Module Catalogue
Regulatory Affairs and Compliance E-learning Solutions

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# Module Catalogue Contents

## About Us:

Zenosis is an Internet-based, regulatory and compliance learning-on-demand provider. Zenosis is available as a remote or integrated solution for life science organisations with contrasting sizes of user base. This almost instantly deployable solution is a continually updated resource providing vital knowledge that will enable your staff to comply with regulatory requirements and increase productivity. This is offered at a cost substantially less than that of conventional training methods, resulting in increased return on investment.

Zenosis modules are accredited with Continuing Professional Development (CPD) points by the Faculty of Pharmaceutical Medicine of the Royal Colleges of Physicians of the United Kingdom.

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Zenosis products are sold and maintained by grapl ltd.
Finding the right module for you and where to go from there.

Key: = Part of the selected topic
      = Related to the selected topic content
Finding the right module for you and where to go from there.

- **Good Manufacturing Practice**
  - GMP01: An Introduction to Good Manufacturing Practice for Medicinal Products
  - GMP02: Good Documentation Practice
  - GMP03: Good Manufacturing Practice in Cleaning and Sanitation
  - GMP04: Good Manufacturing Practice for the Warehouse
  - GMP05: Good Manufacturing Practice in Processing Medicinal Products
  - GMP06: Good Manufacturing Practice in Packaging Medicinal Products
  - GMP07: Corrective and Preventive Action (CAPA) in Medicinal Products Manufacture

- **Drug Safety**
  - PV03: An Introduction to Drug Safety and Pharmacovigilance
  - PV04: Signal Detection and Management in Pharmacovigilance
  - PV05: Risk Management Planning for Medicinal Products
  - PV06: Urgent Safety Restrictions
  - PV07: Good Pharmacoepidemiology Practice

- **Information and Communication Technology**
  - ICT01: Compliance with Regulation 21 CFR Part 11 on Electronic Records and Electronic Signatures

- **Medical Devices**
  - MD01: An Introduction to the Regulation of Medical Devices

Zenosis products are sold and maintained by grapl ltd.
ESS01: Essentials of EU and US Regulatory Affairs for Human Medicinal Products

ESS02: Essentials of Monoclonal Antibodies
This foundation-level module is the ideal introduction for new entrants to the field of pharmaceutical regulatory affairs and compliance. It describes the principal requirements that must be satisfied to gain and maintain approval to market medicinal products in the USA and Europe. The legal framework and the roles of major players in regulation are presented. The life-cycle of a drug is outlined. The various procedures available for assessment and approval of products are described and their requirements outlined. Obligations to be fulfilled after marketing approval are discussed.

Who will benefit from this module?
All staff in the pharmaceutical and biotechnology industries who are inexperienced in regulatory affairs and compliance will find the module an invaluable introductory training course. More experienced personnel will find it a useful reference tool. It will also be of benefit to healthcare professionals who contribute to the development of medicinal products.

Learning objectives
- Describe the role and responsibilities of regulatory affairs within the pharmaceutical industry in both the EU and the USA.
- Identify the main legislative instruments relating to medicinal products in both the EU and USA.
- Understand the main phases of the drug development process and be aware of the regulatory requirements that apply.
- Describe the requirements for applications for marketing approval and the procedures to be followed in both the EU and USA.
- Identify post-marketing regulatory activities in both the EU and USA.

Module outline
- Regulatory affairs primer
- The life-cycle of a drug
- Registering a drug
- After marketing approval
- Assessment
Monoclonal antibodies (mAbs for short) are the leading products of biotechnology. Drugs based on mAbs dominate the list of top-selling medicines worldwide. In addition, mAbs have many uses in medical diagnosis, in laboratory analysis, and in the biotechnology industry itself.

This module will introduce you to monoclonal antibodies, explaining how they work, how they are made, and the many uses to which they are put.

Who will benefit from this module?

This module will benefit anyone educated in science to high school level or beyond who wants an introduction to the basics of monoclonal antibodies.

Learning objectives

- Describe the structure and function of antibodies in the body
- Distinguish types of monoclonal antibody by their source and constitution
- Outline important factors in the production of mAbs
- Identify major uses of mAbs
Regulatory Submissions

SUB01: Orphan Drug Designation in the USA and Europe
SUB02: The European Centralised Procedure (CP)
SUB03: The Mutual Recognition Procedure (MRP)
SUB04: Preparing Submissions in the Common Technical Document (CTD) Format
SUB05: Electronic Common Technical Document (eCTD)
SUB06: Variations to Marketing Authorisations in Europe
SUB09: The New Drug Application (NDA) for Marketing Approval in the USA
SUB11: The Decentralised Procedure (DCP)
SUB12: Registration of Medicinal Products Based on Monoclonal Antibodies
SUB13: How to Gain Approval to Market a Generic Drug in the USA
SUB14: The Regulatory Pathway to Approval of Follow-on Biologics (Biosimilars) in the USA
Orphan Drug Designation in the USA and Europe

Approximate module time: 1.5 hours
Level: Introductory/Intermediate
Audience: Regulatory, Other
Category: Regulatory Submissions
Region: USA, Europe
CPD Points: 1.5

Who will benefit from this module?
This module is intended primarily for regulatory affairs professionals. Staff inexperienced in regulatory affairs and compliance will find the module an invaluable introductory training course; more-experienced personnel will find it a useful reference tool. More generally, it will be of interest to all those involved in the development and registration of medicinal products.

Learning objectives
- Explain why and how governments encourage the development of medicines for rare human diseases, and identify important sources of information
- Specify incentives offered for the development of medicines for rare diseases in the USA and in Europe
- State the criteria for orphan drug designation in the USA and in Europe
- List the contents of an application for orphan designation in the USA and in Europe
- Outline the sponsor’s obligations and options after orphan designation in the USA and in Europe.

Module outline
- Module overview
- Rare diseases and orphan drugs
- US designation
- European designation
- Assessment

MODULE OVERVIEW
An outline of the module’s scope and objectives, and notes on terminology.

RARE DISEASES AND ORPHAN DRUGS
Development of medicines for prevention, diagnosis, or treatment of rare diseases is commercially unattractive, so governments offer incentives to encourage it. In this session, we introduce the concept of orphan drug designation, discuss how it fits within a product development strategy, and identify some important sources of information on rare diseases and orphan drugs.

US DESIGNATION
Legislation to encourage research and development of drugs for rare diseases was introduced first in the USA. In this session we describe the US legal framework for orphan drug designation and specify the incentives offered. We set out the criteria for orphan designation and how they should be satisfied. We list the contents of an application for designation and outline how to apply. Finally we identify the sponsor’s obligations and options after designation.

EUROPEAN DESIGNATION
In this session we describe the European Union’s legal framework for orphan medicine designation and specify the incentives offered. We set out the criteria for orphan designation and how they should be satisfied. We specify the contents of an application for designation, describe how to apply, discuss the procedures for validation and evaluation of the application, and outline the provisions for appeal against refusal of designation. Finally we identify the sponsor’s obligations and options after designation.

Assessment
Multiple-choice mastery assessment.
The Centralised Procedure is one of three routes available to applicants to gain multinational marketing authorisation within the European Economic Area (EEA) on the basis of a single application. In the CP, one successful application leads to a marketing authorisation being issued by the European Commission that applies throughout the EEA. The CP is mandatory for certain types of products.

This module describes the various players in the procedure, the sequence and duration of the stages involved, and the requirements on content, format and timing of submissions.

This module is primarily aimed at regulatory affairs professionals dealing with marketing authorisation applications and related submissions for regulatory approval in Europe. More generally, it will also be of interest to all those involved in the development and registration of medicinal products.

**Learning objectives**

- Provide an overview of the CP process.
- Identify which products may/must use the CP.
- For products for which the CP is optional, outline the advantages and disadvantages of the CP compared with other routes to marketing authorisation.
- Describe requirements on content, format and timing of submissions.
- Specify the sequence and duration of the stages of the CP and the responsibilities of the participants.
- Describe the role of the European Medicines Agency and its relevant competent committee.
- Outline fast-track provisions.
- Describe the appeals procedure.
The Mutual Recognition Procedure (MRP)

The Mutual Recognition Procedure is one of three routes available to applicants to gain multinational Marketing Authorisation within the European Economic Area (EEA) on the basis of a single application. A national authorisation is converted to harmonised authorisations issued in a number of other member states chosen by the applicant.

The MRP is similar to the Decentralised Procedure but with later involvement of the Concerned Member States in the assessment by the Reference Member State. The Coordination Group for Mutual Recognition and Decentralised Procedures provides guidance and acts to facilitate agreement among the participating states.

This module describes the roles of the various players in the procedure, the sequence and duration of the stages involved, and the requirements on content, format and timing of submissions. It discusses the special issues that apply to generic products in the MRP.

Who will benefit from this module?

This module is primarily aimed at regulatory affairs professionals dealing with marketing authorisation applications and related submissions for regulatory approval in Europe. More generally, it will also be of interest to all those involved in the development and registration of medicinal products.

Learning objectives

- Provide an overview of the MRP process.
- Describe the pre-submission and submission actions in relation to timeline deadlines.
- Specify the responsibilities of the Reference Member State (RMS), the Concerned Member States (CMSs) and the applicant.
The CTD is the internationally recognised standard format for submissions to medicines regulatory authorities. In the European Economic Area, the USA and Canada, the CTD, in its electronic format (eCTD), is mandatory for all applications for marketing approval and all subsequent related submissions. The CTD is accepted in many other countries, being mandatory for new prescription medicines in some. This module explains the rationale for the CTD and provides guidance on its structure and format and the ways in which it is used.

