CHAPTER 1

Documentation in Pharmaceutical Industry

Exploratory Product Development Brief (EPDB) for Drug Substance and Drug product

Numerous organizations are encountering an atmosphere that is marked by uncertainty, fast-changing trends, and growing complexity. In such an environment, where many variables are unknown and in flux, the conventional approach to product development cannot reliably identify new types of risk. It is not feasible to fully define a product before commencing development. If companies try to adhere to a traditional phased-and-gated process in a dynamic environment, the product development team is likely to struggle with managing the scope, timeline, and budget that were established at the outset. As a result, changes to product requirements, unexpected issues, rework, schedule delays, budget overruns, and commercial disappointment are all common outcomes. The product development team requires an approach that enables them to adapt to changes in customer needs, markets, competition, technology, and other factors.

ExPD presents a fresh method for developing products by utilizing a two-pronged solution:

1. Treating product development from a comprehensive systems perspective and
2. Fundamentally redesigning the development process to minimize project uncertainties and risk.

ExPD deviates from the conventional phased-and-gated process by fundamentally rethinking the development process to reduce uncertainties and risks. It is an adaptive approach that responds rapidly to changes in internal and external factors. This process enables project teams to identify, evaluate, and prioritize uncertainties and risks throughout a project. The team can then determine how and when to address the uncertainty or when it is appropriate to terminate a project.

Process Structure

ExPD is a holistic and integrated approach that consists of two primary components. According to Drotar and Morrissey, product development is a complex process that must be managed as a comprehensive system, incorporating critical elements such as strategy, portfolio management, organization/teams/culture, metrics, market/customer understanding, and process.

The first aspect of ExPD involves adopting a system-level perspective that integrates these essential components and recognizes their interrelationships. This approach enables the product development team to assess the impact of decisions and changes on the entire development process. The second component of ExPD involves redesigning the product development process to minimize uncertainties and risks by addressing the critical elements identified in the first component. By leveraging this two-pronged approach, ExPD offers a comprehensive and adaptable framework for product development that can effectively respond to the dynamic and constantly evolving nature of modern business environments.

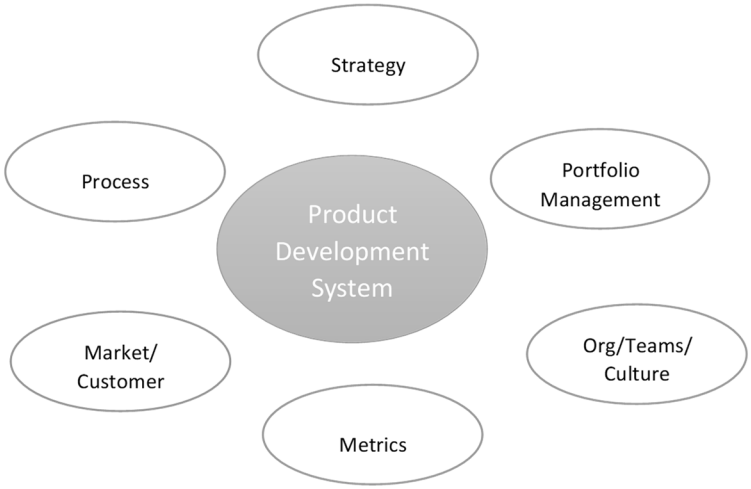

Figure 1.1 Exploratory product development system.

The two-pronged approach of exploratory product development differs from the traditional phase-gate process in that it involves a fundamental redesign of the product development process with a focus on reducing uncertainty and risk. Unlike the traditional approach, ExPD includes three interrelated segments in its process that work together to achieve this objective.

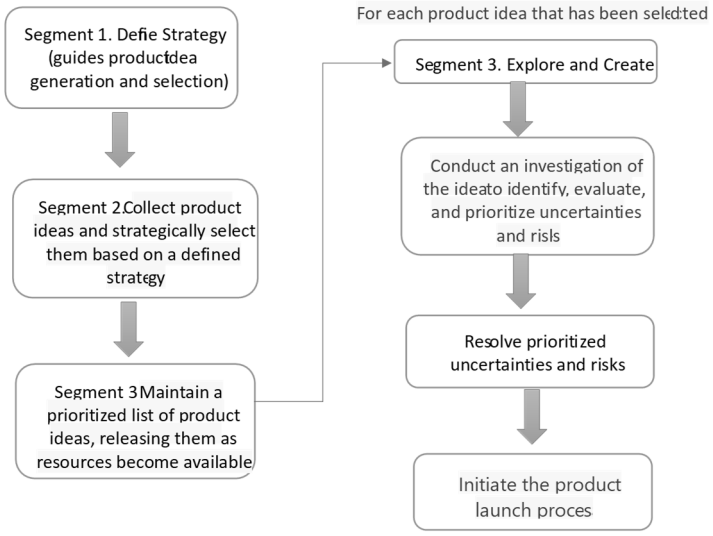

Figure 1.2 The three segments of exploratory product development.

1. **Strategy**

   In the ExPD process, strategy is a critical component and is considered essential to achieving success in product development. ExPD incorporates a strategic framework that provides direction for strategy development in stable, moderately dynamic, or highly dynamic environments. This framework ensures that the enterprise, business unit, and product categories are all aligned with the strategic goals of the organization. Strategy also plays a pivotal role in guiding the product idea generation and selection process, ensuring that the product development efforts are focused on meeting strategic objectives. Therefore, in the ExPD approach, strategy is integrated into every stage of the product development process to ensure that it is aligned with the overall business strategy and goals.

2. **Idea Generation and Selection**

   In the ExPD process, the goal of idea generation and selection is to generate a pool of new product ideas and evaluate them using the strategic framework. Once a promising product idea is identified, whether generated internally or externally, it is prioritized among other competing ideas and allocated resources before being assigned to a product team. The ExPD process includes a prioritization valve that allows for the prioritization of product ideas, taking into account the available resources and adjusting the flow of projects throughout the process. The prioritization valve helps illustrate the process of turning ideas on and off based on available resources, ensuring that the most promising ideas are given priority and

that the product development process remains aligned with the company's strategic goals.

3. **Explore and Create**

   In the Explore and Create stage of ExPD, the product undergoes an Investigate phase where a cross-functional team identifies, evaluates, and prioritizes product uncertainties and risks. Based on this evaluation, the organization determines which products will be released into a resolution loop, where the product team focuses on reducing and resolving the prioritized uncertainties and risks. Once a product enters the resolution loop, the team uses a fast iterative/sprint approach to development, involving four key stages: Design, Build, Execute, and Learn (as shown in Figure 3). The resolution loop is designed to be adaptable to real-time learnings and changes in the environment.

   During the resolution loop, the product team not only works to resolve the most impactful uncertainties and risks, but also strives to develop a finished product that can be released to the market. By using a fast iterative/sprint approach, the team can continuously incorporate feedback and adapt to changing customer needs and market trends, ensuring that the final product is optimized for success in the market.

