



Deliverable 3.6: Courses for early stage researchers update

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Contents

Basic information.....	3
Executive summary	4
1 Description of work & main achievements	5
1.1 Training courses for acquiring and expanding skills of early stage researchers	5
1.1.1 Course 1 “How to interact with industry”	6
1.1.2 Course 2 “Academic publishing”	6
1.1.3 Course 3 “Project management”	6
1.1.4 Course 4 “How to write proposals”	6
1.1.5 Course 5 “Use of the liquid biopsy in medical oncology”	6
1.1.6 Course 6 “Comet Assay - Practical online course/video learning”	7
1.1.7 Course 7 “The Treatment Landscape for Hepatocellular Carcinoma”	7
1.1.8 Course 8 “Overview and Future Perspectives in Colorectal Cancer”	7
1.1.9 Course 9 “Diagnostic and therapeutic aspects of handling GPNETs”	7
1.1.10 Course 10 “Statistical Analysis of Biomedical Data: Basic Principles and Practicals”	7
1.1.11 Course 11 “Patenting of medical inventions”	8
1.1.12 Course 12 “Ethics in biomedical research”	8
1.1.13 Course 13 “Practical methods in oncological research”	9
1.1.14 Planned course “Gastrointestinal Stromal Tumours”	9
1.1.15 Planned course “Good Laboratory Practice (GLP) for <i>in vitro</i> nano and genotoxicology, best practices with nanomaterial handling and preparation for testing” ..	9
2 Deviation from the workplan	10
3 Conclusion	10

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Basic information

Project title	Strategies to strengthen scientific excellence and innovation capacity for early diagnosis of gastrointestinal cancers
Project acronym	VISION
Call	H2020-WIDESPREAD-2018-2020
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Executive summary

Training courses were organised by the coordinator in collaboration with the consortium partners NILU, FhG, NKUA and SERMAS for early stage researchers to acquire new skills and knowledge in the fields of scientific writing, interacting with industry, proposal writing and project management as well as to receive more theoretical background in specific technical methods. In total, 13 different courses in the fields mentioned above were realized as online events until now. Courses 1-4 took place in 2020 and 2021, so in total 17 courses were organized until September 2022. Two more courses are planned until the end of 2022.

The training courses were organized as open call events for all students on the VISION website, not limited for students at BMC SAV in Slovakia.



1 Description of work & main achievements

1.1 Training courses for acquiring and expanding skills of early stage researchers

To give students the opportunity to acquire new skills or early stage researchers to expand their skills the coordinator, in collaboration with the consortium partners NILU FhG, NKUA and SERMAS organized training courses in the fields of interacting with industry, scientific writing, project management and proposal writing as well as on specific technical methods.

All training courses were organized as open call events for all interested students, not limited for students at BMC SAV in Slovakia. The interested persons could register for the event on the project website

For each training course a certificate of attendance, signed by the coordinator and the respective lecturers, were handed out to each participant.

Five courses were realized as webinars in September 2020, ten courses in 2021 followed by three courses in 2022 (up to September 2022). Information about the number of participants and the organizers as well as the specific day of the events is given in Table 1 - 3.

Table 1. Overview of courses organized in 2020.

Date	Topic of the course	Course given by	No. of attendees
10.09.2020	How to act with industry	FhG	22
11.09.2020	Academic publishing	FhG	29
16.09.2020	Project management	NILU	30
17.-18.09. 2020	How to write proposals	NILU	37
30.11.-1.12.2020	Use of the liquid biopsy in medical oncology	SERMAS	36

Table 2. Overview of courses organized in 2021.

Date	Topic of the course	Course given by	No. of attendees
15.-19.03.2021	Comet Assay - Practical online course/video learning	NILU	45
26.05.2021	The Treatment Landscape for Hepatocellular Carcinoma	NKUA	34
12.05.2021	Overview and Future Perspectives in Colorectal Cancer	NKUA	37
02.06.2021	Diagnostic and therapeutic aspects of handling GPNETs	NKUA	32
14.09.2021	How to act with industry	FhG	15
16.-17.09.2021	Academic publishing	FhG	27
23.09.2021	Project management	NILU	22
06.-07.05.2021	How to write proposals	NILU	64
4.-15.10.2021	Statistical Analysis of Biomedical Data: Basic Principles & Practicals	NKUA	79
24.11.2021	Patenting of medical inventions	BMC SAV	15



Table 3. Overview of courses organized in 2022.

