



# Invitation to The University of Heidelberg

## Speakers:

**Prof Dr Carl Anderson**  
*Duquesne University, USA*

**Dr Jon Clark**  
*CDER, FDA, USA*

**David Cockburn**  
*EMA, UK*

**Dr Gerd Fischer**  
*Boehringer Ingelheim, Germany*

**Dr Jean Marie Geoffroy**  
*Takeda, USA*

**Ken J. Leiper**  
*Benson Associates, UK*

**Dr Dirk Lochmann**  
*Merck, Germany*

**Dr David Reed**  
*Eli Lilly, USA*

**Dr Gabriele Reich**  
*IPMB, University of Heidelberg,  
Germany*

**Dr Eda Ross Montgomery**  
*Vertex Pharmaceuticals Inc., USA*

**Hendrik Schneider**  
*IPMB, University of Heidelberg,  
Germany*

**Martin Warman**  
*Vertex Pharmaceuticals Inc., USA*



# QbD / PAT Conference 2009

Co-sponsored by



29 September – 1 October 2009  
Heidelberg, Germany

# About the University of Heidelberg

The University of Heidelberg is one of the **top-ranked institutions of international science and scholarship**. Being



Germany's oldest University with a six-hundred-years history, innovative research and modern teaching has always been the major focus. Accordingly, the university plays an active role in **education of the decision-makers of tomorrow**.



## Institute of Pharmacy and Molecular Biotechnology (IPMB)

The Institute of Pharmacy and Molecular Biotechnology (IPMB) is part of the Faculty of Biological Sciences. The research activities of the IPMB cover a wide range of topics with strengths in drug discovery, drug delivery, molecular biology and biotechnology, bioinformatics and instrumental analysis. In the field of instrumental analysis, a broad range of techniques are used routinely. Major research activities are concerned with Near Infrared Spectroscopy (NIRS) and Chemical Imaging. Both techniques are among the most important analytical tools within the framework of the Process Analytical Technology (PAT) initiative, a key element for improved process understanding, drug quality and drug safety. **To this end, the IPMB defines itself as a PAT Competence Center with the opportunity to enhance the knowledge for many PAT technologies.** This makes the IPMB a partner for industry and authorities. In order to facilitate the knowledge transfer from university to industry, the IPMB collaborates with many national and international pharmaceutical companies. In addition, the IPMB has strong collaborative interactions with nearby research centers and provides extensive teaching and training to undergraduate, graduate and Ph.D. students.

## Invitation to the QbD / PAT Conference 2009



Dear Madam, dear Sir,

After four successful PAT Conferences from 2005 to 2008, we would like to invite you to participate in

### **The University of Heidelberg 2009 International QbD / PAT Conference**

Once again, the aim of this event is to provide a platform for interesting and interactive discussions with regulatory authority representatives (EMA and FDA), industry experts and university colleagues committed to meet the growing expectations of regulators, industry, and society.

This year the programme will focus on the **implementation of Quality by Design (QbD) concepts and how PAT can help to achieve these new goals** in the context of today's industrial and regulatory challenges.

Developments and initiatives pivotal to achieving a significant step change in industry's performance will be reviewed. A significant workshop content will provide all delegates with a highly interactive setting where experts from the pharmaceutical industry, regulatory authorities and international academia will share their experiences with:

- The evolution and interactivity of FDA guidances and expectations
- Application of PAT/QbD to both legacy and new products
- Opportunities for facilitating a significantly improved continuum between R&D and manufacture
- Approaches to ensure that product specifications more realistically reflect therapeutic performance and vice versa

This will be complimented by a lecture programme on specific, relevant applications.

It would be a great pleasure for me to welcome you in Heidelberg on behalf of the Institute of Pharmacy and Molecular Biotechnology.

Dr Gabriele Reich  
**IPMB, University of Heidelberg**

# The Heidelberg QbD / PAT Conference 2009

29 September – 1 October 2009, Heidelberg, Germany

## Regulatory Background and Objectives

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It was only at the turn of the century both industry and regulatory agencies began to fully realise that the ability to meet society's ever increasing healthcare expectations would require a significant step change in the industry's performance. Much has already been put in place to establish the levels of innovation necessary to develop the desired more efficient, agile, flexible pharmaceutical manufacturing sector capable of reliably producing high-quality drug products without extensive regulatory oversight from both regulatory /industry perspectives.