Who will benefit from this module?
Regulatory affairs and compliance staff, and all those involved in drug development and who contribute to regulatory submissions, will find the module an invaluable introductory training course and/or a useful reference tool. Specialists in data handling, knowledge management or documentation will also wish to familiarise themselves with its contents.

Learning objectives
- Explain the rationale for the CTD, and describe the ways in which it is used.
- Identify regional differences in regulatory requirements for information in a CTD-formatted submission.
- Describe the structure of the CTD.
- Access guidance on detailed structure and content of the CTD.
- Outline formatting requirements for a CTD dossier.
The eCTD is mandatory for all applications for marketing approval and all subsequent related submissions in the European Economic Area, the USA and Canada. Other countries intend to make its use mandatory. The eCTD specification has been developed to facilitate the global electronic submission, review and lifecycle management of medicinal product dossiers for regulatory applications. It broadens the scope of the CTD to include information on variations, renewals and amendments, so that it is no longer a static document but is updatable throughout the life of the product. This module outlines the eCTD specification, discusses the approach to regional differences in dossiers, and provides guidance on creation of an eCTD submission. The module provides a training and reference tool that will be of particular value to those new to the use of the format.

**Who will benefit from this module?**

This module is an essential tool for regulatory affairs and compliance staff and specialists in data handling, knowledge management or documentation. All those involved in drug development and who contribute to regulatory submissions will also wish to familiarise themselves with its contents.

**Learning objectives**

- Describe the structure, requirements and functionality of the eCTD.
- Outline XML basics and the architecture of the eCTD.
- Discuss Document Type Definitions (DTDs) and schemas.
- Explain how to build an eCTD.
- Specify regional differences.
- Discuss life cycle and change management.
- List criteria that will make an electronic application technically valid.
- Initiate electronic transfer to a regulatory authority.
- Create, submit and maintain an eCTD dossier throughout the life of a drug product.
Variations to Marketing Authorisations in Europe

Changes to the terms of marketing authorisations for medicinal products, called variations in Europe, must be notified to or approved by the relevant regulatory authorities. Variations include changes to the composition of products, their manufacturing processes, the way they are used, or the indications for which they are authorised. Common approaches are adopted within the European Economic Area to variations to marketing authorisations approved through the Centralised, Decentralised or Mutual Recognition Procedures. Recent legislation has substantially modified the regulatory requirements and extended them to purely national authorisations by member states. This module, which is fully up to date with the new legislation, covers the classification of variations into their several types and the regulatory requirements, guidance and procedures to be followed for each type.

Who will benefit from this module?
Regulatory affairs and compliance staff, and all those who contribute to regulatory submissions, will find the module an invaluable introductory training course and/or a useful reference tool.

Module outline
- Defining variations
- Determining variation types
- General procedural aspects
- Variations via the Centralised Procedure
- Variations via the Mutual Recognition Procedure
- Case study
- Assessment

Learning objectives
- Define the concept of variations to marketing authorisations in the EEA.
- Identify which type of variation is appropriate for each kind of change to be made.
- Identify the documentation required to support the variation.
- Describe how to prepare and submit variation notifications or applications appropriate for each type of variation and route of regulatory approval, including options for grouping of variations and for work sharing of assessment.
The New Drug Application (NDA) for Marketing Approval in the USA

Approximate module time: 3.5 hours
Level: Introductory/Intermediate
Audience: Regulatory
Category: Regulatory Submissions
Region: USA
CPD Points: 3.5

Module outline
- Module overview
- Introduction
- High-level content and formatting
- Quality information
- Nonclinical information
- Clinical information
- Administrative information and summaries
- NDA review and approval process
- Expedited development and review
- Assessment

Who will benefit from this module?
This module is intended primarily for regulatory affairs professionals who are new to the NDA or who seek a refresher course. It will also be of interest to others involved in drug development and/or who interact with the FDA.

Learning objectives
- Summarise the content and format requirements for a New Drug Application
- Outline the procedural requirements for an NDA submission to the FDA.
- Describe the role of the FDA in the NDA review and approval process.
- List the principal provisions available from the FDA for expedited drug development and review, and summarise the criteria that apply to them.

Overview
Provided in this session is information on the module: the scope, the areas not covered, module objectives and US legislative framework. The background and history of NDAs is also included in this session.

Introduction
This session defines the NDA, outlines the history of related legislation, describes desirable interaction with the FDA, and introduces the US regulatory framework.

High-level content and formatting
This session provides an overview of the fundamental content and format requirements of an NDA for submission to the FDA.

Quality information
The CMC information that must be detailed in the application is described in this session.

Nonclinical information
The nonclinical information that must be provided in an NDA is summarised in this session.

Clinical information
This session sets out the components of the clinical information required in an NDA.

Administrative information and summaries
The administrative and prescribing information and the summaries required in an NDA are outlined.

NDA review and approval process
Details of the FDA’s review and approval process are provided.

Expedited development and review
This session describes priority review, accelerated approval, fast track development, and breakthrough therapy designation.

Assessment
Multiple-choice mastery assessment.
The Decentralised Procedure (DCP)

The Decentralised Procedure is one of three routes available to applicants to gain multinational marketing authorisation within the European Economic Area (EEA) on the basis of a single application. It can be used only for a product which has no existing marketing authorisation in any member state. It is similar to the Mutual Recognition Procedure (MRP) but with earlier involvement of the Concerned Member States in the assessment by the Reference Member State. The Coordination Group for Mutual Recognition and Decentralised Procedures (CMD) provides guidance and acts to facilitate agreement among the participating states.

This module describes the roles of the various players in the procedure, the sequence and duration of the stages involved, and the requirements on content, format and timing of submissions. It discusses the special issues that apply to generic products in the DCP.

Who will benefit from this module?

This module is primarily aimed at regulatory affairs professionals dealing with marketing authorisation applications and related submissions for regulatory approval in Europe. More generally, it will also be of interest to all those involved in the development and registration of medicinal products.

Learning objectives

- Provide an overview of the DCP process.
- Describe the pre-submission and submission actions in relation to timeline deadlines.
- Specify the responsibilities of the Reference Member State (RMS), the Concerned Member States (CMSs) and the applicant.
This module addresses characteristic issues influencing the registration of medicinal products based on monoclonal antibodies (mAbs), for use in humans. Regulatory requirements for the registration of biological medicinal products such as those based on mAbs differ in certain respects from those for small-molecule products. This is because of the distinct characteristics of biologics, such as complex structure and susceptibility to variation during manufacture.

In this module, we focus on distinctive issues in the production and testing of mAbs, in the context of relevant regulatory guidance. We discuss manufacturing quality, nonclinical, and clinical issues. We address aspects specific to radiolabelled mAbs. Finally, we identify the pathways for applications to conduct clinical trials and to market mAb-based products in Europe and the USA.

Who will benefit from this module?

This module will benefit regulatory affairs staff and others concerned with the registration of medicinal products based on monoclonal antibodies.

Learning objectives

- Discuss key quality issues in the manufacture of mAb-based products
- Discuss key issues in nonclinical studies of mAb-based products
- Discuss key issues in the clinical investigation and use of mAb-based products
- Identify specific considerations for radiolabelled mAb-based products
- Identify the pathways for applications to conduct clinical trials and to market mAb-based products in Europe and the USA
How to Gain Approval to Market a Generic Drug in the USA

Approximate module time: 3 hours
Level: Introductory/Intermediate
Audience: Regulatory
Category: Regulatory Submissions
Region: USA
CPD Points: 3

Module outline
- Module overview
- Generic drugs and the ANDA
- Patent certification
- The Orange Book
- Bioequivalence
- ANDA compilation and submission
- The Generic Drug User Fee Amendments
- Assessment

This module outlines the legislative and regulatory context for the development of generic drugs and describes the essential role of the Abbreviated New Drug Application (ANDA) in gaining marketing approval. The use of information in the ‘Orange Book’ is explained, as is the role of patent certification in the application. The importance of establishing bioequivalence between a generic and its reference product is emphasised. The module specifies the content and format requirements for an ANDA submission and describes the FDA’s review and approval process. An outline is given of the Generic Drug User Fee Amendments (GDUFA) and the law’s effects on industry players.

The module is up to date with the many final and draft publications, recently released by the FDA, that provide guidance for industry on applications for approval of generic drugs. It is also up to date with the provisions of the second authorisation of GDUFA, applicable in fiscal years 2018 to 2022.

Who will benefit from this module?
This module will benefit staff working in regulatory affairs, medical affairs, clinical development, CMC, analytical methods, and quality assurance departments, and other personnel who contribute to the development and registration of generic drugs.

Learning objectives
- List the criteria for therapeutic equivalence of drugs
- Outline the types of patent classification for an ANDA submission
- Explain how to use the Orange Book in the development of a generic drug
- Describe methods for determining bioequivalence of drug products
- Outline the content and format requirements for an ANDA submission
- Describe the ANDA review and approval process
- Outline the provisions of the Generic Drug User Fee Amendments and summarise their effects on generics sponsors

Module overview
An outline of the module’s scope and objectives, and notes on terminology.

Generic drugs and the ANDA
An overview of the legislative and regulatory context for the development and approval of generic drugs, particularly the Hatch-Waxman Act; a summary of the criteria for therapeutic equivalence of drugs; obtaining guidance from the FDA; controlled correspondence.