Product Development Plan (PDP)

The process of developing and launching a new product involves multiple stages, including strategizing, organizing, generating concepts, creating and evaluating product and marketing plans, and ultimately bringing the product to market. This process is crucial for companies looking to achieve significant growth, as new and innovative products are often the key driver of growth.

Product Development Report

A product development report is a document that outlines the various stages of a product's development, from conception to launch. The report typically includes information on the product's market research, design, testing, manufacturing, and marketing strategies. It is a critical document that provides an overview of the entire product development process, which can be used to assess the product's viability, profitability, and success.

Here are some key sections that are typically included in a product development report:

1. ***Executive Summary*:** This section provides a brief overview of the product, the market opportunity it addresses, and the key findings of the report.

2. ***Market Research*:** This section outlines the market research conducted to identify the target market, customer needs, and preferences, and the competitive landscape.
3. ***Design*:** This section discusses the product design, including the design process, key features and functionalities, and the product's technical specifications.
4. ***Testing*:** This section covers the testing and validation process, including the different types of testing performed, the results, and any changes made to the product based on feedback.
5. ***Manufacturing*:** This section details the manufacturing process, including the materials used, the production process, quality control measures, and any challenges encountered.
6. ***Marketing Strategy*:** This section outlines the marketing strategy for the product, including the target audience, pricing strategy, distribution channels, and promotional activities.
7. ***Financial Projections*:** This section includes financial projections for the product, including revenue, expenses, and profit margins.
8. ***Conclusion*:** This section summarizes the key findings of the report and provides recommendations for the next steps in the product development process.

Overall, a product development report serves as a comprehensive document that provides an overview of the entire product development process. It is a critical tool for assessing the viability and success of a product and can be used to make informed decisions about future product development efforts.

MASTER FORMULA RECORD

The Master Formula Record (MFR) is a crucial document for pharmaceutical products, containing comprehensive information about the manufacturing process. It is typically created by the company's research and development team and serves as a reference standard for preparing the batch manufacturing record (BMR) by manufacturing units. In addition, the MFR may also be referred to as the Master Manufacturing Record or Master Production Record.

"A document or set of documents specifying the starting materials with their quantities and the packaging materials, together with a description of the procedures and precautions required to produce a specified quantity of a finished product as well as the processing instructions, including the in-process controls."

To ensure consistency in each batch manufacturing, it is necessary to have Master Formula records for all manufacturing procedures of each product and

batch size. These records are prepared and endorsed by competent technical staff, such as the head of production and quality control. MFR serves as a reference standard for the preparation of batch manufacturing records (BMR) by manufacturing units. Having MFR is crucial in maintaining the quality and consistency of the product throughout its manufacturing process.

MFR should include:

Product Details:

- Name, logo and address of the manufacturing company.
- Dosage form name.
- Brand name.
- Generic name.
- Product code
- Label the claim of all ingredients
- Product description
- Batch size
- Pack size and packing style
- Shelf life
- Storage conditions
- MFR number and date
- Supersede MFR number and date
- Effective batch number
- Authorization by the production and quality assurance head

Procedure to prepare a Master Formula Record:

A Master Formula Record can be created by experienced and qualified personnel such as manufacturing chemists or analytical chemists, or by using the batch manufacturing record of a previous batch size. It is essential to follow the Master Formula Record at all stages of production, and it is transferred from previous staff to new staff as a standard document for processing each batch. The Master Formula Record serves as a reference standard for creating a Batch Manufacturing Record and plays a critical role in ensuring consistency across batches.

SOP for preparation of the Master Formula Record:

RESPONSIBLE DEPARTMENTS:

Primary Responsibility: F&D and Production Department

Secondary Responsibility: Quality Assurance Department

ACCOUNTABILITY:

Head-Quality Assurance shall be responsible for the implementation of SOP.

STEPS TO PREPARE A MASTER FORMULA RECORD:

1. The Production Department in association with F&D (Formulation and Development) shall prepare the MFR.
2. The MFR should be prepared as per the format attached to the SOP.
3. The MFR should be divided into two parts - Packaging and Manufacturing parts.
4. The first page of both sections should have the following details:
   - Name, address, and logo of the company
   - Dosage form name
   - Brand name
   - Generic name
   - Product code
   - Label claim: This should include all ingredients and text included in product permission.
   - Product Description
   - Batch size
   - Pack size
   - Shelf life
   - Storage conditions
   - Drug Schedule: Whether Schedule H or Schedule G drug.
   - Superseded Master card number and date
   - Present Master card number and date
   - Present Master card effective batch number
   - Reference of changed control number
5. The MFR should be authorized by all the responsible members.
6. The secondary page of the manufacturing section should include process steps to be monitored.
7. Subsequent pages should include the processes to be monitored in a stage-wise movement of material in the form of a flow chart.
8. The list of equipment, machines, and utensils to be used should be described.
9. The subsequent page should include any special precautions to be taken for the product during manufacturing and packing. The same page should also include the Batch Manufacturing Formula.

10. The Batch Formula should have the following columns:
    - Serial number
    - Name of ingredients
    - Reference of specifications of ingredients
    - Quantity to be added (in mg/ml or per tablet or per capsule or per gm, as the case may be)
    - Overages to be added (in %)
    - Quantity to be added per batch or per lot
11. Calculation steps should be given for every active material, ensuring that the active material shall be compensated for assay values less than 100%, which could be due to less potency or higher moisture content.

The MFR should also include the testing requirements for raw materials, intermediate products, and finished products, along with their specifications and acceptable limits. Any special instructions for sampling and testing of materials should be mentioned. The MFR should also include the specifications for environmental controls, such as temperature and humidity, during the manufacturing process. Document should specify the cleaning procedures and acceptance criteria for equipment and facilities. MFR should also include the specifications for labeling and storage of finished products. The document should mention any precautions or warnings that need to be taken during the manufacturing process to ensure the safety of personnel and the environment. Finally, the MFR should be reviewed and approved by authorized personnel before being implemented.

BATCH MANUFACTURING RECORD

A batch manufacturing record should be prepared for each intermediate or API/formulation, containing complete information on its manufacturing and quality control. The batch manufacturing record should be carefully reviewed before issuance to ensure that it is the correct version and accurately reproduces the master production instruction. Before beginning any manufacturing operations, a check must be conducted and recorded to confirm that the equipment and workspace are clear of any previous products, documents, or materials not required for the current process and that the equipment is clean and suitable for use. Each batch record should be assigned a unique identification number, and dated and signed at the time of issuance.

The “Batch Manufacturing Record” is an important document for ensuring the quality and compliance of the manufacturing process. It is a record that contains all the information related to the manufacture of a specific batch or lot of a product, including the ingredients used, manufacturing steps, in-process tests and results, and any deviations from the standard operating

procedures. The BMR provides complete traceability of the product from the raw materials to the finished product and is a critical tool for ensuring consistency and quality throughout the manufacturing process.