From the outset the key challenges were how to:

- encourage and manage innovation while ensuring high quality
- identify and adopt appropriate technologies which will IMPROVE overall quality
- successfully shift from empirical to science based standards for manufacturing process quality

There is also no doubt that the holistic philosophy embodied in QbD is going to be central to a successful outcome. However the rate of industry progress toward these widely held objectives has been less than might have been expected and, since the publication of critical regulatory manufacturing guidances, we as an industry still fall significantly short of desired manufacturing performance.

### The issue is getting there!

Our starting point are empirically based "legacy" products and processes and a ten year plus lead time for new ones built on science based risk assessed principles. The apparent lack of progress is directly related to activities to improve understanding and performance of existing processes, while the lack of apparent consistency of approach is largely down to given company's immediate business needs and life cycle issues.

**As a result, the theme of this year's conference will have a significant interactive workshop content, focusing on the respective roles PAT and QbD will play redressing these impasses.**

The first two workshops will focus on:

- The Journey from PAT to QbD from a Regulatory perspective  
The evolution and interactivity of FDA guidance
- The Journey from PAT to QbD from an Industry perspective  
The application of PAT and QbD to both legacy and new products

As product, process, scientific understanding and risk management changes over time the concept of QbD being dynamic will also raise additional significant challenges critical to achieving the desired state which are the subjects of the remaining workshops :

- The Journey from API to Formulated Product  
Opportunities for facilitating a significantly improved continuum between R&D and manufacture
- The Challenge of Deriving Meaningful Product Specifications  
Approaches to ensure that product specifications more realistically reflect therapeutic performance and vice versa

The conference programme will also include presentations on a range of complimentary topics from academia and industry as well as a programme of short presentations from vendors providing equipment / support for PAT and QbD initiatives.

## Moderator

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**Dr Gabriele Reich, IPMB, University of Heidelberg**

## Conference Programme

### Introduction

- **Welcome by the University**  
**Dr Gabriele Reich, IPMB, University of Heidelberg, Germany**
- **Current Challenges for Implementing QbD**
  - Introduction
  - Why are we here?**Ken Leiper, Benson Associates, UK**

### Regulatory Expectations

- **Implementation of ICH Q8-Q10 from a European Perspective**
  - ICH Q8, Q9, Q10
  - Quality Risk Management
  - Pharmaceutical Quality Systems
  - Implementation and Inspections
  - PAT, Quality by Design, Design Space
  - Real Time Release**David Cockburn, EMEA**

#### WORKSHOP I

- **The Journey from PAT to QbD from a Regulatory Perspective**
  - The evolution and interactivity of FDA guidance**Dr Jon Clark, CDER, FDA, USA**

### Industry Problems

#### WORKSHOP II

- **The Journey from PAT to QbD: An Industry Perspective**

This workshop will focus on the role of PAT within a QbD development programme covering:

  - The use of Design of Experiment (DoE) to generate the necessary process knowledge
    - the steps needed to ensure the system is appropriate for purpose identified by the risk assessment
    - ensuring the PAT system ‘capability’
    - use of data generated in development to improve process performance during late stage development, and robustness at launch
  - The pivotal role of PAT generated data plays in process control
    - the use of control ‘dashboards’
    - the role in Continuous Improvement programs executed as part of a Continuous Validation/ Verification paradigm
  - The differing PAT requirements for:
    - batch versus continuous manufacturing processes
    - matching process changes to PAT system capability**Martin Warman, Vertex Pharmaceuticals Inc., USA**

### The Role of R&D

- **The Impact of Physical Properties of Raw Materials on Solid Dosage Form Design and Manufacture**
  - The role of solid state characteristics for process and product design
  - Understanding the effect of particle characteristics and surface interactions on powder processing
  - Amorphous versus crystalline materials
  - API crystal engineering and control of particle formation
  - Functionality tests to predict excipient performance
  - Managing raw material variability**Dr Gabriele Reich, IPMB, University of Heidelberg, Germany**