Patent certification
The role of patent certification in an ANDA submission, the different types of certification, what happens when a patent is challenged, and the circumstances under which marketing exclusivity may be afforded to a generics sponsor.

The Orange Book
The use of the Orange Book in generic drug development, the format and content of the Book’s listings, and how to extract information for an ANDA.

Bioequivalence
The crucial importance of establishing bioequivalence with a reference listed drug; tests of bioavailability and bioequivalence; the statistical criteria for bioequivalence; waivers of in-vivo studies.

ANDA compilation and submission
Planning and managing an ANDA project; regulatory requirements on content and format; quality (CMC), labeling, and bioequivalence information; submitting an ANDA to the FDA’s Office of Generic Drugs.

ANDA review and approval
The process of review by the FDA; review duration and success rate; communication between applicant and FDA; expedited review; petitions; amendments and easily correctable deficiencies; outcomes of review, and the applicant’s options in response to those outcomes.

The Generic Drug User Fee Amendments
The types of fees that the generics industry must now pay to the FDA; requirements for self-identification of generics industry players; the FDA’s performance goals for review and inspection; changes brought about by GDUFA II.

Assessment
Multiple-choice mastery assessment.
The regulation of biological medicinal products is governed by different laws from those that apply to small-molecule synthetic drugs. Producing faithful copies of therapeutic proteins is more challenging than producing generic drugs. The US legal framework for the licensure of follow-on biologics, and accompanying regulatory guidance from the Food and Drug Administration (FDA), have been established only in recent years.

We describe the provisions of the Biologics Price Competition and Innovation Act, identify criteria for licensing a follow-on biologic as ‘biosimilar’ or ‘interchangeable’, specify periods of market exclusivity that apply, and discuss patent infringement issues.

Finally, we describe the provisions of the Biosimilar User Fee Act, which authorises the FDA to collect fees from follow-on biologics sponsors, to support review activities.

Who will benefit from this module?

This module will mainly benefit regulatory affairs staff concerned with the licensure of follow-on biological products.

Learning objectives

- Outline the provisions of the Biologics Price Competition and Innovation Act
- Identify criteria for licensure of a follow-on biologic as biosimilar or interchangeable
- Specify periods of market exclusivity applicable to biological medicinal products
- Outline patent infringement issues relevant to biological medicinal products
- Access FDA guidance on development and licensure of follow-on biologics
- Outline the provisions of the Biosimilar User Fee Act
Clinical Trials

CT01: How to Gain Approval to Conduct Clinical Trials in Europe
CT03: An Introduction to ICH Good Clinical Practice
CT04: An Introduction to Clinical Trial Preparation and Design
CT06: Clinical Trial Monitoring: Site Evaluation and Set-up
CT07: An Introduction to Clinical Trials and Drug Development
CT08: Clinical Trial Monitoring: Study Monitoring, Documentation and Closure
CT09: Good Clinical Practice Inspections and Audits
CT10: The Investigational New Drug Application (IND) to Conduct FDA-regulated Clinical Trials
To conduct a clinical trial in the European Economic Area the sponsor must apply for authorisation from the national competent authority (i.e. medicines regulator), and favourable opinion must be obtained from a research ethics committee, in each member state in which the trial is to take place. This module sets out the requirements for successful compilation, submission and maintenance of the applications.

In addition to being fully compliant with current European Union legislation, the module looks forward to the implementation of the Clinical Trials Regulation.

The module will benefit:
- regulatory affairs professionals and other staff of pharmaceutical or biotechnology companies involved in clinical development of medicinal products; and
- healthcare professionals conducting clinical research as sponsor-investigators.

It will be of particular value to those who are new to European regulatory affairs, but familiarity with the basics of Good Clinical Practice is assumed.

### Module outline

- Module overview
- The European context
- Applying for approval
- Application for clinical trial authorisation
- Application for ethics committee favourable opinion
- Maintaining authorisation
- The Clinical Trials Regulation
- Assessment

### Learning objectives

- Outline the legal and regulatory framework that governs clinical trials in the European Economic Area.
- Summarise the procedures that must be carried out to gain approval to proceed with a trial.
- Identify the principal components of an application to a national competent authority for clinical trial authorisation and describe their contents.
- Discuss the principal areas of concern to an ethics committee and describe the information to be submitted to one.
- Specify what measures must be taken to maintain the authorisation of a trial in progress.
- Identify changes that will be brought about by the Clinical Trials Regulation.
An Introduction to ICH Good Clinical Practice

**Approximate module time:** 3 hours

**Level:** Foundation

**Audience:** Research, Regulatory, Compliance

**Region:** USA, Europe, Other

**CPD Points:** 3

**Module outline**

- Module overview
- ICH, harmonisation, and principles of GCP
- Clinical research teamwork
- Documentation
- Investigator responsibilities
- Informed consent
- Monitor responsibilities
- Assessment

**Who will benefit from this module?**

This module will benefit all those who participate in clinical research, whether they work in the pharmaceutical or biotechnology industry or as healthcare professionals. A sound knowledge of GCP is essential for clinical research associates / monitors, project managers, clinical investigators, clinical research coordinators / study nurses, data managers, pharmacists, and others contributing to clinical trials.

**Learning objectives**

- Explain why and how the ICH influences clinical research practice through its guideline on GCP, and summarise the principles of GCP.
- Identify the major roles in a clinical trial team, outline the responsibilities of each, and discuss how they work together.
- Describe the responsibilities of a trial sponsor.
- Describe the responsibilities of a clinical investigator.
- Explain the rationale and execution of the informed consent process, and discuss issues that arise in practice.
- Describe the responsibilities of a trial monitor.

Good Clinical Practice (GCP) is a set of internationally recognised ethical and scientific quality requirements for designing, conducting, recording and reporting clinical trials. Compliance with GCP principles is required by regulatory authorities in many countries for the authorisation of clinical trials and the acceptance of their data. The International Council for Harmonisation’s guideline E6, often referred to as ICH GCP, is the international standard specification for Good Clinical Practice.

This module introduces GCP and sets it in the context of typical collaborative work in clinical research. We discuss the role and goals of the International Council for Harmonisation and the principles of GCP. We describe the roles of members of a team working on a clinical trial. We set out the documentation that must be created and maintained. We specify the responsibilities of trial sponsors, clinical investigators and monitors. We explain the rationale and execution of the informed consent process, and discuss issues that arise in practice.

The module is fully up to date with Revision 2 of ICH GCP.

**Module overview**

Sets out the module’s scope, objectives and notes on terminology.

**ICH, harmonisation, and principles of GCP**

Describes the ICH’s role in the harmonisation of regulations, introduces its guideline E6, and sets out the principles of GCP.

**Clinical research teamwork**

Introduces the major roles in a typical clinical research project and outlines their duties and relationships.

**Documentation**

Identifies the documents designated by ICH GCP as essential to the conduct of a clinical trial, describes important examples, and outlines how they should be maintained.

**Sponsor responsibilities**

Duties and functions discussed in this session include risk-based quality management, selection of investigators, trial management, data handling and record keeping, finance and compensation, regulatory submissions, management of investigational product(s), safety reporting, monitoring, audit, dealing with noncompliance, and clinical trial reports.

**Investigator responsibilities**

Duties and functions discussed in this session include: provision of adequate resources and oversight of delegates; liaison with institutional review boards / independent ethics committees; compliance with protocol; management of investigational product(s), informed consent and data records; and safety reporting.

**Informed consent**

Sets out the principles and requirements of informed consent, describes the process, and provides examples of practical issues confronting healthcare professionals and subjects.

**Monitor responsibilities**

Explores the responsibilities of the monitor and provides insight into key challenges. Describes assessment of investigators and investigational sites, education and trial initiation, risk-based monitoring of clinical conduct, including CRF review and source document verification, and trial close-out. Discusses noncompliance and how to deal with it.

**Assessment**

Multiple-choice mastery assessment.
An Introduction to Clinical Trial Preparation and Design

Approximate module time: 4 hours
Level: Introductory/Intermediate
Audience: Research, Regulatory, Manager, Other
Category: Clinical
Region: USA, Europe, Other
CPD Points: 4

Worldwide expenditure on R&D by the pharmaceutical industry is continually increasing. Most of the financial investment in the production of a new drug is allocated to clinical trials.

Given the financial risk involved, it is crucially important that clinical trials be designed and set up efficiently to obtain adequate and accurate data in compliance with regulatory requirements.

This module aims to provide you with effective strategies for the preparation and conduct of a clinical trial, while adhering to regulatory safety standards. Management of data for submission is also covered.

Overview
This session briefly describes the relevant legal documents and guidelines relating to clinical trial design.

Clinical trials in drug development
The crucial role of clinical trials in the drug development cycle is examined. Regulatory requirements and financial pressures, and their interaction with trial design, are discussed.

Protocol design
This session provides an overview of clinical trial protocols. Opportunities to improve a clinical trial protocol for regulatory approval are also discussed.

Clinical trial preparation
This module is intended for all those involved in the preparation, design, conduct or analysis of clinical trials. It will be useful to new entrants to the field or as a refresher for staff, including clinical research associates and data managers, in the clinical/medical departments of pharmaceutical or biotechnology companies or in contract research organisations. It will also be of interest to clinical investigators, study coordinators, and other healthcare staff working on clinical trials.

Endpoints
This session focuses on clinical trial endpoints. The purpose of endpoints and the types are discussed in this part.

Statistical elements
This session covers the role of statistics in clinical trial design and analysis, as acknowledged in the International Council for Harmonisation (ICH) guideline for Good Clinical Practice (GCP).