These are all important pieces of information that should be included in the Batch Manufacturing Record (BMR).

In addition to these, it is important to note that the BMR should also include details on the specific procedures followed for each step in the manufacturing process, including any safety precautions or measures taken. It should also include information on any environmental conditions or controls necessary for the production process, such as temperature, humidity, or air pressure.

Finally, the BMR must be reviewed and approved by a designated quality control unit before the release of the batch for distribution. This helps ensure that all necessary steps have been followed and documented and that the final product meets all specifications and requirements.

Responsibility:

Primary: Officer–QA / Officer–QC/ Officer-Production

Secondary: Manager-QA/ Manager- QC/ Manager- Production

Issue of batch manufacturing record (by Quality Assurance)

1. Based on Production planning, the production manager shall decide on the product and the number of batches to be produced in the month.
2. The production supervisor shall raise the requisition for the batches to be taken for the week and forward it to Quality Assurance.
3. On receipt of Batch Manufacturing Record issue requisition QA personnel will verify the details entered in the requisition form.
4. A photocopy of the MASTER COPY of the required Product Batch Manufacturing Record will be taken.
5. All the pages of the photocopied sheet of the Product Batch Manufacturing Record shall be signed and dated by QA Personnel.
6. Check for the correctness of the Batch number by verifying the BMR register.
7. Enter the details of Date, Product, Batch No, Batch size, Manufacturing Date, Expiry Date, and issued by details in the BMR register.
8. Check and allot expiry date by referring to the master list of product shelf life.
9. Enter batch no. On all the pages of the BMR and get it authorized by QA manager or in the absence by QA executive or QA officer.
10. Insert the signed batch record in a BMR cover and enter the details of the product name, batch number, and batch size. Manufacturing date and expiry date.

11. The batch record along with the batch record register shall be sent to production, the production person receiving the batch record should sign on the batch record register to acknowledge the receipt of the batch record.
12. QA person who has issued Batch Record shall sign the "issued by" on the batch record issue requisition sheet and file the same for future reference.
13. Before issuing the batch record, QA personnel should ensure that all necessary documentation, such as analytical reports and quality control test results, are available and reviewed for each batch.
14. If any discrepancies or deviations are found, they should be recorded in the batch record and investigated before issuing the record.
15. The batch record should be issued to the production department promptly to ensure that production activities can begin as scheduled.
16. All batch records should be stored in a secure location with proper traceability and retrievability.
17. The batch record issue process should be periodically reviewed and updated as necessary to ensure continued effectiveness.

Entry of Batch Manufacturing Records (By Production Personnel)

1. The first step in the entry of Batch Manufacturing Records (BMR) by Production Personnel is for the Production Manager or Deputy Production Manager to check the BMR and sign on the first page to indicate that they have reviewed it. This ensures that there is a level of oversight and accountability in the production process.
2. The calculation sheet is forwarded to the stores' department so that the relevant analytical reference (AR) numbers, quantity, and assay values can be entered. This information is necessary for tracking the usage of raw materials and intermediates during the manufacturing process. The stores department is responsible for maintaining the inventory of all the raw materials, intermediates, and other supplies required for manufacturing. They update the inventory records after the entry of the relevant information in the calculation sheet.
3. It appears that after a relevant entry is made, a sheet is forwarded to the production department. In the production department, a production chemist fills in equipment status details for each piece of equipment, including the line clearance status and ECR number.
4. Where the operator fills out a form for the specific process to be carried out on a particular reactor. The form requires the starting and ending time of the process to be entered and for the operator to sign it. The form is then checked by an in-charge.

5. After completion of every reaction in each of the particular reactors, the intermediate product is sent to the QC (Quality Control) Lab for checking. The purpose of sending the intermediate product to the QC Lab is to ensure that the reaction has been completed as intended and that the product meets the necessary quality standards. The QC Lab will typically check the product for various parameters, such as the level of completion of the reaction, the impurities present in the product, and the level of moisture or other contaminants (which is usually measured by LOD or Loss on Drying).
6. After the final product is obtained, a request is sent to the QC (Quality Control) department for a complete analysis of the product. Once the analysis is complete, the QC department will generate an analytical report, which details the results of the analysis and provides information on the quality and specifications of the product. This report is then sent back to the manufacturing department, where it is reviewed to ensure that the product meets all of the necessary requirements.
7. In the manufacturing process, where all remaining entries are filled out and all analytical reports are attached.
8. The BMR (Batch Manufacturing Record) is sent to the QA (Quality Assurance) department for review.

Review and Control of Batch Manufacturing Records (by Quality Assurance)

1. The QA (Quality Assurance) department checks the batch number. The batch number is a unique identifier assigned to each batch of product that is manufactured. It is used to track the product throughout its lifecycle, from manufacturing to distribution and sale. The purpose of checking the batch number is to ensure that the correct product has been manufactured and that it meets all of the necessary quality standards and specifications.
2. Review the analytical report of all raw materials attached with BMR and check the A.R. No. This step ensures that all raw materials used in the manufacturing process were of the appropriate quality and that the analytical testing was performed according to the approved procedures.
3. Review the Equipment Cleaning Record for each piece of equipment and the relevance of line clearance by QC. This step ensures that all equipment used in the manufacturing process was properly cleaned and that there was no cross-contamination between different batches of product.
4. Review the deviation in the process which is predefined. This step involves reviewing any deviations or exceptions that occurred during the manufacturing process and ensuring that they were properly documented and addressed.

5. If any deviation is present, change the deviation report of the process. Review the report of change in deviation and its significance in the process. This step involves reviewing any changes made to the manufacturing process as a result of deviations or exceptions and ensuring that they were properly documented and approved.
6. Check the quantity of solvent recovered in the process. Recovery should be proper and complete. This step ensures that all solvents used in the manufacturing process were properly recovered and that there was no waste or loss of materials.
7. Wet material packing records should be reviewed. This step involves reviewing the records of the packing of wet materials to ensure that they were properly packaged and labeled.
8. The drying record as well as the dry material packing record should be checked and reviewed. This step involves reviewing the records of the drying process and the packing of dry materials to ensure that they were properly dried, packaged, and labeled.
9. Check the analytical report of the finished product generated by QC department. This step involves reviewing the final analytical report of the finished product to ensure that it meets all of the necessary quality standards and specifications.
10. Finally, attach the review report with a specific number given by the QA department duly dated and signed by the QA manager. This step involves documenting all of the reviews and approvals that were performed during the manufacturing process.
11. If everything is fine, then pass the batch and allow it for dispatch. This step involves releasing the batch for distribution and sale.
12. Send this record to the safe custody of the Quality Assurance department. This step involves storing the BMR and all associated documentation in a safe and secure location for future reference.
13. If anybody needs a copy of the BMR, it should be given as a control copy with the permission of the QA manager. This step ensures that access to the BMR and associated documentation is controlled and limited to authorized personnel.
14. Every BMR should be saved for five years from manufacturing and after that, it should be destroyed as per SOP. This step ensures that all documentation related to the manufacturing process is properly stored and disposed of in accordance with company policies and regulatory requirements.

