# Workforce Development for Generative AI in Life Sciences

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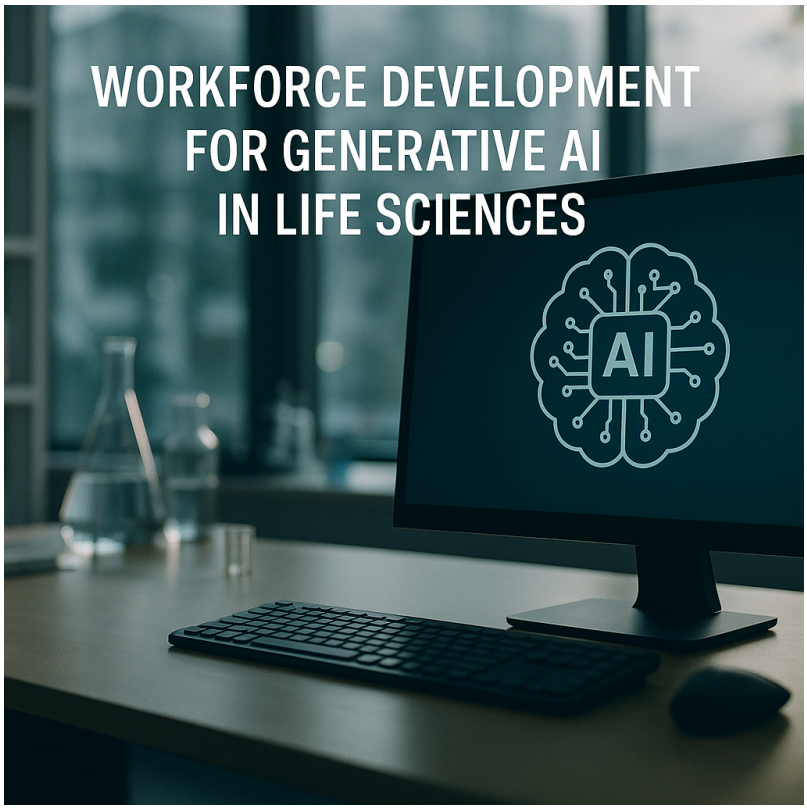

# Upskilling the Life Sciences Workforce for Generative AI Adoption

Generative AI (e.g. ChatGPT, Google Gemini) is rapidly transforming pharma and biotech. Analysts estimate GenAI could unlock **$60–110 billion** in value annually for life sciences by accelerating discovery, trials, regulatory processes and marketing mckinsey.com. Leading companies now view GenAI as a strategic imperative, not just a fad resources.indegene.com mckinsey.com. To move beyond pilots into enterprise-scale use, life-science organizations need a structured, step-by-step approach: align leadership and governance, identify high-impact use cases by function, build the right technology and data infrastructure, drive culture change with training and upskilling, and ensure ethical and compliant deployment. The following guide, drawn from recent industry reports and case studies, outlines this path in detail, with concrete examples and best practices.

## 1. Strategy and Governance: Align Leadership and Build Capacity

Successful GenAI adoption begins at the top. Executive sponsorship and a clear vision are essential. Establish a cross-functional **GenAI Center of Excellence (CoE)** or council that unifies experts from R&D, regulatory, IT, compliance and business operations under strong leadership resources.indegene.com resources.indegene.com. This central body sets strategy and standards while decentralized business units pilot innovations. For example, Indegene recommends a **hybrid operating model**: a centralized CoE drives innovation and sets policies (e.g. data governance, security, responsible AI guidelines), while domain teams embed approved AI tools into their workflows resources.indegene.com resources.indegene.com. Leadership must articulate measurable goals (e.g. “30% faster protocol drafting” or “40% reduction in document review time”) and hold stakeholders accountable resources.indegene.com.