Study design
This session provides an overview of the main types of study design.

Data capture and management
This session describes the purpose of data capture and explores efficiencies in data management as part of the evolving regulatory landscape.

Assessment
Multiple-choice mastery assessment.

Learning objectives

- Outline the role of clinical trial design in clinical research.
- Identify the relevant legal documents and guidelines relating to clinical trial design.
- Recognise the essential statistical components for clinical trial design and how these affect design choice.
- Define the general principles and concepts for trial design, and describe the implications of design choice on regulatory acceptance.
- Identify the strategies to improve data capture and management.
- Describe how electronic data capture can improve clinical trial development.

Who will benefit from this module?

This module is intended for all those involved in the preparation, design, conduct or analysis of clinical trials. It will be useful to new entrants to the field or as a refresher for staff, including clinical research associates and data managers, in the clinical/medical departments of pharmaceutical or biotechnology companies or in contract research organisations. It will also be of interest to clinical investigators, study coordinators, and other healthcare staff working on clinical trials.

Module outline

- Overview
- Clinical trials in drug development
- Protocol design
- Clinical trial preparation
- Endpoints
- Statistical elements
- Study design
- Data capture and management
- Assessment

CPD Points: 4

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Clinical Trial Monitoring: Site Evaluation and Set-up

Approximate module time: 1.5 hours
Level: Intermediate
Audience: Compliance, Other
Region: USA, Europe, Other
CPD Points: 1.5

Module outline
- Module overview
- Investigational site qualification
- Preparation for trial initiation
- Trial initiation at an investigational site
- Assessment

Who will benefit from this module?
The module is intended for those involved in clinical research and development, in particular the monitoring of clinical trials, and those who require an understanding of what this entails. It and its companion module CT08 provide a comprehensive introduction to monitoring for new CRAs, or additional training and professional development for those already working in the field. It will also be of value to clinical research coordinators, clinical investigators and other healthcare professionals involved in clinical studies.

Learning objectives
- State the objectives of an investigational site qualification visit and describe how to carry one out.
- Describe how to prepare for initiation of a clinical trial at an investigational site.
- State the objectives of a trial initiation visit and describe how to carry one out.

Module overview
Sets out the module’s scope, objectives and notes on terminology.

Investigational site qualification
Each candidate investigational site needs to be assessed for its suitability for the trial. A CRA and/or other representatives of the sponsor will typically visit the site to discuss the trial with the potential investigator and learn about the resources that can be deployed there. In this session we describe the objectives of the visit, preparation for it, and its conduct. We set out factors that should be assessed and give examples of the sorts of issues that may arise.

Preparation for trial initiation
When one or more investigational sites are approved by the sponsor, various activities are carried out concurrently in preparation for the start of a trial. In this short session we outline the tasks leading up to site initiation.

Trial initiation at an investigational site
An initiation visit is made to ensure that the participating site is ready for the conduct of the clinical trial and that the relevant personnel have a clear and accurate understanding of how the study is to be conducted. The CRA will review the clinical protocol and procedures with the team, check that all study materials are in place and that facilities and equipment are ready, ensure that the investigator’s trial master file is in order, and confirm the monitoring plan and provisions for audit and inspection. We describe the actions that should be carried out.

Assessment
Multiple-choice mastery assessment.
This module provides an understanding of how clinical trials fit into the drug development process. It outlines the key historical events leading to the development of controlled clinical trials. It specifies the purpose of trials, describes their characteristics, and identifies codes of practice and regulations that apply to them. Finally, it discusses the environment of cost control in which the modern pharmaceutical industry operates.

Who will benefit from this module?

This introductory module is an ideal primer for those new to the fields of clinical research or regulatory affairs. It will also provide valuable background information for administrative, sales and other staff in the pharmaceutical and biotechnology industries, enabling them to understand better the context in which they work.

Module outline

- Overview
- History
- Codes and regulations
- Drug development
- Global market
- Assessment

Learning objectives

- Describe the key events in the historical development of the modern pharmaceutical industry
- Outline the key codes of practice and regulatory processes
- Explain how clinical trials fit within the drug development process
- Describe the economic environment within which pharmaceutical companies operate
Clinical Trial Monitoring: Study Monitoring, Documentation and Closure

The sponsor of a clinical trial must arrange for it to be monitored throughout its duration to ensure that the rights and wellbeing of subjects are protected, the trial data are accurate, complete and verified from source documents, and the conduct of the trial complies with the study protocol. Good Clinical Practice and regulatory requirements. In this module we describe how a Clinical Research Associate (CRA) monitors an ongoing trial to its conclusion.

Who will benefit from this module?

The module is intended for those involved in clinical research and development, in particular the monitoring of clinical trials, and those who require an understanding of what this entails. It and its companion module CT06 provide a comprehensive introduction to monitoring for new CRAs, or additional training and professional development for those already working in the field. It will also be of value to clinical research coordinators, clinical investigators and other healthcare professionals involved in clinical studies.

Learning objectives

- Describe how to prepare for and carry out regular monitoring visits to investigational sites
- Describe how to review case report forms (CRFs) and verify consistency of data with source documents
- Describe how to close out a trial at a site
- Discuss the concept and implications of risk-based monitoring
- Identify warning signs that raise suspicion of scientific misconduct or fraud

Module outline

Sets out the module’s scope, objectives and notes on terminology.

Site monitoring visits

Regular visiting of investigational sites by a CRA is the front line of clinical trial monitoring. The visits allow face-to-face interaction with study site personnel and direct access to source records and site resources, providing the best opportunity for the CRA both to assess and to influence the progress and quality of a trial. In this session, we discuss monitoring tasks, the frequency and duration of visits, preparation for a visit, the kinds of deficiencies that may be found at the site, interaction with study staff, assessment of protocol compliance in a variety of areas, investigational product and subject recruitment issues, review of findings, and report and follow-up.

Data checking

Review and verification of data in CRFs and source documents is considered by many to be the CRA’s principal task. It takes up most of his or her time on a monitoring visit and constitutes the primary measure taken on behalf of the sponsor to assure the quality of the data provided by the investigator. In this session, we describe how to carry out CRF review and source document verification (SDV). We discuss the extent of SDV required, outline differences between paper and electronic CRFs, identify aspects of trial conduct for which CRFs and source records should be checked, discuss on-site corrections and resolution of discrepancies, and outline data retrieval and data query procedures.

Close-out visit

Almost all clinical trials require an on-site visit to close the study at a site, irrespective of whether routine monitoring visits have been made. In addition to completing tasks typically carried out at a routine visit, the CRA will be required to perform some actions specific to the end of the trial, such as retrieving or authorising the destruction of unused supplies, retrieving some essential documents, and reminding the investigator of continuing responsibilities. In this session we describe the close-out of a trial at an investigational site.

Risk-based monitoring

Monitoring of clinical research by traditional methods, particularly as regards data checking, is time consuming and laborious. In recent years, regulatory authorities have focused attention on ways of making quality management in general, and monitoring in particular, more efficient through a risk-based approach. Implications of this approach include: increased emphasis on centralised monitoring rather than site visits; and a move away from 100% source document verification toward risk-based and statistically directed sampling of data. In this session we provide a brief introduction to principles of risk-based monitoring.

Fraud and scientific misconduct

The great majority of healthcare professionals undertaking clinical research act with honesty and integrity. However, cases of scientific misconduct and downright fraud do occur. Besides damaging the reputations of those who commit them, such actions have potentially serious consequences for the research and might even affect public health. In this session we distinguish error, misconduct and fraud, discuss the CRA’s role in detecting them, and describe their consequences.

Assessment

Multiple-choice mastery assessment.
Good Clinical Practice (GCP) inspections and audits are carried out to provide assurance that: the rights, safety and welfare of clinical trial subjects are protected; the data that constitute the results of the trials are accurate and reliable; and the trials are carried out in compliance with relevant legal requirements.

This module describes what investigational medicinal product sponsors, contract research organisations and clinical investigators can expect when they undergo inspection or audit. It focuses in particular on inspection by European and US regulators.

The module describes general principles of GCP inspection and audit, discusses preparation for an inspection, and sets out in detail what European and US FDA inspectors will examine. Finally it describes post-inspection actions by the regulator and the inspected party.

Who will benefit from this module?

This module will benefit all those involved in clinical research who already understand the basics of GCP. It will be of value to staff working in clinical, medical and QA departments of pharmaceutical companies and CROs, to independent clinical research associates, and to healthcare professionals conducting clinical studies.

Learning objectives

- Discuss principles of GCP inspections and audits
- Specify activities to be carried out in preparation for an inspection
- Describe what happens when a European regulator inspects the site of a sponsor or contract research organisation
- Describe what happens when a European regulator inspects the site of a clinical investigator
- Describe what happens when the US Food and Drug Administration inspects the site of a sponsor or contract research organisation
- Describe what happens when the US Food and Drug Administration inspects the site of a clinical investigator
- Specify post-inspection actions by the regulator and the inspected party
An Investigational New Drug Application (IND) is a submission to the US Food and Drug Administration (FDA) for permission to conduct a clinical trial of a medicinal product. This module describes regulatory requirements that sponsors or sponsor-investigators must meet for successful compilation, filing and maintenance of INDs. The IND and its role are defined, and the contexts in which it is required are specified. The information that must be included and the format in which it needs to be presented are outlined. The process of review by the FDA is described, and the outcomes and sponsor’s responses are discussed. The actions necessary to maintain an open IND are set out. Finally, the regulatory provisions for expanded-access use of investigational drugs are described.

