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Workshop 1

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Abstract

The first HyMedPoly Workshop was held at the University of Westminster on 20 July 2016 as an open scientific workshop on biomaterials in medicine with a particular focus on new concepts of drug-free antibacterial therapies.

The full day meeting was attended by 34 delegates. There were 5 presentations, which will be available to download from the HyMedPoly website.

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• *This report is classed as **PU** = Public*

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Executive Summary

HyMedPoly aims to develop new therapies based on biomedical polymers and inorganic materials.

The first HyMedPoly Workshop was held at the University of Westminster on 20 July 2016 as an open scientific workshop on biomaterials in medicine with a particular focus on new concepts of drug-free antibacterial therapies.

There were five presentations from researchers active in field.

- Biologically active ions in biomedicine, including antibacterial applications
Prof. Aldo Boccaccini (University of Erlangen-Nuremberg, D)
- Materials and Schwann cell approaches or repair to nerve injury
Prof. John Haycock (University of Sheffield, UK)
- Antimicrobial Materials: A Clinician's Perspective
Dr. Jochen Salber (Knappschaftskrankenhaus Bochum, D)
- Exploiting glass formulations for antimicrobial applications
Ian Campbell (Lucideon Limited, UK)
- Tissue engineering challenges for cardiac repair
Prof. Sian Harding (Imperial College London, UK):

The full day meeting was attended by 34 delegates from the project and the London area. The presentations will be available from the HyMedPoly website, www.hymedpoly.eu .

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1 Introduction

1.1 The HyMedPoly Project

Infection has become one of the toughest problems in the medical world. As bacteria become more resistant to drugs, there are fewer effective antibiotics to fight against pathogens.

HyMedPoly aims to develop new therapies based on biomedical polymers and inorganic materials. 9 universities and companies from across Europe are creating a cohort of 15 European Industrial Doctorates to synthesise new biopolymers with added antibacterial functionality and develop functionalised bioactive ceramics and glasses that can act as active agents to kill bacteria and prevent their growth.

The new material systems from HyMedPoly are aimed at applications such as wound care, implants and bio film prevention.

Appendix 1 gives more details of the project group and the research projects supported.

1.2 HyMedPoly Summer Schools and Workshops

Summer schools and workshops are a key element of the training activities of HyMedPoly and are planned to take place approximately every six months, providing training both in the science of antimicrobial materials development, application and qualification, and in skills for business. The scientific training programme aims to balance aspects of basic and applied research to combine an appreciation of industry needs with an understanding of the underlying science. The skills for business training provides the Early Stage Researchers (ESRs) with an understanding of the wider issues needed to manage technical projects effectively.

These meetings of the HyMedPoly group also provide an opportunity to progress the project's technical activities. The researchers share results and seek guidance through presentations and discussions with the project partners, the Supervisory Board meets to discuss project management issues and the cohort of ESRs network and discuss general project issues.

Table 1: HyMedPoly Summer Schools and Workshops

	Main Training Events & Conferences	Lead Institution	Project Month (estimated)
1	Summer school 1: Science: Biodegradable polymers synthesis and functionalization Industry Training I: Regulations for medical products Industry Training II: Best practices in managing collaborative R&D projects – communication and knowledge management	PTO (Italy) EUR (DE)	√ 14
2	Workshop 1 – scientific meeting of the network: new concept of drug-free antibacterial therapies	UoW (UK)	√ 19
3	Summer School 2: Science: Hybrid materials development and processing technology Industry Training III: Best practices in managing collaborative R&D projects – forming good project teams	FAU (DE) EUR (DE)	21
4	Workshop 2 – scientific meeting of the network: Drug-free antibacterial hybrid polymers and clinical aspects	IK4 (ES)	27
5	Summer School 3: Science: Product development and regulations Case studies (including preclinical) Industry Training IV: Best practices in managing collaborative R&D projects – dissemination and exploitation	HKB (DE) (Provisional) EUR (DE)	34
6	Workshop 3 – scientific meeting of the network: From science to products: business plan/meeting with investors, start-ups and blue chips and exhibition of HyMedPoly outcomes	Vn (IE)	39
7	International School and Conference –drug-free antibacterial technology for medical applications	Luci (UK)	45

Note: Month 1 = January 2015

√ = delivered

2 The First HyMedPoly Workshop

Workshop 1, “Biomaterials in Medicine: New concepts of drug-free antibacterial therapies”, was held on 20 July 2016, organised and hosted by University of Westminster as a full day meeting. The workshop was publicised through the flyer in Appendix 2 and attracted 34 delegates from the HyMedPoly project as well as postgraduate students and postdoctoral researchers from the London area.

There were five presentations. All presenters were active workers in their fields. Three presenters came from project group members.

