her PhD at University Paris 7, France. She was awarded in 2010 a Fullbright senior scholar fellowship in the Department of Pathology of University of Washington, Seattle, USA. Her research interests focused on the role of genetic variation in cancer susceptibility, genetic basis of rare diseases and African population genetics.

She is founding member and actual secretary of the Senegalese Society for Human Genetics (S2GH), member of the executive committee of the African Society of Human Genetics. She is leading the Senegalese genome project SEN-GENOME.

#### [Sara Zullino - European Infrastructure for Translational Medicine \(EATRIS\) \(Amsterdam, The Netherlands\)](#)



Sara Zullino is the Scientific & SME Outreach Manager at EATRIS. She is responsible for promoting the development of strategic scientific infrastructure projects defined by the EATRIS 'Imaging and Tracing' Platform, and supporting ongoing management and cohesion of translational imaging infrastructure and expertise. She is also responsible for coordinating the team's outreach activities to SMEs to foster new scientific and public-private collaborations. Sara joined EATRIS from the Molecular Imaging Center of the University of Torino (Italy),

where she developed workflows for image data archiving and analysis through the integration of the open-source imaging informatics platform XNAT with in-house tools for preclinical Magnetic Resonance image processing. She was involved in several European projects under the auspices of Euro-BioImaging ERIC, such as CORBEL and EOSC-Life, and contributed to infrastructure strategies and procedures to align preclinical and biomedical image data to FAIR principles. Sara received an MSc in Biomedical Engineering from Sapienza University of Rome (Italy), and a PhD in Complex Systems for Life Sciences from the University of Torino. Her main research focus was the development and acoustic characterisation of novel phase-change contrast agents for ultrasound imaging.

[Yosr Hamdi - Pasteur Institute Tunis - Tunis, Tunisia](#)



Yosr Hamdi is a biologist and research assistant at Institut Pasteur de Tunis, Tunisia. She is a specialist in cancer genomics and precision oncology. Dr. Hamdi is a member of several international Consortia including BCAC, CIMBA, H3ABioNet, and H3Africa. She serves on the advisory boards of several pharmaceutical and biotechnology companies related to genomics and cancer targeted therapies. Dr. Hamdi started in the field of human genetics in 2004 with the Human Genome Project, at Laval University, Quebec, Canada. Then, she had a Master degree in Cellular & Molecular Biology at the Faculty of Medicine, Laval University, Canada. In 2009, she joined the Genomics Center of the Centre de Recherche du Centre Hospitalier de l'Université Laval (CRCHUL), QC, Canada where she obtained her PhD in Molecular Medicine.

By combining genomics, molecular biology and bioinformatics, Dr. Hamdi is continuing the investigations of cancer disease in African populations by implementing Genomic Medicine and Precision Oncology in North Africa.

**Annex IV – Abstracts of lectures**



## SUMMER SCHOOL

# STANDARDS IN PERSONALISED MEDICINE

## ABSTRACTS

### [Data and metadata standards for personalised medicine research - Martin Golebiewski](#)

For facilitating the integration of health data and the setup of computer models in personalised medicine research, the formatting of the data and its description through corresponding metadata (data describing the data in its context) must be harmonized. The aim is to render health data findable, accessible, interoperable, and reusable (“FAIR”) and allow interfacing between the often heterogeneous datasets, comprising many different datatypes. Hence, standards for formatting and describing (meta-)data, workflows and computer models have become important.

To this end, in addition to well established interoperability standards for health data, such as HL7 FHIR, and medical terminologies like SNOMED CT, many grassroots standards for data, models and their metadata have been defined by the scientific communities. These data standards in turn also have to be harmonized to become interoperable to allow integration across the datatypes. To support this and to guide through the forest of available datatype-specific standards, novel standards are defined by the International Organization for Standardization (ISO) in its technical committee ISO/TC 276 Biotechnology, such as ISO 20691 “Requirements for data formatting and description in the life sciences” that was recently published.