#### WORKSHOP III

- **From API to Formulated Product**
  - Truly robust analytical methods
  - A knowledge management framework for API and DP product development
  - What is process understanding and how can it be enhanced
  - Understanding links between API and raw materials, to final product processing and performance
  - Opportunities for facilitating a significantly improved continuum between R&D and manufacture**Dr Jean Marie Geoffroy, Takeda, USA**
- **A Structured Approach to Process Design**
  - Manufacturing processes should be designed to manage variation and consistently supplying products of the desired quality
  - To achieve this goal, Process Analytical Technology (PAT) based design practices can be used
  - The lecture will provide a concise description of the distinction between conventional manufacturing control and the control strategies associated with PAT
  - E55 Standard Practice and the discipline behind ‘structured approaches’
  - Establishing logical links to Q8, Q9 and Q10**Dr Gerd Fischer, Boehringer Ingelheim, Germany**

#### WORKSHOP IV

- **How to Derive Meaningful Specifications**
  - Approaches to ensure that product specifications more realistically reflect therapeutic performance and vice versa**Prof Dr Carl Anderson, Duquesne University, USA**

### Process Monitoring

- **Challenges of Process Monitoring**
  - Sensor positioning and sampling issues
  - Static versus dynamic measurements
  - Verification of sensor response
  - Chemometric approaches to extract critical process information
  - Evaluation of process kinetics and process endpoint
  - Qualitative versus quantitative methods**Dr Gabriele Reich, IPMB, University of Heidelberg, Germany**

- **Case Study 1: Dynamic Inline Process Monitoring in a Rotating Suspension Dryer: Operational Challenges**
    - Influence of light source intensity and illumination time on determination of moisture and residual solvents
    - Implementation of a triggered spectroscopic system with moving sight glasses
    - API dry powder isolation from mother liquor by a suspension dryer combining centrifugation, washing and drying in one unit
    - Improved process understanding and control of product characteristics
- Hendrik Schneider**, *IPMB, University of Heidelberg, Germany*

- **Case Study 2: Improving Process Understanding by Online NIRS Blend Monitoring and NIR Chemical Imaging**
    - Univariate versus multivariate data analysis
    - Use of NIR data to define a design space for the blending process
    - Separation of chemical and physical information to improve process understanding
    - Verification of sensor response by NIR chemical imaging
- Dr Dirk Lochmann**, *Merck KGaA, Darmstadt, Germany*

- **Case Study 3: Real-Time In-Line Blend Uniformity Monitoring in a Tablet Press Prior to Compression using Near-Infrared Spectroscopy: A Non-invasive Approach to Monitor Powder Blends for Segregation**
    - Rapid acquisition times with a non-contact probe enable a large sampling frequency
    - Potential to monitor a larger fraction of the entire blend
    - Alternate strategy for demonstrating adequacy of mixing of powder blends
    - Assessment of critical sources of process and product variability
- Dr David Reed**, *Eli Lilly, USA*

- **Effective Data Processing: Using QbD to Improve Process and Product Understanding**
- Dr Eda Ross Montgomery**, *Vertex Pharmaceuticals, Cambridge, MA, USA*

## The Future of QbD

- **The Future of QbD**

QbD is a holistic, dynamic, change process. This session will review how QbD will continue to develop driven by:

- Change to date
- Ongoing impact of innovation in formulation and manufacture
- Impact on the design of manufacturing assets
- Globalisation

to meet ever changing patient expectation, from the perspective of the proceedings of this conference.

**Dr Jon Clark**, *CDER, FDA, USA*

### Supplier Support for QbD and PAT

Selected Suppliers are invited to present their latest systems and products in short presentations.