Batch Manufacturing Record Attachments Responsibility:

Primary: Production Chemist.

Secondary: Production Officer.

These attachments provide a complete record of the manufacturing process, ensuring traceability and accountability for the final product. It is important to ensure that all necessary attachments are included before submitting the BMR to the Quality Assurance department.

1. Analytical report of raw materials
2. Analytical report of the finished product
3. Process validation report (if applicable)
4. Stability study report (if applicable)
5. Change control request (if any changes were made during the manufacturing process)
6. Batch release certificate signed by the Quality Assurance department.

BATCH PACKING RECORD

A Batch Packing Record (BPR) is a document that provides instructions and records for the packing of a specific batch of a product. It contains detailed information about the packaging process, including the materials and equipment used, the batch number, the quantity of product being packed, and the packaging instructions.

The following information is typically included in a Batch Packing Record:

1. Batch number and product code
2. Date of packing and name of the person responsible
3. Packaging instructions, including the type and size of packaging material, label information, and special instructions
4. Equipment and tools used for packing
5. Verification of packaging materials and equipment, including their condition and suitability for use
6. Record of quantity of product packed
7. Record of any deviations or incidents that occurred during the packing process
8. Signatures and dates of personnel involved in the packing process
9. In-process test results and any associated documentation.

The Batch Packing Record is an essential document for ensuring the consistency and quality of the final packaged product. It is used by the Quality Assurance department to verify that the product has been packed according to the approved specifications and that all relevant documentation has been completed and reviewed.

To ensure accurate and reliable packaging of each batch or part batch, it is essential to maintain a batch packaging record. This record should be created based on the relevant parts of the packaging instructions. At every stage of the packaging process, the responsible person should record the actions taken, along with the date and their signature or electronic password.

The information to be documented includes the product name, batch number, and quantity of bulk product to be packed, as well as the planned and actual quantities of the finished product obtained. The record should also include details of the packaging operations, equipment used, in-process checks, and any deviation from the packaging instructions with appropriate authorization. Finally, the record should provide a reconciliation of the quantities of printed packaging materials and bulk products issued, used, destroyed, or returned to stock.

(a) Record the name of the product, its batch number, the quantity of bulk product to be packed, the planned quantity of finished product to be obtained, the actual quantity obtained, and the reconciliation.

(b) Note down the date(s) and time(s) of the packaging operations.

(c) Identify the name of the person responsible for carrying out the packaging operation.

(d) Record the initials of the operators with different roles and responsibilities.

(e) Document the checks performed for identity and conformity with the packaging instructions, including the results of in-process controls.

(f) The batch packaging record should include details of all packaging operations performed, including the equipment and packaging lines used. In cases where the product needs to be kept unpacked or returned to storage, clear instructions should be included in the record.

(g) Wherever possible, samples of the printed packaging materials used should be included in the record. These should bear the batch number, expiry date, and any additional overprinting.

(h) Any special problems encountered during the packaging process should be noted in the record. This includes any deviations from the packaging instructions, which must be authorized in writing by an appropriate person.

(i) The record should include the quantities and reference numbers or identification of all printed packaging materials and bulk products that were issued, used, destroyed, or returned to stock. These quantities should permit an adequate reconciliation of the product obtained.

DOCUMENTATION

Documentation is an essential part of any quality assurance system, and it serves as a record of the manufacturing process, ensuring that the final product meets the required standards. Clear and accurate documentation helps to prevent errors and enables the tracing of the batch history. Manufacturing specifications, formulae, instructions, procedures, and records must be free from errors and available in written form to ensure that the process is

reproducible and consistent. Good documentation practices are critical for ensuring product quality, safety, and efficacy, and they are a key element of Good Manufacturing Practices (GMP) regulations.

The purpose of documentation in pharmaceutical manufacturing includes:

1. ***Defining specifications and procedures*:** Documentation provides clear and detailed instructions for all materials and methods of manufacture and control. This ensures that processes are consistent, reproducible, and meet quality standards.
2. ***Ensuring personnel are informed*:** Documentation ensures that all personnel involved in the manufacturing process understand their roles and responsibilities, and know what actions to take at each step.
3. ***Ensuring product release*:** Documentation provides the necessary information for authorized persons to decide whether or not to release a batch of a drug for sale, based on the results of quality assurance checks.
4. ***Providing traceability and audit trail*:** Documentation creates a record of all activities, providing an audit trail and traceability. This allows for investigations and helps identify the root cause of any issues that may arise.
5. ***Facilitating validation, review, and statistical analysis*:** Documentation provides the data needed for validation, review, and statistical analysis, which are essential components of quality assurance in the pharmaceutical industry.

PACKAGING INSTRUCTION

Packaging instructions are formal documents that must be approved for each product pack size and type. These instructions should contain or reference the following information:

1. The product name.
2. A description of its pharmaceutical form, strength, and, if applicable, method of application.
3. The pack size is expressed as the number, weight, or volume of the product in the final container.
4. A complete list of all packaging materials required for standard batch size, including quantities, sizes, and types, with codes or reference numbers linking to the specifications for each material.
5. If appropriate, an example or replica of relevant printed packaging materials and samples indicating where the batch number and expiry date are marked.
6. A meticulous inspection of the packaging area and equipment to ensure line clearance before starting operations.
7. A description of the packaging operation, including any significant subsidiary operations and equipment to be used.

8. Detailed in-process control instructions, including sampling and acceptance limits.

STERILE WATER FOR INJECTION

Sterile Water for Injection is a sterile and bacteria-free preparation of distilled water that does not contain any solutes. Its primary use is as a solvent or diluent for drugs or solutions that are suitable for intravenous or intramuscular administration. When used in this way, it provides hydration and facilitates drug delivery to the patient. It is typically the pharmacist who adds any required additives and relabels the container for use by the patient.

COMPONENTS OF BATCH PACKAGING RECORD FOR STERILE WATER FOR INJECTION

- Product name
- Batch number
- Formulation details
- Date, time, code number, and pack number
- Description of the packaging operation, including line clearance
- In-process checks performed during packaging
- Initials of the personnel responsible for the packaging checks

PACKAGING OPERATION

LINE CLEARANCE

Packaging line No	Previous Products
	Batch No

Sr.no	Activity	Removed checked	Done by	Checked by
1	Labeled vials, de-labeled vials, cartons, Insert, wrappers of the previous product/b.no on the table			
2	Labels, cartoons, and inserts of previous products near the labeling machine			
3	Waste from dustbins			
4	Rejected vials, labels, cartons, and inserts of the previous product/b.no for destruction			
5	Stamps removed from previous product /b.no			
6	Packed shippers shifted previous product/b.no to BSR 2			

DISTRIBUTION RECORDS

Distribution records must include the product name, strength, and dosage form, as well as the consignee's name and address, the shipment date and quantity, and the lot or control number of the drug product. Compressed medical gas products are exempt from the requirement of lot or control numbers in their distribution records.

