INTRODUCTION TO TECHNOLOGY TRANSFER

As defined in ICH Q10, the aim of technology transfer is to achieve the commercial objectives of a product by transferring the product and process knowledge between R&D and production, either within one production site or between two production sites. This knowledge contributes to the foundation of bioprocess, control strategies, process validation methods and continuous improvement.

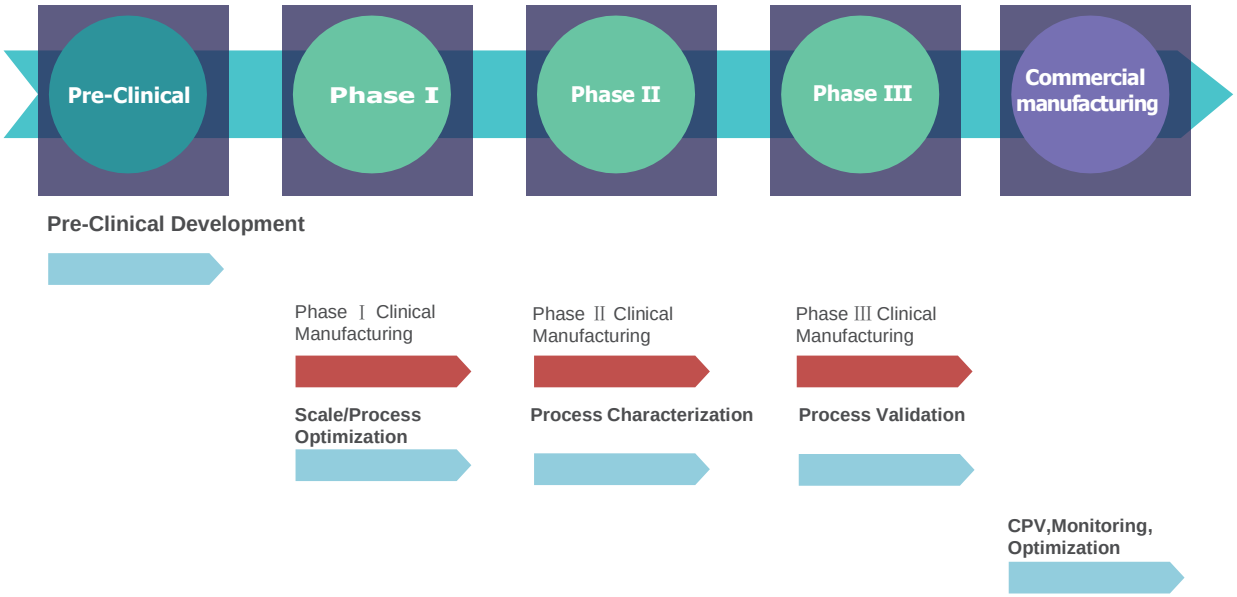

Figure 1. Technology transfer occurs throughout the life cycle of biotherapeutics

PROCESS OF TECHNOLOGY TRANSFER

1. Feasibility study

Quality agreement, technology transfer team, acceptable transfer standard

2. Information exchange and formulating technology transfer plan

Gap analysis, risk assessment, actions to lower the risk, finalize technology transfer plan

3. Technology transfer implementation

Small-scale validation, documentation establishment and validation equipment validation materials release, analytical methods validation, engineering batch and validation batch PPQ

4. Technology transfer report

Similarity of process and comparability of product quality, stability report, technology transfersummary

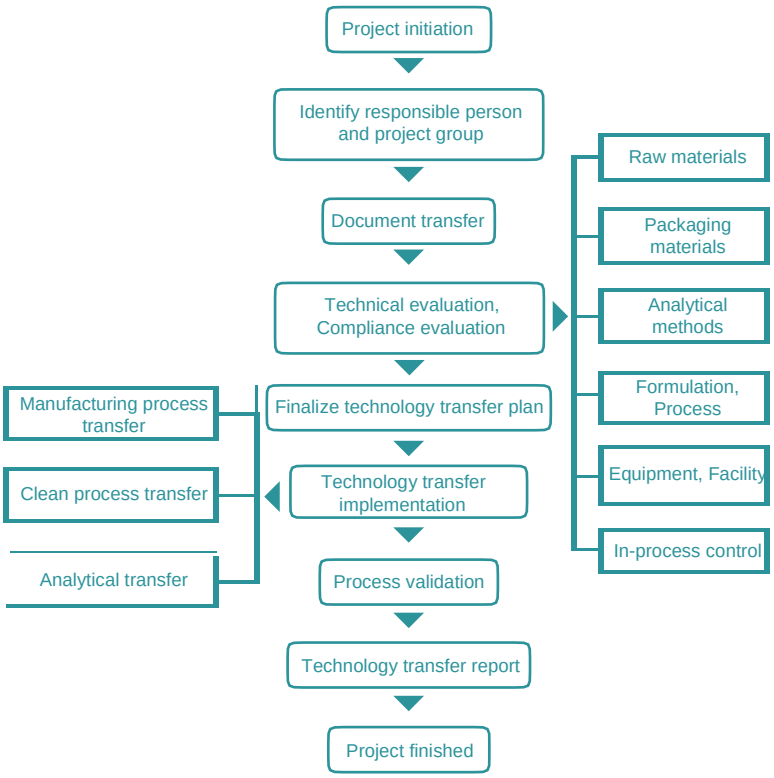

Figure 2. Process of technology transfer

There are detailed descriptions about the content and process of technology transfer in PDA (parenteral drug association) TR65. Usually, technology transfer process can be divided into four steps.