Who will benefit from this module?

- Regulatory affairs professionals and other staff of pharmaceutical or biotechnology companies involved in clinical development of medicinal products; and
- Healthcare professionals conducting clinical research as sponsor-investigators or who wish to treat patients under an expanded-access scheme.

Learning objectives

- Specify the role of an IND and the contexts in which it is required
- Access key regulatory documents relating to INDs
- Describe the contents and format of an IND submission
- Describe the process of FDA review of an IND, the possible outcomes and sponsor’s responses
- Identify actions necessary to maintain an active IND
- Specify options for expanded-access use of investigational drugs

Module overview

An outline of the module’s scope and objectives, and notes on terminology.

Introduction to Investigational New Drug Applications (INDs)

This session explains the role and legal status of an IND, sets out the contexts in which one must be filed, summarises the responsibilities of sponsors and investigators, and outlines the pre-submission process.

IND content and format requirements

This session sets out IND contents required by regulations and describes how these are incorporated in a CTD-formatted submission. The significance of the FDA forms 1571 and 1572 are discussed. The major components of an application are outlined: general investigational plan, investigator’s brochure, clinical protocol, Quality/CMC information, nonclinical data, and clinical information.

Filing and FDA review

Options and requirements for submission of an IND are set out, and the review procedure and its outcomes are described. The roles of FDA reviewers are outlined. The significance of a clinical hold and the sponsor’s response to a hold are discussed.

Maintenance of an IND

This session identifies the various types of IND amendments and reports: protocol amendments, IND safety reports, annual reports, and information amendments. It explains when they need to be made and outlines the regulations that govern them. The responsibilities of sponsors and investigators to report safety findings are described, as are requirements for financial disclosure and record retention.

Expanded-access use

This session describes the various types of expanded-access use of investigational drugs to treat patients outside of clinical trials and sketches a scenario of emergency use.

Assessment

Multiple-choice mastery assessment.
An Introduction to Pharmacokinetics and Pharmacodynamics in Drug Development and Registration

Pharmacokinetic (PK) and pharmacodynamic (PD) studies provide a bridge between science and medicine in the development of a drug. In this module we describe the role of in-vivo PK and PD studies in a drug development programme, set out the uses to which the findings can be put, and discuss their implications for clinical development and application for marketing approval.

Who will benefit from this module?
Pharmacologists, nonclinical researchers, clinical researchers, regulatory affairs staff, and others who contribute to drug development and registration will benefit from this module.

Module overview
An outline of the module’s scope and objectives, and notes on terminology.

Role of pharmacokinetics and pharmacodynamics
Although pharmacokinetic (PK) and pharmacodynamic (PD) studies are routinely carried out in nonclinical and clinical stages of drug development, their role is perhaps less well understood than it ought to be by those who are not specialists in the field. In addition, greater emphasis is being placed by regulators on the value of PK and PD data. Evidence of good practice in the execution of PK and PD studies, and sound understanding of the implications of their findings, are becoming increasingly important in drug registration.

In this session we define PK and PD, outline the uses of PK and PD data in a drug development programme, and give examples of how good practice in obtaining and interpreting PK and PD data can contribute to the minimisation of risk for a drug.

PK and PD studies in drug development
In this session we discuss the various types of study carried out to acquire pharmacokinetic and pharmacodynamic data, grouping them into those conducted in animals only, in animals and humans, and in humans only. We identify their goals, rationale, and place in a drug development programme.

Drug administration routes
In this session, after introducing the principal pharmacokinetic parameters, we describe the PK and PK/PD characteristics of each drug administration route. We discuss the different medical-scientific questions to be addressed by PK/PD research for the different routes.

Pharmacodynamic studies
In this session we discuss the scope of pharmacodynamics, distinguish pharmacodynamic from clinical outcomes, and outline how the former may be used as surrogates for the latter. The core information from PD studies is a quantitative description of the dose–response relationship and the influence of various factors on this relationship. We emphasise the importance of interpreting the shape of the dose–response curve in making major decisions on a drug’s development. Finally, we discuss factors that can influence the beneficial and adverse effects of a drug.

Assessment
Multiple-choice mastery assessment.
This module extends the learner’s understanding of pharmacokinetic and pharmacodynamic studies from the basics described in our companion module PKPD01, An Introduction to Pharmacokinetics and Pharmacodynamics in Drug Development and Registration. It provides detail on a variety of aspects of such studies: design, sampling, data analysis, research in special populations, and bioequivalence testing.

**Who will benefit from this module?**
Pharmacologists, nonclinical researchers, clinical researchers, regulatory affairs staff, and others who contribute to drug development and registration will benefit from this module.

**Module outline**
- Module overview
- Study design
- Sampling practice and outcomes
- Data analysis
- Special populations
- Generics and bioequivalence
- Assessment

**Category:** Nonclinical, Clinical, Regulatory Submissions

**Region:** Europe, USA, Other

**CPD Points:** 1.5

**Module overview**
An outline of the module’s scope and objectives, and notes on terminology.

**Study design**
In this session we discuss the core design of choice for many PK and PD studies: crossover. We outline its advantages and how to counteract an important weakness, which is the carry-over effect.

**Sampling practice and outcomes**
Arguably the most important aspect of the design of a PK or PD study is the sampling schedule. How many samples should be taken per subject and at which time points after dosing? Choice of these factors is crucial in minimising bias and maximising the precision of results. In this session we explain principles of good practice in sampling.

**Data analysis**
In this session, after introducing the principal pharmacokinetic parameters, we describe the PK and PK/PD characteristics of each drug administration route. We discuss the different medical-scientific questions to be addressed by PK/PD research for the different routes.

**Special populations**
Drug development entails research not only into the target population as a whole but into sub-populations with a common demographic or health characteristic that may produce treatment outcomes that differ significantly from the average. In this session we discuss such special populations and how they are studied.

**Generics and bioequivalence**
Licensing of generic drugs is an area in which pharmacokinetic studies constitute the prime determining factor. In the great majority of cases the test that determines the licensing of a generic drug is a comparison of its plasma concentration–time course with that of the product it copies – a bioequivalence test – to assess whether they are sufficiently similar. In this session we describe how to carry out bioequivalence testing.

**Assessment**
Multiple-choice mastery assessment.
Good Manufacturing Practice

GMP01: An Introduction to Good Manufacturing Practice for Medicinal Products
GMP02: Good Documentation Practice
GMP03: Good Manufacturing Practice in Cleaning and Sanitation
GMP04: Good Manufacturing Practice for the Warehouse
GMP05: Good Manufacturing Practice in Processing Medicinal Products
GMP06: Good Manufacturing Practice in Packaging Medicinal products
GMP07: Corrective and Preventive Action (CAPA) in Medicinal Products Manufacture
QAC01: An Introduction to Good Quality Control Laboratory Practice
An Introduction to Good Manufacturing Practice for Medicinal Products

Approximate module time: 1.5 hours
Level: Foundation
Audience: Manufacturing personnel
Category: GMP/QA/QC
Region: Europe, USA, Other
CPD Points: 1.5

Module outline
- Module overview
- GMP – what and why
- Principles of GMP
- Hygiene, cleaning, and sanitation
- Documentation and records
- Assessment

GMP01

Good Manufacturing Practice (GMP) is a set of rules for medicines manufacturers to follow so that their products are safe, effective, and of good quality. The rules may be written into law or set out in guidance documents from regulatory authorities. Regulators will not allow medicinal products to be placed, or to remain, on the market in their country unless the products can be shown to be manufactured in compliance with GMP. To this end, they carry out inspections of manufacturing plants. Companies that persistently commit serious breaches of GMP requirements have suffered huge fines.

All manufacturing personnel must receive initial and ongoing training in the theory and practice of GMP. Everyone who works in a processing, quality control, packaging, or warehouse environment for a pharmaceutical or biotechnology company, or one of their contractors, must understand why GMP is important, how it applies to them, and how to comply with it. This module provides an ideal induction and refresher course in the basics of GMP. We begin by explaining what GMP is and why it is necessary. We then set out major goals of GMP as: prevention of contamination; prevention of mix-ups; scrupulous documentation; validation and maintenance of processes and equipment; quality assurance by an independent unit; and training. We place GMP in the context of a company’s quality management system.

Hygiene, cleaning, and sanitation
Prevention of contamination is one of the most important goals of GMP. Contamination of product is often difficult to detect, so GMP rules emphasise preventive measures, including: attention to personal health and hygiene, and the wearing of special clothing, by staff; and cleaning and sanitation of premises and equipment. In this session we set out the basics of GMP requirements in these vital areas.

Documentation and records
Comprehensive documentation of procedures, formulas, work instructions, and specifications, and thorough recording of batch data, are fundamental requirements of GMP. In this session, we explain why documentation is so important, identify different types of document required, and set out some simple rules for recording and correcting data.

Assessment
Multiple-choice mastery assessment.

Who will benefit from this module?
Everyone who works in, or has occasion to enter into, a manufacturing environment in the pharma/biotech industry should have access to this module.

Learning objectives
- State what GMP is and describe why it is important
- Identify sources of GMP rules in regulations and internationally standardised guidance
- Identify major goals of GMP, outline what manufacturers must do to achieve them, and list some of the things that you need to do in order to contribute
- Comply with basic requirements regarding hygiene, cleaning, and sanitation
- Comply with basic requirements regarding documentation

GMP – what and why
This session explains what GMP is and why it is important, and it gives some lessons from history. It introduces the regulations and guidance documents which are the source of GMP rules. Finally it touches on regulatory inspections and the consequences that can arise from failure to comply with GMP requirements.

