The 5 pitfalls of API development

How to create an ideal plan – and avoid putting your success at risk

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The best API development plan is an early one

No matter where you are in the API development life cycle, early planning makes a big difference.

Core principles for an ideal plan:

- **Develop a phase-appropriate strategy** that balances speed with process development
- **Define your final synthetic route as early as possible** to limit changes in the quality profile
- **Keep the commercial objective in mind** so you know when to invest in the process
- **Work with your manufacturing partner** to develop a roadmap and closely manage timelines

Your API development plan starts … now

Every plan should keep these five key milestones – and potential pitfalls – in mind.

MILESTONES	PITFALLS
1 Pre-clinical toxicology studies	No representative impurities in early-phase batch for adequate toxicology coverage
2 Phase I clinical trials	Pressing forward to save time despite an unsuitable or underdeveloped process
3 Phase II clinical trials	Lack of decision on final process, causing significant program changes, delays and costs
4 Phase III clinical trials	Inability to lay proper foundation for process validation, leading to failure and delayed launch
5 Validation and commercialization	Limited commercialization planning, triggering major manufacturing timeline delays

A capable CDMO can look around the corner to help you reduce risk, avoid pitfalls and advance your plan.

Milestone 1: Pre-clinical toxicology studies

The first major hurdle in API development is producing enough material for early-phase GLP tox studies. For this stage, speed is key, safety is critical – and a future-focused strategy is paramount.

BEWARE THE PITFALL

An unsuitable API formulation can lead to:

- Incomplete assessment of impurity profile
- Insufficient safety tolerance
- Concerns around the drug solubility

REDUCE YOUR RISK

A capable CDMO can develop an effective API formulation plan to help you:

- Set appropriate pre-clinical tox batch specs, focusing on a representative impurity profile
- Keep timelines on track without sacrificing safety
- Generate initial characterization of the API's solid form

Milestone 2: Phase I clinical trials

Your API is put to the test during first-in-human trials. In this critical stage where poor development can result in serious adverse events in clinic, knowledge is power. Use it wisely.

BEWARE THE PITFALL

An inadequate API development plan can lead to:

- Progressing with an underdeveloped early-phase synthetic process
- Underdeveloped or unsuitable analytical methods
- Unavailability of raw materials or reagents at targeted scale

REDUCE YOUR RISK

A capable CDMO can provide early-stage API process know-how to help you:

- Accelerate at-scale development with an adequate synthetic process
- Balance process development with speed of supply
- Develop phase-appropriate analytical methods

Milestone 3: Phase II clinical trials

This proof-of-concept stage narrows the focus of clinical assessment while widening the patient population. Be sure to define your GMP starting material strategy early – and stick to it.

BEWARE THE PITFALL

An undefined final process can lead to:

- A differing tox profile, requiring bridging studies
- Commercialization with an inefficient process
- Process changes, production delays and increased costs before launch

REDUCE YOUR RISK

A capable CDMO can leverage extensive API experience to help you:

- Develop a robust process that controls impurities and ensures quality
- Establish a process that can be cost-effectively implemented at scale
- Source raw starting materials through a trusted global supplier network

Milestone 4: Phase III clinical trials

As you enter the registration stage, every detail you have learned goes into finalizing and standardizing your API development process for validation and certification. Tread carefully.

BEWARE THE PITFALL

A misunderstanding of critical API process parameters can lead to:

- Concerns around API critical quality attributes and quality target profile
- Insufficient data needed to successfully file a process
- Analytical methods not identifying all impurities

REDUCE YOUR RISK

A capable CDMO can tap into robust regulatory expertise to help you:

- Define design space thoroughly to demonstrate process robustness
- Develop fully validated analytical methods to provide accurate data
- Achieve process validation and certification approvals

Milestone 5: Validation and commercialization

Launching your product hinges on regulatory approval. The key to success: efficiently managing each development life cycle and effectively demonstrating your process. All while preparing for scale-up and commercialization from the start. So get going.

BEWARE THE PITFALL

An ineffectively planned API development process can lead to:

- Concerns around regulatory and commercialization preparedness
- Insufficient security of the API supply chain
- Manufacturing delays that keep the product from patients in need

REDUCE YOUR RISK

A capable CDMO can lean on experienced experts to help you:

- Navigate all phases of API development while ensuring a stable supply chain
- Prepare for Pre-Approval Inspections and write CMC sections of the NDA
- Ready your API for product launch, and support ongoing commercial demand from patients in need

An investment in time, a journey of knowledge

API development is a journey best taken with a capable CDMO.
Together, you can:

- Establish and optimize an efficient, cost-effective process
- Use phase-appropriate strategies to reach milestones
- Identify, understand and control impurities in your API
- Generate precise, robust and reproduceable results
- Scale up manufacturing to successfully launch your product

There is no one-size-fits-all approach

Every API is different. So is every API development plan.
It is critical to partner with a CDMO that has:

- Deep scientific, technical, regulatory and production experience
- Proven processes, reliable protocols and diverse internal resources
- A robust, global network of supply chain relationships
- End-to-end expertise, from development to commercialization
- The know-how to reduce risk, anticipate challenges, prepare for contingencies – and apply the right strategies and solutions for your unique API

See how Patheon pharma services can help you reduce risk and avoid pitfalls throughout your API's development.

+1 919 226 3200 • thermofisher.com/patheon
pharmaservices@thermofisher.com

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Published 04/21

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