The first step is **feasibility study**, which is conducted by the management team. The feasibility study includes project feasibility, quality agreement, building a technology transfer team and acceptable transfer standard establishment. The feasibility study should be finished before the beginning of project transfer.

The second step is **information exchange and technology transfer plan development**, which is the basis of a successful technology transfer. Sending unit and receiving unit should analyze the gap of equipment, consumables, process, and personnel according the collected information. Then they conduct risk assessment about the gaps and propose risk mitigation plan. The technology transfer plan is ready when all these aspects are accomplished.

The third step is **technology transfer implementation**, which includes analytical method transfer, process transfer, clean process transfer and successfully performed corresponding engineering batch and validation batch.

The fourth step is the completion of **technology transfer report** according to the assessment of similarity of process and comparability of product quality.

KEY POINTS IN TECHNOLOGY TRANSFER

During the technology transfer process, adequate information exchange at the second step is very important. Next, key points in the information exchange and technology transfer will be introduced in details.

Document Transfer

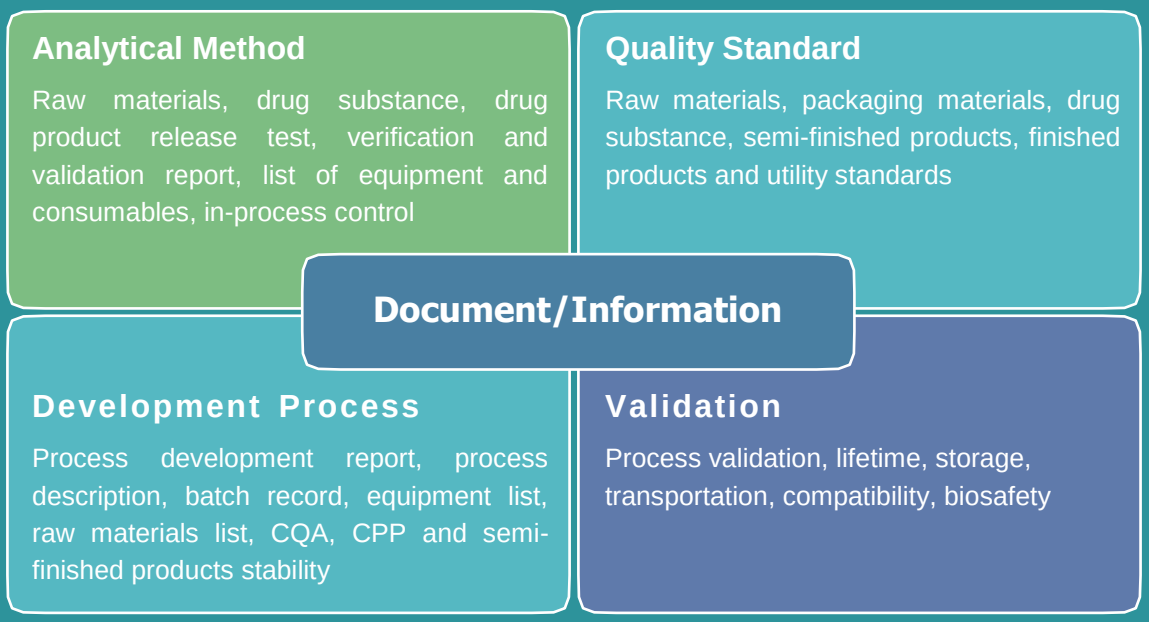

Figure 3. Key points of technology transfer-document transfer

For document and information transfer, it is suggested to consider the following four aspects:

1. Analytical method: Including raw materials, in-process control, drug substance and drug product release test method and validation report, list of all analytical equipment, essential reagents and consumables

2. Quality standard: Including raw materials, packaging materials, in-process control, drug substance, semi-finished products, finished products and utility standards.

3. Development Process: including process development report, process description, batch record, equipment list, essential materials list, CQA (critical quality attributes) assessment, CPP (critical process parameters) and semi-finished products stability.

4. Validation: This part is usually needed in clinical phase II&III, including process validation, column lifetime study, transportation validation report, storage validation report, compatibility report of packaging materials and biosafety-related validation report.

It is recommended that the sending unit and receiving unit prepare technology transfer document list in advance and make confirmation according to the list. Taking analytical method transfer as an example, the documents list during technology transfer includes the following items:

- Reference quality standard and CoA
- DS/DP release test SOP
- DS/DP release test validation report
- DS/DP release test development report
- IPC test method SOP and report
- Raw materials test method validation and SOP
- List of all analytical equipment, essential reagents and consumables