Principles of GMP
In this session we present an overview of the main principles of GMP, and we outline some things that manufacturing personnel need to do to comply with requirements. We identify the principal goals of GMP as: prevention of contamination; prevention of mix-ups; scrupulous documentation; validation and maintenance of processes and equipment; quality assurance by an independent unit; and training. We place GMP in the context of a company’s quality management system.

Hygiene, cleaning, and sanitation
Prevention of contamination is one of the most important goals of GMP. Contamination of product is often difficult to detect, so GMP rules emphasise preventive measures, including: attention to personal health and hygiene, and the wearing of special clothing, by staff; and cleaning and sanitation of premises and equipment. In this session we set out the basics of GMP requirements in these vital areas.

Documentation and records
Comprehensive documentation of procedures, formulas, work instructions, and specifications, and thorough recording of batch data, are fundamental requirements of GMP. In this session, we explain why documentation is so important, identify different types of document required, and set out some simple rules for recording and correcting data.

Assessment
Multiple-choice mastery assessment.
Good Documentation Practice (GDocP) is that part of GMP that applies to the creation, maintenance, use, and retention of documents to provide assurance of the quality of products.

In this module, we emphasise the crucial importance of GDocP and we identify five principles that underpin it. We explain the functions of the various types of documents that are used and discuss how they should be created and controlled. Finally, we set out requirements for record keeping — how data are to be entered into records, corrected if necessary, and how records must be retained.

Everyone who works in a manufacturing environment in the pharma/biotech industry will benefit from this module. It will be of especial interest to quality assurance staff.

- Explain why Good Documentation Practice is important, and identify principles that underpin it
- List the various types of documents used and explain their functions
- Discuss how documents should be created and controlled
- Specify requirements for record keeping, including those for entering and correcting data

Module outline
- Introduction
- Importance and principles of GDocP
- Types of documents
- Document creation and control
- Record keeping
- Assessment

CPD Points: 1

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Cleaning and sanitation of premises and equipment are essential to efforts to prevent contamination of product, and they need to be done in compliance with Good Manufacturing Practice (GMP) regulatory requirements. This module shows why it is so important to do a good job, what to consider before and during each job, and how best to go about the work.

We begin by explaining how product may become contaminated and what can be done to prevent contamination through effective cleaning and sanitation procedures. We set out good practices to keep the factory clean and sanitary, and we describe how to prepare for and carry out cleaning and sanitation of premises. Finally we turn to the vitally important subject of cleaning and sanitising of production equipment.

**Preventing contamination**
Preventing contamination of product is one of the highest priorities in the factory, and effective cleaning and sanitation are essential to these efforts. In this session we describe sources of contamination and how to deal with them. We discuss the agents and equipment used, precautions to be observed, and the principles of the work required.

**Cleaning and sanitation of premises**
The whole factory must be kept clean and sanitary. In this session we discuss how to contribute to general cleanliness of the premises and how to go about cleaning surfaces in the buildings. We also outline pest control measures.

**Cleaning and sanitising of equipment**
Production equipment must be thoroughly cleaned, and sanitised as necessary, to prevent contamination of product. In this session we describe how to go about this vital task in compliance with GMP requirements. We discuss how the grade of work required may vary according to the use of equipment, and we emphasise that written and validated procedures must be followed exactly. We focus on equipment parts that require particular attention, and we explain the significance of hold and dwell times. We end with the completion of cleaning status tags and records, and we outline the use of automated clean-in-place systems.

**Assessment**
Multiple-choice mastery assessment.

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**Who will benefit from this module?**
Everyone who works in a manufacturing environment in the pharma/biotech industry will benefit from this module.

**Learning objectives**
- Understand why cleaning and sanitation are so very important in preventing contamination of product
- Adopt good practices in preparing for, carrying out, and recording the cleaning and sanitising of premises and equipment
The warehouse plays a crucial role in a medicinal products factory. This module explains the requirements of Good Manufacturing Practice (GMP) for the warehouse, and how to comply with them.

We begin with an introduction to work in the warehouse of a medicinal products manufacturer, in which we describe the kinds of goods that come in and go out and how they may be stored in a typical layout. We identify methods of segregating stock, and we set out seven main goals of GMP for the warehouse. GMP for the warehouse overlaps with Good Distribution Practice (GDP), which applies to the whole distribution chain for products.

In the next session we discuss procedures for the receipt of inward goods and outline how the goods are checked, identified, labelled, quarantined, sampled and tested, and released for use or rejected. In the third session, we describe good practice for storage, inventory control, and transfer of materials and products to and from production. Finally, we discuss dispatch of finished products, and procedures for dealing with returned or recalled products.

This module provides essential training for all personnel who work in the warehouse of a medicinal products manufacturer. Other staff working in a manufacturing environment in the pharma/biotech industry will also benefit from this module.

### Learning objectives
- Comply with the requirements of Good Manufacturing Practice for the warehouse
- Carry out the tasks and checks necessary when receiving goods
- Follow good practice for storage and inventory control
- Carry out the tasks and checks required for dispatch of finished products
- Deal appropriately with returned or recalled products

### Module outline
- Module overview
- Working in the warehouse
- Receipt of inward goods
- Storage
- Dispatch, returns, and recalls
- Assessment

### Who will benefit from this module?
This module provides essential training for all personnel who work in the warehouse of a medicinal products manufacturer. Other staff working in a manufacturing environment in the pharma/biotech industry will also benefit from this module.
Approximate module time: 1 hour
Level: Introductory/Intermediate
Audience: Manufacturing personnel
Region: Europe, USA, Other
Module outline
Category: GMP/QA/QC
Operations in the dispensary and on processing lines are at the heart of medicinal product manufacturing. This module describes how to carry out such operations in compliance with the requirements of Good Manufacturing Practice.

We discuss how to: dispense starting materials; set up, control, and record formulation processes; evaluate product yield and calculate materials reconciliation. We set out the Good Manufacturing Practice (GMP) requirements that must be met in carrying out these tasks.

Who will benefit from this module?
This module provides essential training for all personnel who work on the processing of medicinal products. Other staff working in a manufacturing environment in the pharma/biotech industry will also benefit from this module.

Learning objectives
- Dispense starting materials in compliance with GMP requirements
- Set up, control, and record formulation processes in compliance with GMP requirements
- Evaluate product yield and check materials reconciliation in compliance with GMP requirements

Dispensing
The dispensary is the place where raw materials entering the processing area are controlled. It is where starting materials coming from the warehouse are weighed and transferred into containers ready to be taken for formulation operations. Dispensing is a critical step in production and must be done with great care. Any error can have a substantial impact on product quality. In this session we discuss good practice in dispensing starting materials.

Formulation
Formulation processes are the prime engines of pharmaceutical manufacturing. Control of these processes is central to the assurance of product quality. In this session we set out the main tasks involved in processing a batch after starting materials or intermediate product have been dispensed, and we describe relevant GMP requirements.

Yield and reconciliation
Product yield evaluation and material reconciliation are two ways of checking the balance between the amount of material input to a process and the amount output from it. If the balance does not lie within acceptable limits, this may indicate a problem with the process. In this short session we discuss the importance of yield and reconciliation, how to check them, and what must be done to comply with GMP requirements with regard to them.

Assessment
Multiple-choice mastery assessment.
Packaging operations constitute the last manufacturing step before release of a product to the market. They convert bulk product to the final product. Packaging for medicinal products is subject to Good Manufacturing Practice rules similar to those for the products themselves. In this module we describe the functions that packaging must fulfil and the quality controls that are applied to packaging materials and operations. We set out the requirements for control of printed materials. We describe preparation, in-process control, and completion of a packaging run. Finally, we explain how to carry out reconciliation of packaging materials.

Who will benefit from this module?
This module provides essential training for all personnel who work on the packaging of medicinal products. Other staff working in a manufacturing environment in the pharma/biotech industry will also benefit from this module.

Learning objectives
- Describe the functions of packaging and give examples of controls applied to packaging materials and operations to provide assurance of quality
- Specify requirements for control of printed materials
- Adopt good practice in the preparation, in-process control, and completion of a packaging run
- Explain how to carry out reconciliation of packaging materials

Module overview
An outline of the module’s scope and objectives, and notes on terminology.

Packaging quality
Packaging, or container-closure, systems must contain and protect the product from spoilage, preserve its stability, and provide evidence of tampering as required. Labelling must provide the correct information about the product, its storage requirements, and its use. Information that allows the distribution of batches to be traced should be included, and measures to defeat counterfeiters are increasingly required.

Packaging quality affects product quality, so packaging materials, systems, and operations are subject to quality assurance requirements that are similar to those for starting materials and products. Controls must be in place to provide assurance that packaging fulfils its various functions. In this session we set out those functions and sketch examples of the kinds of controls that are necessary.

Control of printed materials
Control of printed materials is an especially important part of packaging operations. All information on packaging materials and inserts must correctly apply to the product and batch. Mislabelling/misbranding of a drug is a very serious error.

In this session we describe controls applied to printed materials at the printer, on receipt of inward goods, and in storage, issue, and return to store. We outline how variable data such as batch numbers and expiry dates can be coded on packaging materials. Finally, we emphasise the importance of reconciliation of printed materials.

The packaging run
A packaging run is subject to controls similar to those for the processing of product. Checks must be carried out beforehand, in-process and other quality controls need to be applied during the run, all operations must be recorded, and cleaning needs to be done afterwards.