### Short Presentations (as of September 2009)

#### Reliable Data Collection in PAT

- J&M Analytik AG, Essingen, Germany

### Optimization of Drying Processes by Gas Analysis using Mass Spectrometry

- ANYSCO GmbH, Karlsruhe, Germany

## Social Event



After an intensive first conference day, all speakers and participants are invited to a dinner in the pleasant atmosphere of a traditional restaurant in Heidelberg. Here you will have the opportunity to establish new contacts, discuss

technical matters in more detail, or just relax. Furthermore, you are invited to a guided tour of the historical city of Heidelberg. The participation in this tour will also be free of charge.

## Heidelberg – Optimal Accessibility via Frankfurt Airport

As one of the most beautiful cities in Europe, Heidelberg is at first sight an interesting venue – but is it also easily accessible? The answer is: Yes! The connection to Frankfurt Airport is convenient and fast. Next to London, Frankfurt Airport offers the **most frequent air connections in Europe**. It takes only about 45 minutes to get from Frankfurt to Heidelberg.

- **Lufthansa Shuttle Bus:** You can take this bus also if you do not fly by Lufthansa. It leaves for Heidelberg approximately once an hour.
- **The TLS Airport Shuttle Service Frankfurt** can be booked directly at the Marriott Hotel : Germany's most experienced Airport Shuttle-Service TLS brings you promptly and reliably from the airport to your hotel. This shuttle service can be ordered directly in the reservation form of the Marriott Hotel.
- **Train:** You can get on the train at the Airport Station. A train leaves up to three times per hour and usually takes less than an hour to get you to Heidelberg.

## Welcome to Heidelberg



Heidelberg is known for its world-famous Castle and the picturesque Old Town in breathtakingly beautiful surroundings. The city also stands for **Germany's oldest university and modern research facilities**, for historic

streets and a lively university atmosphere as well as for total relaxation and beautiful walks, plus stimulating international conferences and festivals.

## Conference Exhibition

During the three conference days, leading suppliers of PAT-related equipment are invited to exhibit their products in a presentation room, allowing participants

- to get to know systems from various manufacturers,
- to personally meet with potentially interesting suppliers and
- to learn more about the performance of the latest equipment.

Please contact Marion Weidemaier for further information on the opportunity to exhibit at the conference:

Phone ++49-(0)62 21-84 44 46, Fax ++49-(0)62 21-84 44 34, e-mail: weidemaier@concept-heidelberg.de.

## Speakers

**PROF DR CARL ANDERSON**, *Duquesne University, Pittsburgh, PA, USA*

Carl Anderson is an assistant professor of pharmaceutical sciences in the Mylan School of Pharmacy and Graduate School of pharmaceutical sciences. He joined the pharmaceutical Hoechst-Marion-Roussell in 1995 and worked there until 2002. At Duquesne University he leads a research group investigating industrial pharmaceutical applications of analytical technology, pharmaceutical applications of chemical imaging, and best practices in risk-based manufacturing. He is currently a member of ASTM E.55 Pharmaceutical Application of PAT.

**DR JON CLARK**, *CDER, FDA, USA*

Jon Clark, Ph.D. is Associate Director for Policy Development and GMP, Office of Pharmaceutical Science, Centre for Drug Evaluation and Research, FDA.

**DAVID JOHN COCKBURN**, *European Medicines Agency, London, UK*

The last 6 years David has spent at the Inspections Sector, EMEA, where his primary responsibility has been the secretariat for the GMP/GDP Inspectors Working Group. David also undertakes a similar role for the EMEA PAT team, which is a subgroup of GMP/GDP Inspectors Working Group, the joint CHMP/CVMP Quality Working Party and Biologics Working Party of CHMP. The PAT team is mandated to prepare a harmonised European approach to the assessment of PAT-based applications, including Quality by Design Approaches, and associated inspections. David is at present temporarily acting as Head of Sector, Inspections (for GMP and Quality related aspects).

**DR GERD FISCHER**, *Boehringer Ingelheim, Germany*

Dr. Gerd Fischer worked as Head of the QA and Head of Quality Operations API Production; Head of Global Quality Management Process Development; Global Strategic Initiative Leader; Head Global Industrial Development Quality and Technical Expertise at Hoechst Marion Roussel, Aventis, Sanofi-Aventis from 1996 to 2006. From 2007 to date Gerd Fischer has been Corporate Quality Manager at Boehringer Ingelheim.

