






**COST CLINIMARK TRAINING SCHOOL**  
**Approaches for Biomarker Discovery and Validation**

CA16113 - CliniMARK

**Participants**  
**Instructors: 24 Senior Researchers from Academia, Industry and Regulatory Agencies**  
**Trainees: 34 PhD/MSc students and scientists involved in biomarker research**

**Introduction**

The quest for novel biomarkers is a popular research activity with high productivity. Thousands of studies are published claiming the discovery of biomarkers suitable for improving disease management. **The stark reality though indicates that very few potential biomarkers are approved for clinical use.**

**Thus, there is a waste of research resources without tangible benefits to society.** Moreover, there are many unmet clinical needs that are not currently addressed by the available biomarkers in diseases of high prevalence and of high financial and social cost such as cancer, cardiovascular disease, chronic kidney disease, and chronic obstructive pulmonary disease. This situation is partly due to a lack of education resources dedicated to omics studies in biomarker research.

**Teaching objectives are set so that students can:**

- 1. obtain a global view of omics approaches and the biomarker life cycle from discovery to clinical implementation**
- 2. acquire skills relevant to biomarker data analysis (analytical assay validation, clinical performance)**
- 3. develop critical thinking by thorough evaluation of published biomarker studies, and improve presentation skills**

	Mon, Sep 23	Tue, Sep 24	Wed, Sep 25	Thu, Sep 26	Fri, Sep 27
09:00	Arrival and Registration	Introduction to omics and Biomarkers <b>Antonia Vlahou</b>	Antibody quality control in biomarker research <b>Saara Wittfooth</b>	Biomarkers in Screening for Obstructive Sleep Apnea <b>Deborah Penque</b>	Biomarkers for psychiatric disorders <b>Chris Turck</b>
09:30		Biomarker panels by CE-MS <b>Harald Mischak</b>	Biomarker clinical implementation <b>Eva Martinez-Caceres</b>	Proteomics for anxiety disorders: mind the mitochondria <b>Michaela Filiou</b>	Predictive biomarkers for CVD <b>Andreas Simm</b>
10:00					
10:30					
11:00		Coffee break	Coffee break	Coffee break	Coffee break
11:30					
12:00		Good Standardisation Practice in biomedical research <b>Andrea Wutte</b>	Targeted proteomics assays for biomarker evaluation <b>Virginie Brun</b>	Proteomics for biomarker discovery <b>Michalis Aivaliotis</b>	Biomarkers of healthy ageing <b>Niki Chondrogianni</b>
12:30		Student talks 1-13	Student talks 18-30	Eureka: there is something rotten in the biomarker kingdom <b>Makis Zoidakis</b>	Genomics biomarkers <b>Lila Koumandou</b>
13:00					
13:30					
14:00		Lunch Break Poster viewing Discussions Free time	Lunch Break Poster viewing Discussions Free time	Lunch Break Poster viewing	Lunch Break Poster viewing Discussions Free time
14:30					
15:00		High sensitivity immunoassays <b>Stanislav Kukla</b>	Validation of LC-MS/MS methods for the quantification of protein biomarkers: the example of soluble receptor for advanced glycation end products (sRAGE) <b>Rainer Bischoff</b>	Cultural excursion Free time	Meet the expert Biomarker assay validation Study design, MRM data analysis
15:30					
16:00		Student talks 14-17	Student talks 31-34		
16:30					
17:00		Coffee break	Coffee break		Coffee break
17:30		Biomarkers in the pharmaceutical industry. Translating research into clinical benefits <b>Peter Groenen</b>	Biomarkers used in clinical practice for monitoring biological drugs <b>Begoña Oliver</b>		Biomarkers of Human Ageing derived from the MARK-AGE Study <b>Alexander Bürkle</b>
18:00					Oxidative stress and biomarkers <b>Grune Tilman</b>
18:30					
19:00	Welcome <b>Niki Chondrogianni</b> <b>Makis Zoidakis</b>	Molecular diagnostics: from bench to clinic <b>Daria Ler</b>	Liquid biopsy preparation <b>Chris Sutton</b>		
19:30	Biomarkers at the interphase of academia and industry <b>Alain van Gool</b>	Poster session discussions	Poster session discussions	Summing-Up Round Table	
20:00					
20:30	Welcome reception	Dinner	Dinner	Dinner	Farewell reception / awards