In this session we identify documents that need to be followed for the run, we describe line clearance and set-up tasks, and we discuss in-process controls and statistical quality control.

Reconciliation of materials
Reconciliation of materials is an important control for packaging operations. In this session we describe the reconciliation of quantities of product and of printed matter.

Assessment
Multiple-choice mastery assessment.
A company’s Corrective and Preventive Action (CAPA) system establishes how personnel should deal with manufacturing problems that have occurred or that may occur if not prevented. This module explains the principles of corrective and preventive action and describes typical CAPA procedure. It goes on to introduce root cause analysis and outline the role of progress tracking, escalating, and trending of CAPA procedures.

Who will benefit from this module?

This module provides essential training for all personnel who work in a manufacturing environment in the pharma/biotech industry.

Learning objectives

- Explain what a CAPA system is and describe how it operates in a company’s Quality Management System
- Describe how a typical CAPA procedure is carried out
- Outline the purpose and practice of root cause analysis
- Discuss the role of progress tracking, escalating, and trending of CAPA procedures

Module overview

An outline of the module’s scope and objectives, and notes on terminology.

CAPA principles

In this session we explain what a CAPA system is and why it is important. We explain the differences among correction, containment, corrective action, and preventive action. We specify sources of information about manufacturing problems, and we emphasise the importance of documentation of a CAPA system.

CAPA procedure

Problems that may give rise to CAPAs are best tackled by systematically progressing through a number of stages of procedure. In this session we set out the typical stages of a CAPA procedure, along with the questions to be addressed and the actions taken at each stage.

Root cause analysis

Root cause analysis is a rigorous approach to finding the deepest causes of problems. In this session we emphasise the value of applying CAPA to root causes rather than their symptoms. We set out the stages of a typical analysis, and we list examples of tools for finding causes and studying trends.

Tracking, escalation, and trending

One of the most common findings of regulatory inspectors is the lack of effective and timely closure of CAPA reports. In this short session we emphasise the importance of tracking the progress of CAPA procedures, escalating issues, and reviewing trends in the CAPA system.

Assessment

Multiple-choice mastery assessment.
Within the medicinal products industry’s Good Manufacturing Practice (GMP) framework, analytical laboratories engaged in quality control of starting materials, intermediates, bulk products, finished products, and packaging, are required to comply with relevant GMP standards. We refer to these as Good Quality Control Laboratory Practice, or GQCLP, standards. Regulatory authorities may inspect laboratories for compliance with the standards.

This module introduces QC laboratory staff to the requirements that they need to meet to comply with GQCLP.

All staff engaged in the quality control of medicinal products will find the module valuable as an introduction or refresher course.

### Learning objectives
- Access GQCLP guidelines and regulations
- Describe typical contents of a laboratory quality manual
- State some basic laboratory safety practices
- Identify key types of laboratory document and summarise their contents and relationships
- Specify good practices for record keeping and data recording
- List key features of test methods and specifications
- Identify regulations and guidelines on the management of electronic data
- Outline how to handle out-of-specification conditions
- State why laboratory housekeeping is important and identify types of audit

### Module outline
- Introduction
- Laboratory quality manual
- Basic laboratory safety practices
- Laboratory documentation
- Record keeping and data recording
- Test methods and specifications
- Good automated laboratory practices
- Managing out-of-specification events
- Housekeeping and lab audits
- Additional resources
- Assessment

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**Module overview**

**An Introduction to Good Quality Control Laboratory Practice**

- **Approximate module time:** 2 hours
- **Level:** Introductory/Intermediate
- **Audience:** QC laboratory staff
- **Category:** GMP/QA/QC
- **Region:** USA, Europe, Other
- **CPD Points:** 2

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**Access GQCLP guidelines and regulations**

**Describe typical contents of a laboratory quality manual**

**State some basic laboratory safety practices**

**Identify key types of laboratory document and summarise their contents and relationships**

**Specify good practices for record keeping and data recording**

**List key features of test methods and specifications**

**Identify regulations and guidelines on the management of electronic data**

**Outline how to handle out-of-specification conditions**

**State why laboratory housekeeping is important and identify types of audit**

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[Logo: Zenosis] [Logo: Royal College of Physicians] [Logo: CPD Certification Service]

Zenosis products are sold and maintained by grapl ltd.
PV03: An Introduction to Drug Safety and Pharmacovigilance
PV04: Signal Detection and Management in Pharmacovigilance
PV05: Risk Management Planning for Medicinal Products
PV06: Urgent Safety Restrictions
PV07: Good Pharmacoepidemiology Practice
**An Introduction to Drug Safety and Pharmacovigilance**

**Approximate module time:** 2 hours

**Level:** Foundation

**Audience:** Drug Safety, Regulatory, Compliance, Manager, Other

**Category:** Drug Safety, Clinical

**Region:** USA, Europe, Other

**CPD Points:** 2

**Who will benefit from this module?**

Entry-level staff, and those seeking a refresher, in drug safety / pharmacovigilance and clinical departments will find the course invaluable, as will clinical investigators and other healthcare professionals. Staff in other departments of pharmaceutical and biotechnology companies will benefit from taking the course to gain an appreciation of the basics of the subject.

**Module outline**

- Module overview
- Regulation and company organisation
- Before a product is marketed
- After a product is marketed
- Quality system, inspections and audits
- Review and further information
- Assessment

**Learning objectives**

- Explain, with examples, why drug safety monitoring / pharmacovigilance is necessary
- Describe ways in which drug safety / pharmacovigilance is regulated nationally and internationally, and identify international policy-making bodies.
- Outline how drug safety / pharmacovigilance responsibilities are organised within pharmaceutical and biotechnology companies.
- Sketch how a product safety database is compiled, how a product's safety profile is assessed, and how safety information is included in documentation for regulatory authorities, healthcare professionals, and consumers.
- Apply appropriate terms to describe different types of adverse effect.
- Specify requirements to report adverse reactions to regulators.
- Outline requirements for safety data and for risk management plans in applications for marketing approval.
- List tasks involved in monitoring adverse reactions to marketed products, and sketch how safety signals are detected and tested.
- Identify factors that influence the evaluation of a product's benefit/risk balance, and list actions that may be taken in response to changes in the balance.
- Identify ways in which the quality of a pharmacovigilance system may be assured, and outline preparations for a regulatory inspection or audit.

**Module overview**

Describes what the course is about, sets out learning objectives, defines key terms and provides a brief overview of course content.

**Regulation and company organisation**

Explains the rationale for modern drug safety / pharmacovigilance (PV) regulation and practice, describes international policy-making bodies and sources of regulatory guidance, and outlines company drug safety / PV organisation, product safety databases and core safety information.

**Before a product is marketed**

Sets out the fundamentals of pre-marketing drug safety / PV: safety information for investigators, describing adverse effects, clinical trial reporting requirements, safety data in marketing applications, risk management planning, and product information.

**After a product is marketed**

Sets out the fundamentals of post-marketing PV: monitoring adverse drug reactions, licence holders' reporting requirements, detecting and testing safety signals, assessing benefit/risk balance, risk minimisation, communicating new safety information, product withdrawal.

**Quality system, inspections and audits**

Describes measures, increasingly emphasised by regulators, to ensure adequate performance of a PV system: the organisation's PV quality system, regulatory inspections, and audits.

**Review and further information**

Summarises key points and provides links to important guidance documents and other reference sources.

**Assessment**

Multiple-choice mastery assessment.
Signal Detection and Management in Pharmacovigilance

Approximate module time: 1.5 hours
Level: Introductory/Intermediate
Audience: Drug Safety, Regulatory, Compliance, Manager
Category: Drug Safety
Region: USA, Europe, Other
CPD Points: 1.5

Module outline
- Module overview
- Signal detection
- Signal validation
- Signal analysis and prioritisation
- Risk assessment and minimisation
- Assessment

Learning objectives
- Identify methods of signal detection and discuss their limitations
- Describe how to accumulate evidence on a causal association between a drug and an event
- Specify factors that increase the priority assigned to a signal, and describe methods of further investigation
- Discuss reassessment of benefit/risk balance in the light of a previously unexpected reaction to a product, and specify actions to minimise risk

Who will benefit from this module?
All staff working in medical, drug safety, or pharmacovigilance departments of pharmaceutical or biotechnology companies or contract research organisations should have access to this module. It will also be of value to healthcare professionals and regulatory authority personnel.

Signal detection
The question we address in this session is: ‘Are there data that may indicate a safety signal?’. The various sources of safety signal-relevant data are set out. ‘Traditional’ signal detection by qualitative review of individual case reports is described, followed by a discussion of quantitative analysis of aggregate data on drug–event associations to detect signals of disproportionate reporting, a process known as ‘data mining’.

Signal validation
The question we address in this session is: ‘Is there a safety signal?’. Steps taken to determine our degree of confidence in the existence of a signal are described. The development of a case series is outlined, and qualitative clues to causality are listed. Approaches to estimation of the incidence of the adverse event(s) in the exposed population are described: including crude approximation of reporting rate, and active surveillance through cohort/prescription-event monitoring and observational study in registries.

Signal analysis and prioritisation
The question we address in this session is: ‘How important is the signal, and do we know enough about it?’. Factors that increase the priority assigned to a signal are listed. The consequences of assignment of a category of risk are outlined. Further investigation of a signal through controlled research, in the form of pharmacoepidemiological studies or clinical trials, is described, and factors influencing a decision to undertake such an investigation are set out.