Date	Topic of the course	Course given by	No. of attendees
17.-18.03.2022	Ethics in biomedical research	NKUA, SERMAS, FhG, NILU	36
7. – 8.4.2022	Practical methods in oncological research (Part I)	FhG, NKUA, SERMAS, NILU	47
21. – 22.4.2022	Practical methods in oncological research (Part II)	FhG, NKUA, SERMAS, NILU	47

1.1.1 Course 1 “How to interact with industry”

Fraunhofer is the international leader of applied research. Part I of the course introduced the Fraunhofer Society, from history to research fields and cooperation models. Examples of successful collaborations with industry were presented. Part II focused on the Fraunhofer IBMT, with examples of collaborations with industry in the field of biology and medicine. Part III gave an overview of national and international funding opportunities for projects with industry. FhG has long-term experience in collaborating with industries. FhG can share this experience among partners: Theoretical and practical training how to interact with industrial partners.

1.1.2 Course 2 “Academic publishing”

Academic publishing includes master thesis writing, PhD thesis writing, research paper writing, scientific poster and oral presentation. For all this publishing types, scientific writing is essential. Thus, this course introduced to effective writing, formatting, organization of a scientific writing process, the publication process. Besides theory, the presentations included tips and a lot of examples. Also, the aspects of citation and plagiarism, authorship was discussed. Part III of the course included an exercise on finding the right journal for publishing your data.

1.1.3 Course 3 “Project management”

This training course dealt with the following topics: Implementation, impact, consortium, management and resources, administrative and formal issues, intellectual properties rights, and patent applications.

1.1.4 Course 4 “How to write proposals”

NILU has great experience in writing proposals and success in obtaining EC grants. During the course NILU shared this experience. Theoretical and practical training how to write proposals with focus on highly innovative objectives excellence, feasible work plan were part of the training.

1.1.5 Course 5 "Use of the liquid biopsy in medical oncology”

This course is a set of five seminars about the use of the liquid biopsy in Oncology and one clinical seminar about neuroendocrine tumors. The course includes seminars of 4 specific



examples of liquid biopsy markers, circulating tumor cells (CTC), miRNA, exosomes and circulating free DNA (cfDNA).

1.1.6 Course 6 “Comet Assay - Practical online course/video learning“

This is a practical online course/video learning on comet assay method. The course takes place for 5 days. On the first day, the background and principles of the assay are introduced in a series of lectures. On the second day, the technical aspects of the assay are presented. Part of the day is dedicated to the planning of a real experiment. Trainees have the opportunity to perform the assay themselves in their own laboratory, with the constant support of the trainers. On the following days, a hands-on experiment is to be performed. In the morning, the daily work is presented through videos created at NILU, in which the trainers show how the experiment is performed step-by-step. In this phase, trainees have the opportunity to interact with the trainers, ask questions and discuss the technical aspects of the experiment. In the afternoon, after viewing the videos, trainees have the possibility to physically train on the experiment in their laboratory. All along, trainers are available online to support trainees if needed.

Thus, in addition to theoretical knowledge, the course participants had the opportunity to discuss and immediately solve the problems they have/had with the organizers of the course the problems they have/had during the individual steps of the comet assay method.

1.1.7 Course 7 “The Treatment Landscape for Hepatocellular Carcinoma“

The cycle of four lectures focused on 1) Histological and molecular subtypes of hepatocellular carcinoma, 2) Locoregional therapies and patient profiling, 3) Surgical Treatment in HCC, and 4) Systemic Treatments and Immunotherapy in HCC. This online course was designed for medical and biology students and followed by an open discussion with the aim to introduce medical students and trainees in the existing treatment of hepatocellular carcinoma.

1.1.8 Course 8 “Overview and Future Perspectives in Colorectal Cancer“

The cycle of three lectures focused on 1) Hereditary colorectal cancer syndrome, 2) Histological and molecular subtypes of colorectal cancer (CRC), and 3) Surgery for Colon Cancer and systematic therapies. Online course was designed for medical and biology students and included an open discussion.

1.1.9 Course 9 “Diagnostic and therapeutic aspects of handling GPNETs“

The cycle of three lectures focused on diagnostic and therapeutic aspects of handling GPNETs. The first lecture provided an Introduction to GPNET, while the further two were dedicated to surgery as a treatment for GPNETs and therapeutic Spectrum in GPNETs. Online course was designed for medical and biology students.

1.1.10 Course 10 “Statistical Analysis of Biomedical Data: Basic Principles and Practicals“

The course designed to provide participants with the basic understanding of terms and methods of statistical data analysis, with specific focus on practical exercise and familiarization with statistical applications in biomedical research. Examples were given and sets of data were given for further practice on the following:

1. Descriptive Statistics
 - a. Variables and data types



- b. Central tendency and variance indicators
 - c. Distributions and graphs
 - d. Introduction to SPSS: variable entry and coding, data entry and management
2. Inferential Statistics
- a. Population and sample
 - b. Confidence intervals and hypothesis testing
 - c. Univariate analysis (X^2 test, Student's t-test, Mann-Whitney test, one-way ANOVA, Kruskal-Wallis test, Pearson and Spearman correlation coefficients, Paired t-test, Wilcoxon sign rank test, ANOVA for repeated measurements)
 - d. Linear regression (simple and multiple linear regression, model interpretation)
 - e. Logistic regression (hypothesis testing and model fitting, interpretation of model coefficients)
 - f. Survival analysis
 - g. SPSS practicals

After each theoretical part, the participants could verify the acquired knowledge on examples using the free 30-day SPSS trial version: <https://www.ibm.com/analytics/spss-trials>.