**DR JEAN MARIE GEOFFROY**, *Takeda, USA*

Jean-Marie Geoffroy, PhD is Director of Product Development for Takeda Pharmaceuticals Inc. His 19 years of technical experience includes process analytical technology, formulation development and marketed product support, focusing on technology transfer, process validation, and process optimization. He is currently a member of ASTM's E55 Executive Committee, AAPS, and ISPE. Prior to Takeda, he has worked at TAP Pharmaceuticals, Abbott Laboratories, Marion Merrell Dow Pharmaceuticals and CIMA Labs.

**KEN J. LEIPER**, *CChem., MRSC, Benson Associates, UK*

K. J. Leiper is an independent consultant in Pharmaceutical Quality Systems, Analytical Science, and Process Analytical Technology with 37 years experience in a range of senior management positions with Glaxo/Wellcome Manufacturing. Ken Leiper is chair of ASTM Pharmaceutical Application of Process Analytical Technology Committee E55.01

**DR DIRK LOCHMANN**, *Merck Serono, Darmstadt*

Dirk Lochmann studied Pharmacy at the Johann-Wolfgang-Goethe University in Frankfurt. He received his PH.D. in Pharmaceutical Technology at the Universities of Frankfurt and Graz. Since 2005 he has been working as laboratory manager in Pharma Analytik at Merck Darmstadt focusing on online analytics. Since 2008 Dirk Lochmann heads the laboratory for Process Analytical Technology (PAT) at Merck Serono Darmstadt.

**DR DAVID REED**, *Eli Lilly, USA*

Dr. Reed joined Lilly as a Senior Analytical Chemist in 1988. He was promoted to Research Scientist in 1995 as a member of the Chemical Characterization team in Product Research & Development. Dr. Reed was promoted to Research Advisor in 2003. His main area of research is in vibration spectroscopy and in advancing PAT solutions to enhance technical capacity and capability. He has served on the FDA Advisory Subcommittee on Process Analytical Technologies (PAT) for Pharmaceutical Sciences and has provided a variety of technical support functions within Lilly for both Product Research & Development and Manufacturing Sciences & Technology.

**DR GABRIELE REICH**, *Faculty of Biological Sciences, University of Heidelberg*

Gabriele Reich is Senior Lecturer for Pharmaceutical Technology and Biopharmaceutics at the Institute of Pharmacy and Molecular Biotechnology (IPMB), Faculty of Biological Sciences, University of Heidelberg and Research Scientist at IPMB / Department of Pharmaceutical Technology and Pharmacology.

**DR EDA ROSS MONTGOMERY**, *Vertex Pharmaceuticals Incorporated, Cambridge, Mass., USA, Senior Director, Quality: CMC and QbD*

Eda Ross Montgomery is currently responsible for the implementation of Quality by Design at Vertex, including development of a strategy for the CMC filing, implementation at manufacturing sites, launch, and continuous improvement of Vertex' commercial products. Eda has over 20 years experience in the pharmaceutical industry, where she has led CMC teams for all Chemistry, Manufacturing, and Control activities and Analytical Development activities for 4 NDA filings and headed Analytical Development, Lifecycle Management, and Commercial Support departments.

**HENDRIK SCHNEIDER**, *IPMB - Dept. of Pharmaceutical Technology and Biopharmaceutics, University of Heidelberg*

Hendrik Schneider received his diploma in Mechanical Engineering from RWTH Aachen University. He is currently working as a PhD student in the research group of Dr. Gabriele Reich at the IPMB, University of Heidelberg. The integral part of his PhD work comprises the implementation of PAT tools in a centrifuge dryer for dynamic inline monitoring of critical process steps.

**MARTIN WARMAN**, *Vertex Pharmaceuticals Incorporated, Cambridge, Mass., US*

Martin is currently a Scientific Fellow with responsibility for PAT at Vertex Pharmaceuticals Inc, Cambridge, MA. Previously he ran a successful consultancy company (Martin Warman Consultancy Ltd) supporting the development and implementation of PAT within the pharmaceutical industry. He has over 15 years relevant experience in the field having in the past led the PAT Development Team as part of the Process Analytical Support Group (PASG) within Pfizer Global Manufacturing; during which time he gained experience in a developing and implementing a wide variety of PAT solutions, from spectroscopic, through chromatographic and including acoustic.