The main purpose of these records is to provide sufficient data for contacting trade customers in case of a product recall. Assigning a lot number to each order is an effective way to achieve this goal. The recording of the dates, when a specific lot of product began and ended its distribution, can also be useful. This allows all customers who received the product between those dates to be identified and contacted.

There may be some overlap on the first and last days of distribution, as some customers may receive products from the previous or next lot. However, this should not compromise the recall effectiveness. Whatever system is used, it should allow for the reintroduction of returned goods into the distribution chain. Distribution records encompass a wide range of documentation, such as invoices, bills of lading, customers' receipts, and internal warehouse storage and inventory records. Not all documents need to include all the required information, and customer and product codes can be used as alternatives to names and addresses.

CERTIFICATE OF ANALYSIS (COA)

A Certificate of Analysis (COA) is a Quality Assurance document that verifies a regulated product's compliance with its specifications. It typically includes the test results obtained during quality control testing of a specific batch of the product. The company responsible for the material should prepare and issue the COA.

Purpose and Scope

The purpose of a Certificate of Analysis is to provide a report of analytical results for a specific batch of raw materials, components, APIs, finished products, or other similar items. It is typically issued by the company responsible for the material and includes actual results obtained from testing performed as part of quality control measures. The scope of a COA is limited to the specific batch of the product being analyzed.

The COA must be reviewed and approved by a designated representative of the testing site and must include the following information:

- Vendor or supplier details
- Product information, including name and strength
- Test results for the specific batch, including the name of the test, acceptance criteria, and the actual results obtained
- A statement indicating whether the product conforms to the specified requirements
- References to the method and specification documents used for the testing
- Information about the source of the data presented
- Approval and date of issuance
- Expiration date or retest information, if applicable.

The following information is required for a Certificate of Analysis (COA):

- Name and batch number of the product
- Manufacturer of the product
- The manufacturing date of the product
- Retest date of the product
- The expiry date of the product
- Transport instructions for the product
- Storage conditions for the product
- Content of reference substance in the product
- Note how the contents were calculated
- Any special handling requirements for the product
- Results for all required tests, including their specifications.

Certificate of Analysis: e-COA

The use of electronic Certificates of Analysis (e-COAs) is becoming increasingly common and is acceptable if appropriate controls are in place. To ensure the validity and accuracy of e-COAs, the following considerations should be met:

(a) Access to the computer system should be restricted to authorized personnel only. This includes limitations on data entry and editing, with user authentication through username and password. Additionally, the integrity and accuracy of the system should be confirmed during implementation and regularly checked thereafter.

(b) Data entered into the computer system should be time- and date-stamped, and accompanied by audit trails to track any changes made. If these criteria are met, electronically generated COAs can be considered valid. However, e-COAs must include contact information for the issuing entity.

The certificate should include:

- The name and address of the laboratory that conducted the tests.
- The registration number of the certificate of analysis.
- Details of the batch for which the certificate is issued, including the name, description (such as grade, quantity received, and type of container), and batch number used by the original manufacturer and repacker/trader. It should also include the date of manufacture and the expiry date or retest date.
- The date on which the batch was received for testing.
- A reference to the test procedure used, including the acceptance criteria (limits).
- The results of all tests performed on the batch, including numerical values and comparison with established acceptance criteria.
- Any additional test results obtained from samples taken as part of a periodic statistically based testing program.
- A statement indicating whether the batch met the requirements.
- The date or dates on which the tests were performed.
- The signature of the head of the laboratory or an authorized person.
- The name, address, telephone number, and fax number of the original manufacturer. If supplied by a repacker or trader, the certificate should also include their contact details and a reference to the original manufacturer.
- A statement of the expected conditions of shipping, packaging, storage, and distribution, which must be followed to maintain the validity of the certificate.
- If the sample was supplied by a repacker or trader, a copy of the certificate generated by the original manufacturer should also be included.

Model certificate of analysis for active pharmaceutical ingredients, excipients, and medicinal products

Registration number of sample or certificate: _____

Name and address of laboratory testing the sample:

_____

Sample information

Name of product (INN, brand name(s), etc.):

_____

Dosage Form (if applicable):_____

Marketing authorization number(if applicable):_____

Description (appearance of container and contents):

_____

_____

Batch number(s): _____

Conditions:_____

Data received: _____

Date of manufacture: _____

Expiry date (for medicinal products) or retest date (for starting materials or excipients):_____

Name and address of original manufacturer:

Telephone:_____ Fax:_____

SITE MASTER FILE

The pharmaceutical manufacturer creates the Site Master File (SMF) to provide specific information about the quality management policies and activities, as well as the production and/or quality control operations carried out at the named site and any closely integrated operations at adjacent and nearby buildings. If only a part of a pharmaceutical operation is carried out on the site, the SMF should only describe those operations. When submitted to regulatory authorities, the SMF should provide information on the manufacturer's good manufacturing practices (GMP) related activities for the general supervision and efficient planning and undertaking of GMP inspections.

The SMF should contain adequate information but should not exceed 25-30 pages plus appendices. Simple plans, outline drawings or schematic layouts are preferred instead of narratives. The SMF, including appendices, should be easily readable when printed on A4 paper sheets. It should be a part of the documentation belonging to the quality management system of the manufacturer and kept updated accordingly. The SMF should have an edition number, an effective date, and a review date. It should be regularly reviewed to ensure it is up-to-date and representative of current activities.

Purpose

These explanatory notes are intended to assist pharmaceutical manufacturers in creating a Site Master File (SMF) that is relevant and helpful to regulatory authorities during Good Manufacturing Practice (GMP) inspections.

Scope

These guidelines are intended to assist manufacturers of medicinal products in preparing an SMF that meets the expectations of regulatory authorities in planning and conducting GMP inspections. The need for an SMF may vary depending on regional and national regulatory requirements, and manufacturers should consult these requirements for clarification. These guidelines apply to all types of manufacturing operations, including production, packaging and labeling, testing, relabeling, and repackaging of medicinal products. The guidelines may also be useful for blood and tissue establishments, as well as manufacturers of active pharmaceutical ingredients (APIs).

I. General Information on the Manufacturer

1. Contact information on the manufacturer
   - The manufacturer's name and official address
   - The names and street addresses of the site, buildings, and production units located on the site
   - Contact information for the manufacturer, including a 24-hour telephone number for contact personnel in the case of product defects or recalls
   - Identification numbers of the site, such as GPS details, D-U-N-S number, or any geographical location system
2. Authorized pharmaceutical manufacturing activities of the site
   - A copy of the valid manufacturing authorization issued by the relevant competent authority in Annex 1 or reference to the Eudra GMP database, if applicable. If the competent authority does not issue manufacturing authorizations, this should be stated.
   - A brief description of manufacturing, import, export, distribution, and other authorized activities by the relevant competent authorities, including foreign authorities with authorized dosage forms/activities, respectively, not covered by the manufacturing authorization.
   - The type of products currently manufactured on-site (listed in Annex 2) if not covered by Annex 1 or the Eudra GMP database.
   - A list of GMP inspections of the site within the last five years, including dates and the name/country of the competent authority that performed the inspection. A copy of the current GMP certificate should also be included.