For the application of modelling approaches in personalised medicine research standards are currently developed, such as the EU-STANDS4PM series of ISO technical specifications (ISO/TS 9491 Biotechnology) on recommendations and requirements for predictive computational models in personalised medicine research. The first standard of this series that will be released in the next months, provides guidelines for constructing, verifying and validating models. Also, a second part is already under development that provides guidelines for implementing computational models in clinical integrated decision support systems.

### [A European standardization framework for data integration and data-driven in silico models for personalized medicine – EU-STANDS4PM–Marc Kirschner](#)

A major goal of EU-STANDS4PM is to assess and evaluate national standardization strategies for Big Data (in health) integration and data-driven in silico modelling methodologies applied in personalized medicine with the aim to bundle European standardization efforts. The project will assess and evaluate European data sources as well as in silico methodologies relevant for personalized medicine. This process is the foundation to assemble specific recommendations and guidelines (including formal standard documents) for data harmonization and integration strategies as well as data-driven in silico approaches to interpret human disease/health data.

Currently there are no widely accepted, overarching strategies to harmonize (i) heterogeneous health and disease data and (ii) data-driven in silico approaches for the interpretation of Big Data to enable personalized medicine. In addition, data governance concerning the collection, share, access, storage, use, and re-use of data needs to be further developed and broadly implemented. What is lacking are standardization documents on a European level (issued through e.g. European Committee for

Standardization, CEN or the International Organization for Standardization, ISO) and recommendations for innovative/improved data governance concepts, such as harmonized Data Access Agreements. This would allow for the exploitation of Big Data to develop true medical benefits for an individual patient or stratified patient groups.

Therefore, a key element of the EU-STANDS4PM work plan is the development of formal standard documents, such as ISO Technical Specifications. Due to time constraints, lack of resources and the complexity of formal procedures, the development of an International Standard is not feasible in the scope of the project. As a major strategic project output, EU-STANDS4PM initiated the development of two ISO Technical Specifications that cover computational models as well as clinical decision support systems in personalized medicine research. These two documents have been submitted to the corresponding ISO Technical Committee 276 for further review and processing through the Technical Committee route for publication as a normative standard document.

#### [Developing recommendations for personalised medicine research methodologies – the PERMIT project experience and the ICPeMed Best Practice Recognition program – Paula Garcia](#)

The field of personalised medicine is very dynamic, fast paced and many ways quite new. As more and more efforts are being invested in this field, it is important that the scientific community uphold scientific integrity and objectivity. Harmonization and standardization of practices in clinical research overall is important to ensure quality, reproducibility and robustness of results. This allow researchers to ensure patient safety. Furthermore, standardized methods open the way for collaboration increasing the weight of evidence and contributing to sounder public policy. The particular interdisciplinary nature of personalised medicine requires harmonized and standardized practices.

The PERMIT project developed methodological guidelines for the full personalised medicine research pipeline aiming to produce better quality research, while the ICPeMed Best Practice Recognition Program aims to identify and showcase best practices in personalised medicine that can be replicated and implemented across the globe. Better quality personalised medicine will require the involvement of all stakeholders and will depend on the integration of best practices and standardized methods.

#### [Best practices in generating genomic data for personalized medicine- Rokhaya Ndiaye Diallo](#)

Genomic data generation is a key component of personalized medicine. Genomic data should be FAIR (Findable, Accessible, Interoperable and Reusable) for responsible data sharing. To ensure such high quality data it is important to follow the best practices in data generation, from clinical phenotyping to NGS data generation.

#### [Standards for Data Management in Personalized Medicine: Opportunities, Challenges, and Possible Solutions - Damazo Kadengye - African Population and Health Research Center \(APHRC\) – \(Nairobi, Kenya\)](#)

In healthcare, big data tools and technological advances have the potential to create significant value by improving outcomes while lowering costs for each individual patient. Much as there are increasing technological advances have significantly contributed to production of personalized health data, the generation of evidence through advanced data science tools and analytics still lags behind in most African countries. Reasons for this are many ranging from the inherent heterogeneity of data sources, limited human resources and infrastructure on the continent, hurdles associated with legal and ethical issues surrounding the use of/ or sharing personal data across disciplines and borders, as well as the lack of broadly accepted standards. There is therefore a need for broadly acceptable standards for data

management that allow interpretation of heterogeneous personalized health data in order to advance personalized medicine.