Tuesday 24/9	
9:00-10:00	Introduction to omics and Biomarkers <b>Tonia Vlahou</b>
10:00-11:00	Biomarker panels by CE-MS <b>Harald Mischak</b>
11:00-11:30	Coffee break
11:30-12:30	Good Standardisation Practice in biomedical research <b>Andrea Wutte</b>
12:30-14:00	Student talks (1-13) <b>Akbar-Grosskopf</b>
14:00-15:30	Lunch, Poster viewing, Free time, Discussions
15:30-16:30	High sensitivity immunoassays <b>Stanislav Kukla</b>
16:30-17:00	Student talks (14-17) <b>He-Hurtado</b>
17:00-17:30	Coffee break
17:30-18:30	Biomarkers in the pharmaceutical industry. Translating research into clinical benefits <b>Peter Groenen</b>
18:30-19:30	Molecular diagnostics: from bench to clinic <b>Daria Ler</b>
19:30-20:30	Poster session, Discussions
20:30	Dinner

**Wednesday 25/9**

<b>9:00-10:00</b>	Antibody quality control in biomarker research <b>Saara Wittfooth</b>
<b>10:00-11:00</b>	Biomarker clinical implementation <b>Eva Martínez-Cáceres</b>
<b>11:00-11:30</b>	<b>Coffee break</b>
<b>11:30-12:30</b>	Targeted proteomics assays for biomarker evaluation <b>Virginie Brun</b>
<b>12:30-14:00</b>	<b>Student talks (18-30) Jakovlevic-Saeed</b>
<b>14:00-15:30</b>	<b>Lunch, Poster viewing, Free time, Discussions</b>
<b>15:30-16:30</b>	Validation of LC-MS/MS methods for the quantification of protein biomarkers: the example of soluble receptor for advanced glycation end products (sRAGE) <b>Rainer Bischoff</b>
<b>16:30-17:00</b>	<b>Student talks (31-34) Sarajevs-Vujcic</b>
<b>17:00-17:30</b>	<b>Coffee break</b>
<b>17:30-18:30</b>	Biomarkers used in clinical practice for monitoring biological drugs <b>Begoña Oliver</b>
<b>18:30-19:30</b>	Liquid biopsy preparation <b>Chris Sutton</b>
<b>19:30-20:30</b>	<b>Poster session, Discussions</b>
<b>20:30</b>	<b>Dinner</b>

**Thursday 26/9**

<b>9:00-10:00</b>	Biomarkers in Screening for Obstructive Sleep Apnea <b>Deborah Penque</b>
<b>10:00-11:00</b>	Proteomics for anxiety disorders: mind the mitochondria <b>Michaela Filiou</b>
<b>11:00-11:30</b>	<b>Coffee break</b>
<b>11:30-12:30</b>	Proteomics for biomarker discovery <b>Michalis Aivaliotis</b>
<b>12:30-13:30</b>	Eureka: there is something rotten in the biomarker kingdom <b>Makis Zoidakis</b>
<b>13:30-14:30</b>	<b>Lunch, Poster viewing, Free time, Discussions</b>
<b>14:30-20:30</b>	<b>Cultural excursion, free time</b>
<b>20:30</b>	<b>Dinner</b>

<b>Friday 27/9</b>	
<b>9:00-10:00</b>	Biomarkers for psychiatric disorders <b>Chris Turck</b>
<b>10:00-11:00</b>	Predictive biomarkers for CVD <b>Andreas Simm</b>
<b>11:00-11:30</b>	<b>Coffee break</b>
<b>11:30-12:30</b>	Biomarkers of healthy ageing <b>Niki Chondrogianni</b>
<b>12:30-13:30</b>	Genomics biomarkers <b>Lila Koumandou</b>
<b>13:30-15:00</b>	<b>Lunch, Poster viewing, Free time, Discussions</b>
<b>15:00-17:00</b>	<b>Meet the expert:</b> Biomarker assay validation, Study design, MRM data analysis
<b>17:00-17:30</b>	<b>Coffee break</b>
<b>17:00-17:30</b>	
<b>17:30-18:30</b>	Biomarkers of Human Ageing derived from the MARK-AGE Study <b>Alexander Bürkle</b>
<b>18:30-19:30</b>	Oxidative stress and biomarkers <b>Grune Tilman</b>
<b>19:30-20:30</b>	<b>Summing-Up Round Table</b>
<b>20:30</b>	<b>Farewell reception / awards</b>

### **Actions after the end of the training school**

1. Create a permanent record on the CliniMARK website (education curriculum deliverable)
2. Compile the discussions and evaluations in order to write an article with guidelines for developing courses relative to biomarker discovery, validation and clinical implementation

#### Resources for task 2

- Guidelines for Developing Successful Short Advanced Courses in Systems Medicine and Systems Biology  
Cell Systems 2017, 5(3):168-175 <https://doi.org/10.1016/j.cels.2017.05.013>
- Waste, Leaks, and Failures in the Biomarker Pipeline  
Clinical Chemistry 2017, 63(5):963-972 <https://doi.org/10.1373/clinchem.2016.254649>

## Cultural Excursion

Boat trip around Spetses and swimming in a nearby small island

Cost 10 Euros