3. Any other manufacturing activities carried out on the site
   - Description of any non-pharmaceutical activities on the site, if any.

II. Quality Management

1. The Quality Management System of the Manufacturer

Quality Management System: This section provides a brief description of the quality management systems used by the manufacturer, including references to the relevant standards. It also outlines the responsibilities of senior management for maintaining the quality system, as well as information on the site's accreditations and certifications.

2. Release Procedure of Finished Products

This section details the qualifications required for authorized persons/ qualified persons responsible for batch certification and release procedures. It also includes a general description of the batch certification and release process, the role of authorized persons/qualified persons in quarantine and release of finished products, and the arrangements in place when multiple authorized persons/qualified persons are involved. The statement also covers whether the control strategy employs process analytical technology (PAT) and/or real-time release or parametric release.

3. Management of Suppliers and Contractors

This section provides a summary of the manufacturer's supply chain and external audit program, along with a description of the qualification system for contractors, manufacturers of APIs, and other critical materials suppliers. It also outlines measures taken to ensure that products are compliant with transmitting animal spongiform encephalopathy (TSE) guidance and what happens when substandard medical products, bulk products, APIs, or excipients are suspected or identified. The use of outside scientific, analytical, or other technical assistance about manufacture and analysis is discussed, along with a list of contract manufacturers and laboratories, their addresses, and contact information. The responsibility sharing between the contract giver and acceptor is also covered, concerning compliance with the marketing authorization.

4. Quality Risk Management

This section provides a brief description of the quality risk management (QRM) methodologies used by the manufacturer, including the scope and focus of QRM, any activities performed at the corporate level, and those performed locally. It also mentions whether the QRM system has been used to assess the continuity of supply.

5. Product Quality Reviews

This section briefly describes the methodologies used for product quality reviews.

***Personnel*:** This section includes an organization chart showing the arrangements for quality management, production, quality control positions, senior management, and authorized persons/qualified persons. It also provides the number of employees engaged in quality management, production, quality control, storage, and distribution.

6. Premises and Equipment

This section provides a short description of the plant, including the size of the site and a list of buildings. If the production takes place in different buildings for different markets, the buildings are listed with destined markets identified. It also provides a simple plan or description of manufacturing areas with an indication of scale, along with layouts and flowcharts of the production areas showing the room classification and pressure differentials between adjoining areas and indicating the production activities in the rooms. The layouts of warehouses and storage areas, with special areas for the storage and handling of highly toxic, hazardous, and sensitizing materials are indicated, if applicable. Specific storage conditions, if applicable, are also described, along with a brief description of heating, ventilation, and air-conditioning (HVAC) systems, including principles for defining the air supply, temperature, humidity, pressure differentials, and air-change rates and policy of air recirculation.

7. Details of Documentation System and Storage Location

This section requires a description of the documentation system in use, whether electronic or manual. Additionally, it should provide information on where documents and records are stored or archived off-site, including pharmacovigilance data where applicable. This should include a list of document types/records, the name and address of the storage site, and an estimate of the time required to retrieve documents from the off-site archive.

8. Production Details

This section should provide information on the type of products manufactured on-site, including a list of dosage forms of both human and veterinary products. It should also cover investigational medicinal products (IMP) manufactured for any clinical trials on the site. If different from commercial manufacturing, information on production areas and personnel should also be included. Additionally, details on toxic or hazardous substances handled, product types manufactured in a dedicated facility or on a campaign basis, and PAT applications (if applicable) should be provided. This section should also outline the general policy for process validation and the policy for reprocessing or reworking.

9. Material Management and Warehousing

This section should provide information on the arrangements for the handling of starting materials, packaging materials, bulk, and finished products. It should cover aspects such as sampling, quarantine, release, and storage. Additionally, the arrangements for the handling of rejected materials and products should be included.

10. Quality Control

This section should describe the QC activities carried out on the site in terms of physical, chemical, microbiological, and biological testing.

11. Distribution, Complaints, Product Defects, and Recalls

This section should cover details on product distribution, including the types and locations of the companies to which the products are shipped from the site. It should also describe the system used to verify that each customer/recipient is legally entitled to receive medicinal products from the manufacturer. Furthermore, a brief description of the system to ensure appropriate environmental conditions during transit, such as temperature monitoring/control, should be included. This section should also outline the arrangements for product distribution and the methods by which product traceability is maintained. Measures taken to prevent manufacturers' products from entering into the illegal supply chain should also be detailed. Lastly, a brief description of the system for handling complaints, product defects, and recalls should be included.

12. Self-inspections

This section should provide a short description of the self-inspection system with a focus on the criteria used for selecting areas to be covered during planned inspections, practical arrangements, and follow-up activities.

DRUG MASTER FILE

Introduction

A Drug Master File (DMF) is a voluntary submission to the Food and Drug Administration (FDA) that provides confidential and detailed information about facilities, processes, or articles used in the manufacturing, processing, packaging, and storing of one or more human drugs. Although it is not required by law or FDA regulation, a DMF may be submitted at the holder's discretion. The information contained in the DMF can support various applications such as Investigational New Drug Application (IND), New Drug Application (NDA), Abbreviated New Drug Application (ANDA), Export Application, or amendments and supplements to any of these. However, it is important to note that a DMF cannot substitute for an IND, NDA, ANDA, or Export Application.

The guidelines for DMF's are provided in 21 CFR 314.420 and are intended to provide DMF holders with acceptable procedures for preparing and submitting a DMF. The guidelines discuss the types of DMF's, the required information for each type, the submission format, administrative procedures governing DMF review, and the obligations of the DMF holder. The DMF's purpose is generally to allow a third party to reference material without disclosing the contents of the file. When an applicant references its material, they should refer to the information contained in their IND, NDA, or ANDA directly rather than establishing a new DMF.

TYPES OF DRUG MASTER FILE

Type I - Manufacturing site, facilities, operating procedure, and personnel

Type II - Drug substance & intermediate, material used, and drug product

Type III - Packaging material

Type IV - Excipient, flavor, essence, colorant, & material used in the preparation

Type V - FDA accepted reference information

Type I: Manufacturing Site, Facilities, Operating Procedures, and Personnel

To assist the FDA in conducting on-site inspections of manufacturing facilities outside the US, it is recommended to submit a Type I DMF. This DMF should provide a detailed description of the manufacturing site, equipment capabilities, and operational layout. Generally, a Type I DMF is not required to describe domestic facilities, unless in special cases, such as unregistered and uninspected facilities.