Key governance pillars include:

- **Strategic alignment:** Balance “responsible AI” deployment with domain innovation. Ensure GenAI projects support business objectives (e.g. faster time-to-market, compliance) rather than operate in silos resources.indegene.com resources.indegene.com.
- **Executive sponsorship:** Secure C-suite buy-in. Leaders should sponsor use cases, communicate the vision broadly, and support necessary investment in data, tools, and training resources.indegene.com mckinsey.com.

- **Compliance oversight:** Set up AI governance councils to review AI use cases for safety and regulatory compliance. Define policies on data privacy, intellectual property, and quality standards, in line with GDPR, HIPAA and new rules like the EU AI Act resources.indegene.com zs.com. For example, Indegene notes that as regulatory standards (GDPR, HIPAA, EU AI Act) gain prominence, robust security and Responsible AI frameworks become critical resources.indegene.com.

By designating accountability and governance structures early, organizations create the foundation to scale GenAI safely. Indegene emphasizes that talent development ("AI fluency") is a fourth pillar: investing in people and skills is as important as technology resources.indegene.com resources.indegene.com.

## 2. Identify and Prioritize Use Cases Across Functions

Next, map GenAI use cases to each function's highest-impact processes. This ensures focus on "low-hanging fruit" with clear ROI and avoids scattershot pilots. Common life-science functions and example use cases include:

- **Research & Discovery:** *Literature review and knowledge synthesis.* Scientists can use LLMs to scan and summarize vast literature, identify new target-disease links, and even generate hypotheses. For instance, AstraZeneca built an internal "AZ ChatGPT" research assistant that lets chemists query decades of proprietary data ("What do we know about Target X in oncology?") and get synthesized insights far faster than manual search intuitionlabs.ai. Generative models (like BioGPT) trained on biomedical corpora can answer technical questions and extract data from literature clinicaltrialsarena.com. *Drug design:* Generative models also aid molecular design by proposing novel compound structures based on learned chemistry patterns (e.g. **GENTRL**, ChemBERTa) whatfix.com.

- **Preclinical & Medical Affairs:** *Scientific writing and content generation.* GenAI can draft sections of study reports or regulatory documents. For example, Indegene notes that medical-affairs teams at top pharma used GenAI to **fact-validate promotional claims** and create Standard Response Documents, cutting review time by ~60% resources.indegene.com. Pharmacovigilance groups have used AI to produce first drafts of Periodic Safety Update Reports (PSURs), reducing submission time by over 20 days resources.indegene.com.

- **Clinical Operations:** *Protocol development and patient selection.* AI tools are optimizing trial protocols and design. In practice, GenAI platforms have cut protocol amendments by ~40% and boosted enrollment by ~25% resources.indegene.com. Teams have asked ChatGPT-like models to draft informed-consent forms, patient recruitment letters, and monitoring plans. Eli Lilly, for instance, pilots ChatGPT to draft study protocols and informed-consent sections which experts then refine, greatly accelerating what was a manual task intuitionlabs.ai. AI can also analyze patient databases to stratify cohorts or</current_article_content> predict responses, improving trial outcomes resources.indegene.com.

- **Regulatory Affairs:** *Submission drafting and query response.* Regulatory teams use GenAI to draft submission modules (e.g. Clinical Overview, CSR sections) and automate routine writing. A leading pharma tested a GenAI solution that searched past Health Authority (HA) queries and drafting patterns, enabling 80% faster response to new queries resources.indegene.com. Merck's "GPTeal" is an internal gateway to ChatGPT/LLaMA/Claude that lets reviewers safely generate content (e.g. draft responses to FDA queries) under IT oversight intuitionlabs.ai intuitionlabs.ai. Such tools help reduce repetitive paperwork, leaving experts to focus on strategic compliance checks.