Risk assessment and minimisation
The question we address in this session is: ‘How does the signal affect benefit/risk balance, and what do we need to do about it?’. Factors affecting re-assessment of the benefit/risk profile of a product in the light of verification of a previously unexpected reaction are set out. Possible risk minimisation actions are listed. Requirements for reporting to regulatory authorities are described, and advice is given on communicating safety information to healthcare professionals and consumers.

Assessment
Multiple-choice mastery assessment.
Risk Management Planning for Medicinal Products

Proactive risk management is a major component of good pharmacovigilance practice. This module sets out the principles of risk management planning and outlines regulatory requirements for risk management plans in regions that are major markets for medicinal products.

Module overview
An outline of the module’s scope and objectives, and notes on terminology.

Principles of risk management planning
In this session we set out principles of risk management planning as a major component of good pharmacovigilance practice. We discuss the modern emphasis on proactive risk management in addition to routine pharmacovigilance measures. We describe risk assessment factors important in safety specification, pharmacovigilance planning, and risk minimisation for a drug. We then focus on the selection, implementation, and evaluation of non-routine risk minimisation activities.

Regulatory requirements for risk management plans
In this session we outline regulatory requirements for risk management plans in regions that are major markets for medicinal products: Europe, the USA, and (in a brief sketch) Japan. We describe the structure, main components, and submission requirements for EU Risk Management Plans and US Risk Evaluation and Mitigation Strategies, and we sketch notable aspects of risk management requirements in Japan.

Assessment
Multiple-choice mastery assessment.
An Urgent Safety Restriction (USR) is a regulatory action taken, in response to a safety signal, to make an interim change to the terms of the marketing authorisation for a medicinal product in Europe. This module describes the principles and procedures for USRs.

**Who will benefit from this module?**

All staff working in medical, drug safety, or pharmacovigilance departments of pharmaceutical or biotechnology companies with products authorised in Europe should have access to this module. It will also be of value to healthcare professionals and regulatory authority personnel.

**Module outline**

An outline of the module’s objectives, and notes on terminology.

**Principles**

In this session we define Urgent Safety Restriction and explain its purpose in the European Union and other countries of the European Economic Area. We describe how an USR may be triggered. Finally, we give some examples of safety signals that may, and some that may not, give rise to an USR.

**Procedure**

In this session we describe how to prepare for and initiate an Urgent Safety Restriction (USR) for a centrally authorised product and for a product authorised through the Mutual Recognition or Decentralised Procedure. We outline the 24-hour procedure for execution of an USR, and the follow-up actions required, in each case. Finally, we specify the requirements for a variation application following an USR.

**Assessment**

Multiple-choice mastery assessment.
Pharmacoepidemiology is the study of the use and effects of drugs in large numbers of people. It provides a bridge between clinical pharmacology and epidemiology. The increasing demand for real-world evidence of the safety, efficacy and utility of medicinal products has focused greater attention on pharmacoepidemiological research. This module will help those who plan and conduct such research, and analyse and report the findings, to follow good practice.

Who will benefit from this module?

Staff working in drug safety and pharmacovigilance or clinical research departments of pharmaceutical and biotechnology companies will benefit from this module. It will also be of value to healthcare professionals.

Learning objectives

On completion of this module, you should be able to follow good practice in:

- Planning pharmacoepidemiological research
- Collecting data in such research
- Analysing data from pharmacoepidemiological studies
- Interpreting and communicating the results of such studies

Module overview

An outline of the module's scope and objectives, and a glossary of terms.

Study planning and data collection

In this session, we:

- Outline the role and formulation of a research question and study protocol
- Discuss the choice of study design and research methods
- Identify types of data source and means of data collection
- Summarise obligations for protection of subjects
- Discuss operational definition and validation of drug exposure, outcomes, and covariates
- Give examples of good practice in data collection, management, and verification

Analysis, interpretation, and communication

In this session, we:

- Discuss data analysis and the interpretation of results
- Outline the role and formulation of a statistical analysis plan
- Describe obligations for provision of a study report and communication of findings

Assessment

Multiple-choice mastery assessment.
ICT

ICT01: Compliance with Regulation 21 CFR Part 11 on Electronic Records and Electronic Signatures
Part 11 of Title 21 of the US Code of Federal Regulations (21CFR11) sets out requirements that computer systems must meet to satisfy the Food and Drug Administration (FDA) that electronic records and electronic signatures provided by those systems are trustworthy and reliable to the same extent as paper counterparts. The regulation sets out controls and procedures which need to be established and followed for relevant computer systems in FDA-regulated environments. An FDA-regulated environment is a 'GxP' environment operated by an organisation involved in activities leading to the marketing of drugs or medical devices in the USA; examples are drug manufacturing sites, medical device manufacturing sites, analytical laboratories, clinical investigational sites, and nonclinical study laboratories.

21CFR11 applies to records that are required to be submitted to the FDA, or that are subject to FDA inspection, and that are in electronic form – that is, as computer files. It applies to all computer systems used to create, modify, maintain, archive, retrieve, or transmit such records – from a humble spreadsheet program to a complex information management system.

Companies that market or intend to apply for approval to market drugs or medical devices in the USA must comply with 21CFR11, whether or not they are based in the USA. Suppliers to such companies of materials, equipment, or data that are subject to FDA regulation must also comply.

This module provides essential training for all personnel who use computer systems in GxP environments.

- Define regulation 21CFR11 and explain its context and purpose
- Specify criteria to determine which environments, computer systems, electronic records, and electronic signatures must comply with the regulation
- Describe procedures and controls required by the regulation for electronic records and electronic signatures
- Describe the consequences of the FDA’s discretion in enforcing compliance with some of the provisions of the regulation

Module overview
An outline of the module’s scope and objectives, and notes on terminology.

21CFR11 and its scope
We define regulation 21CFR11 ('Part 11'), explain its purpose, and set out criteria for identifying the environments, computer systems, electronic records, and electronic signatures to which it applies. We describe how underlying legal requirements are specified by predicate rules. We point out that it is not the type of computer system that determines whether Part 11 applies, but the use to which the system is put. Finally, we introduce the regulation’s distinction between closed and open systems.

Procedures and controls
We describe the procedures and controls that need to be established and followed to comply with Part 11. We identify those for which the FDA exercises enforcement discretion. We give examples of open systems and outline additional procedures and controls required for them.

Electronic signatures
We set out Part 11’s requirements for electronic signatures. We specify the information to be provided and we outline constraints on the way signatures are linked to records. We emphasise the importance of uniqueness of signatures and verification of the identity of signatories. We mention the need for one-off certification with the FDA. We outline components of non-biometric and biometric signatures. Finally, we set out procedures and controls required for user names and passwords.

FDA enforcement discretion
We describe the FDA’s narrow interpretation of Part 11, and its effect on the need to comply with some of the regulation’s provisions. We discuss the latest relevant FDA guidance for industry and the effect of the agency’s interpretation on its enforcement of compliance with requirements for validation, audit trails, record retention, and record copying. We also specify the exemption for legacy computer systems.

Assessment
Multiple-choice mastery assessment.
Medical Devices

MD01: An Introduction to the Regulation of Medical Devices
This module provides an introduction to the basics of medical device regulation, especially the requirements that manufacturers must meet in order to market devices in Europe and the USA.

We explain what medical devices are and give examples of the various types. We outline the principles of their regulation and the criteria for placing them on the market. We identify major players in regulation worldwide.

We then outline prominent characteristics of the regulation of medical devices in the USA and in Europe. The module is up to date with the current upheaval in European Union legislation on medical devices.

This module provides essential training for all personnel concerned with the development, regulatory compliance, or marketing of medical devices. It is especially suitable for induction training of entry-level staff.

- Module overview
  An outline of the module’s scope and objectives, and notes on terminology.

- Medical devices and their regulation
  In this session we explain what medical devices are and how they differ from medicinal products. We define various special categories of such devices. We identify basic principles of their regulation, including risk classification. We outline requirements for technical documentation, clinical data, and post-market surveillance and vigilance. Finally, we identify the major players in regulation.

- Regulation of medical devices in the USA
  In this session we outline prominent characteristics of the regulation of medical devices in the USA.

- Regulation of medical devices in Europe
  In this session we outline prominent characteristics of the regulation of medical devices in the European Economic Area.

- Assessment
  Multiple-choice mastery assessment.

- Learning objectives
  - Define and give examples of the various categories of medical device
  - Outline the principles of medical device regulation and the criteria for placing devices on the market
  - Identify major players in the regulation of medical devices worldwide
  - Identify legal statutes and sources of regulatory guidance on medical devices in the European Union and the USA
  - Outline prominent characteristics of the regulation of medical devices in the USA
  - Outline prominent characteristics of the regulation of medical devices in the European Economic Area
How can Zenosis benefit me?

Benefits of Zenosis e-Learning to an organisation and end user:

- **24/7 learning** – Users can access modules when they want. For example at work, at home or when travelling.
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- **Flexibility** – The end-user is able to skip through information they may already know, and a beginner has up to a year to access the information if they need it or simply for reference.
- **Self-paced learning** – This allows the user to learn at their own speed; to stop and start as they choose.

- **Custom design** – We can amend or change a module to meet specific company needs.
- **Greener** – The company’s carbon footprint is reduced with no travel.
- **CPD points** – Users earn Continuing Professional Development (CPD) points awarded by the Faculty of Pharmaceutical Medicine of the Royal Colleges of Physicians of the United Kingdom.

To discuss any of the modules or to set up free trial access please contact:

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