- *Biologically active ions in biomedicine, including antibacterial applications*
Prof. Aldo Boccaccini (University of Erlangen-Nuremberg, D)
A review of the wide range of biologically active ions quoted in literature, highlighting the antibacterial activity.
- *Materials and Schwann cell approaches or repair to nerve injury*
Prof. John Haycock (University of Sheffield, UK)
An introduction to clinical strategies to repair gap injuries to peripheral nerves and the roles that materials and structures have in developing increased regeneration distances and in increasing the extent and effectiveness of reinnervation.
- *Antimicrobial Materials: A Clinician’s Perspective*
Dr. Jochen Salber (Knappschaftskrankenhaus Bochum, D)
A review of microbe infections from a clinicians’ perspective, highlighting the growing need for antimicrobial treatments to address an increasing number of both tissue and device related infections and focusing on the growth and proliferation cycles of bacteria and the challenges to producing effective treatments.
- *Exploiting glass formulations for antimicrobial applications*
Ian Campbell (Lucideon Limited, UK)
An introduction to the nature of glass, a key material type in HyMedPoly. The review covered glass preparation methods (fusion, phase separation and sol-gel processing), the effect of composition on properties and antimicrobial effect of certain glasses.
- *Tissue engineering challenges for cardiac repair*
Prof. Sian Harding (Imperial College London, UK):
A review of the role of materials in cardiac repair following heart failure, the challenges faced by researchers and some approaches under development. Case studies highlighted included the role of materials to enhance cell attachment or survival, engineered heart tissue and patches to deliver cells.

The five presentations are to be available from the HyMedPoly website, www.hymedpoly.eu. At the time of reporting four of the five had been uploaded, the fifth was being edited by the author for public release.

The Workshop was also an opportunity to hold a closed meeting for the project participants to progress technical activities and discuss project management issues.

Appendix 1 – The HyMedPoly Project Group and Research Projects

HyMedPoly aims to develop new therapies based on biomedical polymers and inorganic materials. The nine universities and companies from across Europe shown in Table 1 are creating a cohort of 15 European Industrial Doctorates. The projects, detailed in Table 2, are to synthesise new biopolymers with added antibacterial functionality and develop functionalised bioactive ceramics and glasses that can act as active agents to kill bacteria and prevent their growth.

The new material systems from HyMedPoly are aimed at applications such as wound care, implants and bio film prevention.

Table 1.1: The HyMedPoly Consortium Members

Consortium Member	Legal Entity Short Name
Beneficiaries	
1. Lucideon	Lucid
2. University of Westminster	UoW
3. Politecnico di Torino	Polito
4. University of Erlangen-Nuremberg	FAU
5. Vornia	Vornia
6. University of Southampton	Soton
7. Knappschafts-Hospital Bochum GmbH	KHB
Partner Organisations	
8. IK4 Tekniker	IK4
9. Eurescom	EUR

Table 1.2: The HyMedPoly Research Projects and Interaction between Them

ESR	Project Title	Academic Host	Non Academic Host
1	Degradable Antibacterial Polyesters and Composites	Polito	Vornia
2	Design and Engineering of Therapeutic Polyurethanes	Polito	Vornia
3	Bioresorbable Antibacterial Polyesters	FAU	Lucid
4	Biodegradable and Bioresorbable Polyesters	FAU	Lucid
5	Novel Antibacterial Natural Polymers	UoW	Vornia
6	Hydrogel Based Hybrid Antibacterial Polymers	UoW	Vornia
7	Bioactive Silica Glass	FAU	Lucid
8	Substituted Hydroxyapatite	FAU	Lucid
9	Bioactive Phosphate Glass	FAU	Lucid
10	Innovative Antibacterial Polymers	UoW	KHB
11	Antibacterial Materials For Tissue Engineering Scaffolds	UoW	KHB
12	Mechanobiology of Cell-Surface Interaction	Soton	Lucid
13	Mechanics of Porous and Structured Materials	Soton	Lucid
14	In-vitro Bio-evaluation of Antibacterial Polymers	Polito	KHB
15	Antibacterial Testing of Polymers	Polito	KHB

Appendix 2 – Flyer for HyMedPoly Workshop 1

20th July 2016
 University of Westminster
 New Cavendish Street
 115 Faculty of Science and Technology
 Pavillion (1st floor),
 New Cavendish Campus



Biomaterials in Medicine : New concepts of drug-free antibacterial therapies

Prof. Ipsita Roy

The meeting will explore the importance of antimicrobial approaches and cellular interactions in developing new concepts of drug-free antibacterial therapies.

Workshop programme

- 10:00 - 10:30 Coffee/Registration
- 10:30 - 11:30 Prof. Aldo Boccaccini (University of Erlangen-Nuremberg):
"Biologically active ions in biomedicine, including antibacterial applications"
- 11:30 - 12:30 Prof. John Haycock (University of Sheffield):
"Materials and Schwann cell approaches or repair to nerve injury"
- 12:30 - 13:30 Lunch
- 13:30 - 14:30 Dr. Jochen Salber:
"Antimicrobial Materials: A Clinician's Perspective"
- 14:30 - 15:30 Ian Campbell (Lucideon):
"Exploiting glass formulations for antimicrobial applications"
- 15:30 - 16:00 Coffee/Tea break
- 16:00 - 17:00 Prof. Sian Harding (Imperial College London):
"Tissue engineering challenges for cardiac repair"
- 17:00 - 17:05 Concluding remarks – Prof. Ipsita Roy (University of Westminster)

Registration: <https://hymedpoly.eu/open-workshop-science-2016/>

The workshop is part of the HyMedPoly project (*Drug-free antibacterial hybrid biopolymers for medical applications*; H2020-MSCA-ITN-2014; <https://hymedpoly.eu/>).



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