## Easy Registration



Reservation Form:  
**CONCEPT HEIDELBERG**  
P.O. Box 10 17 64  
69007 Heidelberg  
Germany



Reservation Form:  
+ 49 6221 84 44 34



e-mail:  
info@concept-heidelberg.de



Internet:  
www.pat-conference.org

### Dates

Tuesday, 29 September 2009, 09:00 – 18:30 h  
(Registration and coffee 08:00 – 09:00 h)  
Wednesday, 30 September 2009, 08:30 – 18:30 h  
Thursday, 1 October 2009, 08:30 – 15:30 h

### Venue

MARRIOTT Hotel  
Vangerowstraße 16  
69115 Heidelberg, Germany  
Phone ++49 (0) 62 21 - 90 80  
Fax ++49 (0) 62 21 - 908 608

### Fees

Conference  
Non-ECA Members EUR 1,990.- per delegate plus VAT  
ECA Members EUR 1,791.- per delegate plus VAT  
APIC Members EUR 1,890.- per delegate plus VAT  
(does not include ECA Membership)  
EU GMP Inspectorates EUR 995.- per delegate plus VAT

### Accommodation

CONCEPT HEIDELBERG has reserved a limited number of rooms in the conference hotel. You will receive a room

reservation form when you have registered for the event. Please use this form for your room reservation or be sure to mention "The Heidelberg PAT Conference 2009" to receive the specially negotiated rate for the duration of your stay. Reservation should be made directly with the hotel not later than 17 August 2009. Early reservation is recommended.

### Conference language

The official conference language will be English.

### Organisation and Contact

CONCEPT HEIDELBERG  
P.O. Box 10 17 64  
D-69007 Heidelberg, Germany  
Phone +49 (0) 62 21/84 44-0, Fax +49 (0) 62 21/84 44 34  
E-mail: info@concept-heidelberg.de  
www.concept-heidelberg.de

#### For questions regarding content:

Dr Günter Brendelberger (Operations Director)  
at ++49 (0) 62 21 / 84 44 40 or per e-mail at  
brendelberger@concept-heidelberg.de

#### For questions regarding reservation, hotel, organisation etc.:

Ms Marion Weidemaier (Organisation Manager)  
at ++49 (0) 62 21 / 84 44 46 or per e-mail at  
weidemaier@concept-heidelberg.de

If the bill-to-address deviates from the specification to the right, please fill out here:

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Fax 06221/84 44 34

D-69007 Heidelberg

Reservation Form (Please complete in full)

### The Heidelberg QbD / PAT Conference 2009

29 September – 1 October 2009, Heidelberg, Germany

Mr  Ms

Title, first name, surname

Company

Department

Street / P.O. Box

City Zip Code

Country

Phone / Fax

E-Mail (Please fill in)

#### General terms and conditions

If you cannot attend the conference you have two options:

1. We are happy to welcome a substitute colleague at any time.
2. If you have to cancel entirely we must charge the following processing fees: Cancellation
  - until 2 weeks prior to the conference 10 %
  - until 1 weeks prior to the conference 50 %
  - within 1 week prior to the conference 100 %.

CONCEPT HEIDELBERG reserves the right to change the materials, instructors, or speakers without notice or to cancel an event. If the event must be cancelled, registrants will be notified as soon as

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**Terms of payment:** Payable without deductions within 10 days after receipt of invoice.

**Important:** This is a binding registration and above fees are due in case of cancellation or non-appearance. If you cannot take part, you have to inform us in writing. The cancellation fee will then be calculated according to the point of time at which we receive your message. In case you do not appear at the event without having informed us, you will have to pay the full registration fee, even if you have not made the payment yet. Only after we have received your payment, you are entitled to participate in the conference (receipt of payment will not be confirmed)!