In this session, we shall briefly discuss the nature of personalized health data and the data management opportunities, challenges and possible solutions for generating reliable personalized FAIR data which offer actionable information that can help support better decision making for personalized medicine.

#### [Biomarker Identification and Risk Stratification - Maritha Kotze & Elouise E Kroon](#)

Unravelling the complexity of genotype, phenotype and environmental interaction is crucial for biomarker identification and risk stratification from the study population to the individual. Accurate phenotyping is required to identify clinically relevant gene variants underlying complex, noncommunicable diseases (NCDs). While genomic testing is available for differential diagnosis of severe subtypes of dyslipidemia such as familial hypercholesterolemia, blood biochemical biomarkers are used as standard practice to stratify treatment, and addition of DNA testing is often limited to screening of at-risk family members. Breast cancer genomics evolved from a perceived single disease entity to the identification of four major tumour subtypes with different treatment requirements. The underutilization of pathology in bridging the clinical implementation gap between a gene(s) and disease led to the development of a dynamic pathology-supported genetic testing (PSGT) platform at the intersection of research and service delivery, recently recognized as an example of best practice in personalized medicine.

#### [AI for patient stratification: Challenges and recommendations – Enrico Glaab](#)

Artificial intelligence (AI) has the potential to significantly improve personalized medicine by enabling the development of more effective diagnostic tools and medical treatments. However, the application of AI in this field faces several challenges, including biases in the training data, a lack of standardization in the algorithms used, and limitations in the interpretability of AI models. To address these challenges and fully realize the potential of AI for personalized medicine, it is essential to invest in robust and reproducible modeling and evaluation pipelines, and establish clear standards for the use of AI in healthcare. Additionally, efforts should be made to ensure that AI algorithms are transparent, accountable, and interpretable, and that they are developed and validated by involving the relevant interdisciplinary expertise, including medical professionals and patients

In this session, an introduction to AI for personalized medicine will be given, and the current limitations and gaps in the field will be discussed. An overview of general recommendations to address common challenges in AI for stratification will be provided, including example use cases from previous successful diagnostic biomarker development projects."

#### [The translational process in personalized medicine – Sara Zullino](#)

The aim of this session is to present guidelines for improving the quality and reliability of preclinical research in the field of personalized medicine. The guidelines were created through a comprehensive process that involved reviewing relevant literature, consulting experts, and reaching a consensus among stakeholders. The focus of the guidelines is to promote better model development, transparency, regulation, collaboration with clinical research and patient engagement. The ultimate goal is to advance the development of personalized medicine and ensure that preclinical research leads to safe and effective treatments for patients.

### [Clinical trial designs for personalised medicine – Raphaël Porcher](#)

Personalised medicine has been defined in many different ways, and it encompasses a broad range of situations, or aims. Nonetheless, many methodological, including statistical, challenges are associated with personalised medicine clinical trials. In this presentation, we briefly review limitation of some commonly used clinical trial designs in personalised medicine, and present some specific designs that have gained attention in personalised medicine, namely basket, umbrella, and platform trials, as well as adaptive enrichment designs.

### [Regulatory aspects of personalized medicine: the need for regulatory research – Julia Stingl](#)

Personalized medicine has gained an important role in current therapeutic practice as well as new drug development. The idea of targeting specific individual structures or special disease features has led to an important area in drug development, especially in cancer treatment. Many personalized medicine drugs are summarized under the group of ATMPs (advanced therapeutic medicinal products) and include specific therapeutics such as gene therapy, cell therapy and tissue engineering, all products targeted to the patient-specific interface or disease profile. For these individualized therapeutics, usually different regulatory standards apply compared to classical drugs. These standards have been developed because of the different nature of ATMP developments which include small sample sizes, rare diseases, valid companion diagnostics, need for accelerated market authorization.