The description of the site should include the actual address and a map displaying its location to the nearest city. An aerial photograph and a diagram of the site may also aid in understanding the location. A diagram highlighting major production and processing areas can be beneficial in understanding the operational layout. Equipment capabilities, application, and location should also be described, but make and model details are usually unnecessary unless the equipment is new or unique. Additionally, a diagram of key organizational elements, including manufacturing, quality control, and quality assurance positions at both the manufacturing site and corporate headquarters, is helpful.

Type II: Drug substance & intermediate, material used, and drug product

A Type II DMF is typically used to provide detailed information about a specific drug intermediate, drug substance, drug product, or type of material used in their preparation.

For Drug Substance Intermediates, Drug Substances, and Material Used in Their Preparation, the submission should follow the guidelines for Submitting Supporting Documentation in Drug Applications for the Manufacture of Drug Substances and the Format and Content of the Chemistry, Manufacturing, and Controls Section of an Application.

The submission should follow the guidelines for the Format and Content of the Chemistry, Manufacturing, and Controls Section of an Application, Submitting Documentation for the Manufacture of and Controls for Drug Products, and Submitting Samples and Analytical Data for Methods Validation.

Type III: Packaging Material

For each packaging material used in the manufacturing, processing, packaging, and storing of human drugs, a Type III DMF should be submitted. The DMF should provide a detailed description of the intended use, components, composition, and release controls of the packaging material. It should also include the names of the suppliers or fabricators of the components used and the acceptance specifications. Additionally, data supporting the acceptability of the packaging material for its intended use should be provided, following the "Guideline for Submitting Documentation for Packaging for Human Drugs and Biologics."

If toxicological data on the packaging materials are not otherwise available by cross-reference to another document, it should be included under this type of DMF.

Type IV: Excipient, Colorant, Flavor, Essence, or Material Used in Their Preparation

A Type IV DMF is intended for the submission of information relating to excipients (inactive ingredients) used in the formulation of human drugs. DMF should provide a complete description of the excipient, including its composition, specifications, and controls for release.

The names of the suppliers or fabricators of the excipient and the acceptance specifications should also be given. Data supporting the acceptability of the excipient for its intended use should also be submitted as outlined in the "Guideline for Submitting Supporting Documentation in Drug Applications for the Manufacture of Drug Substances."

Toxicological data on these materials would be included under this type of DMF, if not otherwise available by cross-reference to another document. Guidelines suggested for a Type II DMF may help prepare a Type IV DMF.

Type V: FDA Accepted Reference Information

The submission of Type V DMFs for miscellaneous or duplicate information that should be included in other types of DMFs is discouraged by the FDA. If a DMF holder intends to submit information and supporting data that does not fall under Types I through IV, they must first submit a letter of intent to the Drug Master File Staff. Following this, the FDA will contact the holder to discuss the proposed submission.

Submissions of Drug Master Files

To ensure completeness and clarity of information, a DMF submission should include a transmittal letter, administrative details, and specific information as outlined in this section. All documents in the DMF should be in English, and any information in another language must be accompanied by a certified English translation. Every page of each copy of the DMF should be numbered sequentially and dated. An updated table of contents must also be provided with each submission.

A. Transmittal Letters

A.1. Original Submissions

The submission should identify as an original submission and indicate the type of DMF as classified in Section III, along with its subject. If known, the DMF should also identify the applications it is intended to support, including the name and address of each sponsor, applicant, or holder, and all relevant document numbers. The holder or authorized representative should sign the submission, and their typewritten name and title should also be provided.

A.2. Amendments

The submission should identify as an amendment and include the DMF number, type of DMF, and the subject of the amendment. A description of the purpose of submission, such as an update, revised formula, or revised process, should be included. The holder or authorized representative should sign the submission, and their typewritten name and title should also be provided.

B. Administrative Information

B.1. For Original Submissions, the following information should be provided:

(a) Name and address of the DMF holder.

(b) Name and address of corporate headquarters.

(c) Name and address of the manufacturing/processing facility.

(d) Contact information for FDA correspondence.

(e) Name and address of any agents, if applicable.

B.2. For Amendments, the following information should be included:

(a) Identification of the submission as an amendment, including the DMF number, type of DMF, and the subject of the amendment.

(b) A description of the purpose of the submission, such as an update, revised formula, or revised process.

(c) Signature of the holder or authorized representative.

(d) Typewritten name and title of the signer.

General Information and Suggestions for Preparing a DMF

1. The environmental assessment should be included in the DMF, if applicable.
2. Stability information should be provided.
3. The DMF should be assembled and delivered in an organized and easy-to-navigate format.
4. An original and duplicate copy should be submitted for all DMF submissions. The DMF holder and their agents/representatives should also retain a complete reference copy that is identical to the submissions to FDA, maintained in the same chronological order.
5. Each volume of a DMF should generally be no more than 2 inches thick, and multivolume submissions should be numbered accordingly.
6. The preferred paper size is 8-1/2 by 11 inches. However, larger individual pages may be used when necessary to present diagrams or instructions. These pages should be folded and mounted for easy review and storage.
7. Delivery to FDA

Authorization to Refer a Drug Master File

- Before the FDA can review DMF information in support of an application, the DMF holder must submit a letter of authorization to the DMF in duplicate, permitting the FDA to refer to the DMF.
- If the holder cross-references its own DMF, the authorization letter should include the information designated by items 3, 5, 6, 7, and 8 of this section. The holder does not need to send a transmittal letter with its letter of authorization.
- The letter of authorization should contain the following:
  - The date.
  - The name of the DMF holder.
  - The DMF number.
  - The names of the persons authorized to incorporate the information in the DMF by reference.
  - The specific products covered by the DMF.

- The submission dates.
- The section numbers and/or page numbers to be referenced.
- A statement of commitment that the DMF is current and that the DMF holder will comply with the statements made in it.
- The signature of the authorizing official.
- The typed name and title of the official authorizing reference to the DMF.

DRUG MASTER FILE REVIEW

A Drug Master File (DMF) is not subject to approval or disapproval. Instead, the FDA will review DMF information only when it is referenced by an IND sponsor, an applicant for an NDA, ANDA, or Export Application, or another DMF holder. Any deficiencies found in the DMF information will be communicated to the holder, who is responsible for submitting the requested information to address the deficiencies. The DMF holder must also notify affected parties of any changes or additions to the DMF and provide an annual update on the anniversary date of the original submission. Failure to update or assure the FDA annually that previously submitted material and lists remain current can cause delays in FDA review or even closure of the DMF.

Holder Obligation

The Holder Obligation mandates that any modifications or additions related to specific customers, including changes in authorization, must be submitted in duplicate and with sufficient cross-referencing to previous submissions. The cross-reference should include details such as the date, volume, section, and/or page number that is being affected by the change or addition. This requirement helps ensure that financial institutions maintain accurate and comprehensive records, which can be used to detect and prevent illegal activities such as fraud.