1.1.11 Course 11 “Patenting of medical inventions“

The aim of the course “*Patenting of medical inventions*” is to acquaint the audience with the issues of obtaining patent protection for inventions from the field of medicine and biotechnology. The presentation starts with a short introduction of the Technology Transfer Office of Slovak Academy of Sciences, its history, team and services. The second part of the presentation deals with intellectual property, its two main categories (industrial property and copyright) and briefly also with various protection forms of intellectual property. The next part of the seminar introduces to the audience the most common type of industrial legal protection used in research organizations and universities – the patent protection. The main part of the presentation is devoted to patenting of medical inventions and explains to the audience on practical examples what and how can be patented in the field of medicine and biotechnology as well as the special rules that apply in these fields. The seminar ends with a discussion and answering of questions.

1.1.12 Course 12 “Ethics in biomedical research”

The aims of this course expanded in two days was to provide participants with various ethical aspects in biomedical research, with a focus on nanomedicine. The course consists of four lectures, each devoted to different aspects of ethics – from a philosophical point of view to the ethics of nanomedicine. An integral part of this course was a practical session focused on how to present a project to the ethics committee and how to prepare a consent form. The following aspects were discussed

1. Philosophical ethics and its relation to bioethics (NKUA)
2. Introduction to ethics in biomedical research (SERMAS/IRYCIS)
3. Animals` welfare and ethics (BMC SAV)
4. Stem cells and ethics (FhG-IBMT)
5. Nanomedicine and ethics (NILU)



1.1.13 Course 13 “Practical methods in oncological research”

The cycle of lectures is divided into 4 sessions: 1) Microfluidic system and advanced *in vitro* models, 2) Basic and translational research, 3) Clinical Oncology Research, and 4) Nanosafety research in regulatory context: Challenges and opportunities. In each session, the participants could listen to 3 lectures, presenting various molecular-genetic methods and innovative approaches used in oncological and biomedical research. This course was a theoretical part of the Joint Summer School. During the four days following topics were presented and discussed:

Session 1: Microfluidic system and advanced *in vitro* models (FhG-IBMT)

- Microfluidic components and systems for cell applications
- Biodegradable nanoparticles for medical applications
- Stem cells: Sources, cultivation, differentiation, application

Session 2: Basic and translational research (NKUA)

- Translational research: from bench to bedside and back
- Cancer and senescence
- How Genetic engineering can affect Cancer Research and Treatment: CRISPR Technique

Session 3: Clinical oncology research (IRYCIS)

- The fundamentals of translational research: Ethics, Informed consent, sample and data collection, and storage
- Liquid Biopsy methods: Analysis of circulating free nucleic acids
- *In vitro* Tumor Models: From monolayer cultures to 3D and organoid cultures

Session 4: Nanosafety research in regulatory context: Challenges and opportunities(NILU)

- Hazard and risk assessment of nanomaterials: Historical perspective and current status
- Smart, safe and sustainable by design approach in nanotechnology
- Implementation of new advanced approaches into the regulatory landscape

1.1.14 Planned course “Gastrointestinal Stromal Tumours“

The cycle of three lectures focuses on 1) The pathology and molecular mapping of GIST, 2) Surgical challenges of GIST tumors, and 3) Targeted therapy for GIST. This online course is designed for medical and biology students. It will be held on October 19, 2022

1.1.15 Planned course “Good Laboratory Practice (GLP) for *in vitro* nano and genotoxicology, best practices with nanomaterial handling and preparation for testing”

Basic principles of good laboratory practice for *in vitro* toxicology, nano and genotoxicology, best practices with nanomaterial handling and nanomaterial preparation for testing, study plan, master schedule, QA roles, report, archiving. The course is planned for November 2022.



2 Deviation from the workplan

There are no deviations from the work plan. On the contrary, more courses were organized than originally planned. The goal was for the students to benefit as much as possible from the project activities. Some courses were repeated due to high student interest.

3 Conclusion

13 courses (online events) were successfully implemented between September 2020 and April 2022. Courses 1-4 have taken place in 2021 and in 2022. The number of participants per course was between 15 and 79 persons. Certificates of attendance, signed by the coordinator and the respective lecturers, were handed out to each participant. Further courses are planned for October and November 2022 and the first semester of 2023. The selected materials from the above mentioned courses are available on the project website.