The consequence of accelerated market access is that less evidence on variability in efficacy and safety exists at the moment of market authorization. Once the drug is on the market and is used in different populations and at larger number, issues of patient variability in drug safety and efficacy may arise. Even if the same targeted biomarker is specifically tested, patient variability in comorbidity, comedication, further pharmacogenetic background, ethnicity, age, gender and lifestyle lead to variability in treatment outcome (sometimes ending up in a negative benefit risk on the long-term).

The key challenge of accelerated market authorization remains the gain of valid data and evidence for a positive benefit risk ratio even after market access. This implies research in clinical practice, data science and pharmacovigilance efforts in order to catch up the gap in evidence caused by less requirements for randomized controlled trials during development. Building this evidence for the new personalized medicinal products not only saves the patient, and helps the clinician but also provides the evidence basis for regulatory decisions in the future. Postmarketing research in personalized medicine is therefore also termed regulatory science or regulatory research. It may include methods of personalized medicine itself such as pharmacogenetic diagnostics and research on new or unknown genetic variants, assessment of risk profiles and reporting of adverse drug effects, developing methods for personalized dosing, and the study and prevention of drug drug interactions.

### [Pharmacogenetics in Personalized Medicine – an overview and comparison of current clinical guidelines- Collen Masimirembwa](#)

Pharmacogenetics (PGx) evaluates drug-gene interactions (DGI) that affect drug safety and efficacy. Research has uncovered numerous variations in genes that code for drug targets and for processes that affect drug metabolizing enzymes & transporters, that have been shown to affect the pharmacodynamics (PD) or the pharmacokinetics (PK) of some medicines. Mechanistic and clinical studies have gone on to show that some of these effects can have a profound effect on treatment outcomes. This has in turn made major regulatory bodies such as FDA and EMA to include pharmacogenetic information on hundreds of medicines. Most of this product label information

however does not have clinical guidelines on what clinicians should do in the event their patient is a carrier of such variants. Several associations of experts therefore evaluated the clinical evidence of some of the DGI and came up with clinical guidelines on the implementation of pharmacogenetics. Current guidelines from such committees include the Dutch Pharmacogenetics Working Group (DPWG), the Clinical Pharmacogenetics Implementation Consortium (CPIC), the Canadian Pharmacogenomics Network for Drug Safety (CPNDS), and the French National Network (Réseau) of Pharmacogenetics (RNPGx).

These guidelines are now being used in major PGx implementation studies across the world of which some major ones include the IGNITE studies in the USA, the just completed UPGx-PREPARE study in Europe, and the recently initiated iPROTECTA study in Africa. These studies are evaluating the feasibility and effectiveness of clinical PGx. In this workshop, we will discuss the current clinical guidelines with respect to their similarities and differences, how they are being implemented in different settings, and what the future for pharmacogenetics based personalized medicine looks like.

## **EU-Africa Collaborations**

### [SALAMA Study: Studying acute Leukemia mutations in Africa - Dr Koga Luhulla](#)

Acute leukemia is one of the common cancers in children, it accounts for 30% of all pediatric cancers. Genetic mutations play a major role in pathogenesis of this disease. There has been a high survival gap of these patients between High Income Countries (HIC) and Low and Middle Income Countries (LMIC). Apart from other factors, the difference in disease biology has been postulated to contribute to this survival gap.

We have collaborated with Children Hospital in Ireland to understand genetic profile of acute leukemia in Tanzania and also to do parallel analysis with a cohort of acute leukemia patients in Ireland so to identify the difference in disease biology between these two countries. We are collaborating with EU Africa PerMed to explore the possibility of initiating personalized medication in treatment of this disease in Africa in near future.