The following are important regulations regarding Drug Master Files (DMFs) that must be followed by holders who submit confidential information about facilities, processes, or articles used in the manufacturing, processing, packaging, and storing of one or more human drugs:

A. Notice Required for Changes to a Drug Master File:

The holder must inform every applicant or sponsor who has referenced their DMF of any significant changes made to the DMF.

B. Listing of Persons Authorized to Refer to a Drug Master File:

The DMF should have a comprehensive list of individuals who are authorized to refer to the DMF by reference. list should be updated annually and include the holder's name, DMF number, and date of the update. The updated list

should identify the name or code of the information each authorized person can incorporate and provide its location by date, volume, and page number.

C. Annual Update:

The holder must provide an annual report on the original submission's anniversary date. If the DMF's subject matter remains unchanged, the holder should state that it is current. Failure to update or confirm annually with the FDA that submitted materials and lists remain current can cause delays in FDA reviews and initiate procedures for closure.

D. Appointment of an Agent:

If an agent is appointed, the holder should provide a signed letter of appointment to the DMF containing the agent's name, address, and scope of responsibility. Domestic DMF holders are not required to appoint an agent or representative.

E. Transfer of Ownership:

To transfer DMF ownership to another party, the holder should notify the FDA and authorized persons in writing. The letter should contain the name and address of the transferee, the name of their responsible official, the effective transfer date, and the transferring official's signature and title. The new holder should submit a letter of acceptance of the transfer, update the information contained in the DMF as necessary, and include any changes related to new ownership, such as plant location and methods.

Closure of Drug Master File

A holder who wishes to close a Drug Master File (DMF) should submit a request to the Drug Master File Staff, which should include the reason for the closure and a statement that the holder's obligations have been fulfilled. The FDA may also close a DMF if it does not contain an annual update of persons authorized to incorporate the information in the DMF by reference and a list of changes made since the previous annual report. The holder will be notified of the FDA's intent to close the DMF.

Practice Questions

MCQs

1. EPDB stand for
    a. Exploratory product development brief
    b. Explain the product development brief
    c. Explain the product and discover brief
    d. Explain the parcel discover a brief

2. A document is a piece of…… , …….. and …… matter.
   a. Written, Printed, Electronic
   b. Placed, written, submitted
   c. Written, printed, binder
   d. Solved, printed, checked

3. Good documentation is ……. Procedure.
   a. Systemic
   b. Proper
   c. Right
   d. Continuous

4. Clearly written documents prevent
   a. Errors
   b. Misunderstanding
   c. Breach of data
   d. Deletion

5. Drug product is a finished.
   a. Dosage form
   b. Prepared form
   c. Particular form
   d. Data form

6. PDP stands for
   a. Product development plan
   b. Product development paper
   c. Paper drug product
   d. Product drug plan

7. --------- record is used as a reference standard for preparing batch manufacturing record.
   a. Product development report
   b. Master formula record
   c. Batch reconciliation report
   d. All of the above

8. --------- record should be prepared for each intermediate and API/ formulation with complete information relating to manufacturing processes.
   a. Product development report
   b. Master formula record
   c. Batch reconciliation report
   d. Batch manufacturing record

9. -------- is responsible for the implementation of SOP for MFR.
   a. Head – quality assurance
   b. Head- quality control
   c. Pharmaceutical manufacturer
   d. All of the above

10. Who is primarily responsible for the issue, entering, reviewing, and control of BMR.
    a. Officer- QA
    b. Officer -QC
    c. Officer- production
    d. All of the above

11. -------- report is essential to provide a comprehensive understanding of the product and process for FDA application reviews.
    a. MFR
    b. BMR
    c. DMF
    d. PDR

12. -------- is primarily responsible for BMR attachments.
    a. Production chemist
    b. Production officer
    c. Both a and b
    d. None of the above

13. Who is secondarily responsible for BMR attachments?
    a. Production chemist
    b. Production officer
    c. Both a and b
    d. None of the above

14. % reconciliation in batch reconciliation means
    a. Quantity, of material used in manufacturing and packaging
    b. Production of material used in manufacturing and packaging
    c. Accounting of material used in manufacturing and packaging
    d. All of the above

15. -------- record is relating to all manufacturing processes for each product and batch size to be manufactured.
    a. MFR
    b. BMR
    c. SMF
    d. DMF

16. MFR should include
    a. Product detail
    b. Manufacturing processes
    c. Packaging processes
    d. All of the above

17. COA stands for
    a. Certificate of analysis
    b. Certificate of assurance
    c. Certificate of analyte
    d. Certificate of authorization

18. The basic operational and environmental conditions applied to produce safe foods are called
    a. HACCP
    b. FSSA
    c. FSSAI
    d. GMP

19. Drug master file is of ---------- types
    a. 6
    b. 7
    c. 8
    d. 5

20. DMF is prepared by
    a. Pharmaceutical manufacturer
    b. Sponsor
    c. Investigator
    d. monitor

21. DMF stands for
    a. Drug master file
    b. Drug master formula
    c. Dose master formula
    d. Dose master file

22. DMF is submitted to
    a. VENDOR
    b. SPONSOR
    c. USFDA
    d. Not submitted to any authority

23. What is a master document in the pharmaceutical industry?
    a. DMF
    b. COA
    c. SMF
    d. BMR

24. COA is given for --------- purpose.
    a. Validation of equipment
    b. Product meets its product specification
    c. Good analysis of the manufacturer
    d. Good location and premises

25. Type 3 DMF includes ----------
    a. Manufacturing site
    b. FDA accepted reference information
    c. Packaging material
    d. Excipient, colors, flavours

26. PDR Stands for Type ----------
    a. Product Development Report
    b. Product diagnosis Report
    c. Product documentation record
    d. Process Drug Record

27. BPR stands for ----------
    a. Batch Process Record
    b. Batch Primary Record
    c. Batch Packaging Record
    d. Batch Passing Record

28. BMR stands for ----------
    a. Batch Manufacturing Record
    b. Batch Master Record
    c. Batch Process Record
    d. Batch Passing Record

29. SMF Stands for ----------
    a. Site Master Formula
    b. Site Manufacture file
    c. Site Master File
    d. Substance Master file

30. Documentation in the pharmaceutical industry covers ----------
    a. Certificate of Analysis
    b. Site Manufacture file
    c. Master formula record
    d. All the above

Short Answer Questions

Q.1. Define documentation.

Q.2. Explain the basics of GDP.

Q.3. Define master formula record.

Q.4. Define the batch number.

Q.5. What is batch manufacturing record?

Long Answer Questions

Q.1. Explain EPDB for drug substance and drug product.

Q.2. Summarize in a short product development plan and product development report.

Q.3. Define batch manufacturing record and batch packing record.

Answers to MCQs

1. a	2. a	3. a	4. a
5. a	6. a	7. b	8. d
9. a	10. d	11. d	12. a
13. b	14. c	15. a	16. d
17. a	18. d	19. d	20. a
21. a	22. c	23. a	24. b
25. c	26. a	27. c	28. a
29. c	30. d		