### [Collaboration Between EU \(ITALY- Istituto Oncology Romagnolo\) and AFRICA \(Bugando Medical Centre\) - Dr Nestory Masalu](#)

Since 2004, an important and continuous cooperation has been developed between the Istituto Romagnolo per lo Studio dei Tumori (IRST) of Meldola - Italy and the Bugando Medical Center (BMC) of Mwanza - Tanzania.

Together IRST and BMC assisted in the establishment of the oncology Department in 2008, several Italian Medical Oncologists have visited the Oncology Department in BMC, and at the same time, some physicians from Bugando have received a complete and extensive training in Oncology in several Italian Institutions. This cooperation has been very useful in developing oncological expertise in Tanzania, through the implementation of clinical protocols, data collecting and reporting modalities, oncological drugs supply and, skill improvement in pharmacology and pharmaceutical clinical research and molecular studies, have been performed in breast cancer and retinoblastoma in Mwanza area and reported in the annual conference of ASCO. Several areas of research have been worked upon together between IRST and Bugando and are in different areas of publications since 2010 to date.

This collaboration today is continuous through almost weekly communication exchange between Italian and Tanzanian physicians and it's leading to implement research projects in retinoblastoma and Wilms tumors.

Moreover, this collaboration have stimulated the government to establish the second cancer institute in Tanzania at Bugando Medical Center.

#### [PerMediNA: The North African Experience in Personalized Medicine Implementation – Yosr Hamdi](#)

Several important discoveries in the field of human genetics have led to the foundation of modern molecular and personalized medicine (PM). Recently, huge efforts have been dedicated to the implementation of personalized medicine at the national, regional, African and international levels. PerMediNA (Personalized Medicine in North Africa) is a project funded by the European Ministry of Foreign affairs, aiming to implement a North African Precision Medicine consortium and ecosystem that includes all engaged stakeholders including health care providers, clinicians, pathologists, radiologists, geneticists, academic researchers, IT and bioinformaticians, Biotech and Pharma companies, policy makers, advocacy groups and patients. In this project we will conduct a pilot study on lung cancer with a considerable amount of genomics and transcriptomics data will be generated on patients originating from North Africa. In addition, training activities in different fields related to PM will be organized in the framework of PerMediNA Project. Finally, we aim to formulate recommendations and a Personalized Medicine Plan-2030 for national authorities and policymakers in order to implement PM in the three North African countries (Tunisia, Algeria and Morocco).

In conclusion, our experience highlights the importance of conducting innovative translational research towards the implementation of Precision Medicine in the region. Additional efforts will be made to advance personalized medicine in patient care by educating consumers and providers, accelerating research and supporting necessary changes in policy and regulation.

#### [Overview of research collaboration opportunities for Personalised Medicine - Maria José Alvarez Ruiz](#)

Personalised medicine has many potential benefits, and its development will change the way some healthcare services are delivered. Over the past decade, the EU has launched a number of different types of initiatives aimed at promoting personalized medicine: related to genomic medicine; the European Genome Initiative to promote collaborative alliances; ERA PerMed and ICPeMed, in the EU Digital Health Strategy and the upcoming Development of the EHDS (European Health Data Space) within the Genome Data Infrastructure. In this talk, an overview of the research initiatives linking health collaborations between Europe and Africa will be shared.

**Annex V – Participant list**



Last Name	First Name	Nationality	Gender	Institution	Position
<b>Grantees</b>					
El-Attar	Eman	Egyptian	female	Medical Research Institute, Alexandria University	Associate Professor
Aluvaala	Eva	Kenyan	female	Kenya Medical Research Institute (KEMRI)	Senior Research Scientist
Torrorey-Sawe	Rispah	Kenyan	female	Moi University	Senior Lecturer
Iradukunda	arnaud	Burundi	male	University of Burundi	Researcher
Giambra	Vincenzo	Italian	male	Fondazione IRCCS "Casa Sollievo della Sofferenza" (Italy) and University of British Columbia (Canada)	Group leader at the assistant professor level
Boujemaa	Maroua	Tunisian	female	Institut Pasteur de Tunis	Post-Doctoral Fellow
Takundwa	Mutsa	South Africa	female	Council for Scientific and Industrial Research	Senior Researcher
Gessesse	Yoseph	Ethiopian	male	Addis Continental Institute of Public Health	Assistant Profesor
Akingbade	Adebanji	Nigeria	male	EKiti state university Ado-Ekiti, University of Ilorin, Ilorin Nigeria	Lecturer 1
Ihim	Augustine	Nigeria	male	Nnamdi Azikiwe University	Senior Lecturer
<b>Self-funded in-person participants</b>					
Kamal Kassim	Samar	Egyptian	female	Faculty of Medicine, Ain Shams University, Cairo, Egypt	Professor
Soliman	Omar	Egyptian	male	Children's Cancer Hospital Egypt 57357 - Faculty of Medicine Ain Shams Medical Research Institute	Bioinformatics Associate
Hamad	Reem	Sudanese	female	Institute of Endemic Diseases, National Center for Gastroenterology and liver diseases	Research fellow , project manager, head of the research unit of NCGLD
Sehli	Sofia	Moroccan	female	University Mohammed VI of Health Sciences	PhD student
Ekeji	Nwogo Immaculata	Lesotho	female	Health Hope Services, Uzmec Global Pty Ltd	Consultant, Managing Director.
Aldera	Alessandro	South African	male	University of Cape Town; JDW Pathology Inc	Consultant Pathologist
Ahmed	Saed Nuh	Somali	male	Ministry of Health , Hargeisa Somaliland, Northern Somalia	Head of Medicines Regulatory Authority Program; National COVID-19 Vaccination Coordinator
Sarr	Pierre Diaga	Senegalese	male	Division of Human Genetics - Cheikh Anta Diop University of Dakar/Senegal	Head of the research division
Bakare	Adebayo	Nigerian	male	Damien Foundation Belgium -Nigeria Project	Senior Medical & Deputy Programme Manager /Research Manager
Mabaso	Njabulo	South African	male	National Health Laboratory Service	Medical Geneticist
Mariotti	Paolo	Italian	male	IRST	Project manager
<b>Online participants</b>					
Latosinska	Agnieszka	Polish	female	Mosaiques Diagnostics GmbH	Head of drug discovery research & Director of cardiovascular research

Onyambu	Frank	Kenya	male	Meru University of Science and Technology, Kenya; Yemaachi Biotech, Nairobi, Kenya	Senior Lecturer (Meru University); Country director (Yemaachi Biotech)
Ilovi	Syokau	Kenyan	female	University of Nairobi	Clinical Geneticist & Lecturer
Njagi	Lilian	Kenyan	female	Kenya Medical Research institute Center for Respiratory Disease Research	Clinical Research Scientist
Obiero	Christina	Kenyan	female	Kenya Medical Research Institute - Wellcome Trust Research Programme	Clinical Investigator
Gronich	Naomi	Israeli	female	Lady Davis Carmel Medical Center, Clalit Health Services; Technion - Israel Institute of Technology	Physician, Personalized Medicine and Pharmacoepidemiology in Clalit Health Services; Physician - Department of Emergency Medicine
Govender	Ireshyn	South Africa	male	Council for Scientific and Industrial Research	Researcher
Mbayabo	Gloire	Congolese	male	University of Kinshasa, KU Leuven	PhD Student
Said	Bibie	Tanzania	female	Kibong'oto Infectious Diseases Hospital	Physician- Scientist (Clinical trialist)
Tindi	Kester	Ugandan	male	Makerere University, African Field Epidemiology Network (AFENET), Public Health Emergency Operations Centre	Bioinformatics research fellow, Epidemiologist
Sylla	Ousmane	Mali	male	National Office of Reproductiv Health	Responsible of Maternal Perinatal Death Surveillance, Responses
Woromogo	Sylvain Honore	Central African Republic	male	Inter States Centre for Higher Education in Public Health for Central Africa (CIESPAC)	Research teacher
Hassan	Ibrahim	Nigerian	male	Addis Continental Institute of Public Health	Assistant Profesor