- **Medical Writing & Publishing:** *CSRs, publications, grant proposals.* Generative AI can produce first drafts of lengthy documents. Merck reported scientists using ChatGPT (via GPTeal) to draft email updates, memos, and even clinical study report sections intuitionlabs.ai. Because LLMs can hallucinate or "invent" data, human review is mandatory – but having a draft saves weeks of labor. An *Applied Clinical Trials* article notes GenAI's potential to automate Clinical Study Reports (CSRs), speeding TTM for new therapies, provided data and document standards are "ready" for AI use appliedclinicaltrialsonline.com appliedclinicaltrialsonline.com.

- **Commercial & Marketing:** *Content creation and personalization.* Marketing teams leverage GenAI for digital ads, emails, web copy, and sales collateral. Pfizer's internal GPT "Charlie" generates draft promotional material and flags compliance issues in real time intuitionlabs.ai intuitionlabs.ai. Content reuse is tagged "green" for fast approval, while new claims get a "red" flag for human review – a built-in compliance guardrail. Indegene also cites companies creating dynamic, localized marketing videos with AI, cutting production costs by ~40% and doubling speed-to-market resources.indegene.com.

- **Manufacturing & Supply Chain:** *Process documentation and troubleshooting.* AI can draft SOPs or maintenance guidelines by summarizing best practices. For example, Moderna extended its GenAI tools beyond R&D: manufacturing teams use GPT assistants to troubleshoot process documents, and legal teams use them to summarize regulations intuitionlabs.ai. By treating AI as a "virtual coworker," Moderna reports faster resolution of manufacturing questions and better knowledge sharing intuitionlabs.ai intuitionlabs.ai.

- **Human Resources & Administration:** *Internal communications and training.* Even non-scientific departments benefit. Novartis deployed a "NovaGPT" branded ChatGPT for HR, drafting policy documents, company announcements, and job descriptions intuitionlabs.ai intuitionlabs.ai. This cut writing time dramatically – often only a few AI-generated sentences are kept and polished, boosting efficiency while maintaining quality intuitionlabs.ai intuitionlabs.ai. Such pilot use cases build familiarity with AI before rolling it out to core functions.

In practice, each organization must tailor its use-case list. A McKinsey study found that beyond marketing and discovery, AI is maturing in supply-chain forecasting, pharmacovigilance, and medical affairs mckinsey.com zs.com. Companies should **inventory processes** and prioritize those with high volume or cognitive burden (e.g. repetitive writing, complex data search) wipro.com. Use frameworks (like Indegene's ROI matrix) to score use cases on business value, strategic fit and feasibility resources.indegene.com resources.indegene.com.

## 3. Build the Technical Foundation: Tools and Infrastructure

With strategy and use cases defined, invest in the right technology stack. Key considerations include:

- **Choice of models:** Public cloud LLMs (ChatGPT, Gemini, Claude, LLaMA, etc.) versus on-prem or private models. Many life-science companies use **ChatGPT Enterprise** (HIPAA/GxP-compliant version) for broad needs, as Moderna did intuitionlabs.ai. Others deploy guarded interfaces: Merck's **GPTeal** wraps ChatGPT, LLaMA and Claude in a secure portal so company data never leaks to external models intuitionlabs.ai. Domain-specific models (e.g. **BioGPT** trained on PubMed) can improve biomedical accuracy clinicaltrialsarena.com. Evaluate models for scientific language handling, citation ability, and privacy.

- **Data and Knowledge Integration:** Generative AI is most powerful when connected to your data. Use **retrieval-augmented generation (RAG)** or knowledge graphs to ground LLMs in internal databases (clinical results, medical literature, SOP libraries). AstraZeneca's AZ-ChatGPT, for example, taps decades of experimental data to answer queries intuitionlabs.ai. Ensure data is standardized (CDISC SDTM for trials, etc.) so AI can retrieve and cite it correctly. As one guideline notes, data readiness (standardized formats and tagged content) is a prerequisite for trustworthy AI outputs appliedclinicaltrialsonline.com.

- **Development Platforms:** Provide an AI "sandbox" or workbench for teams to experiment. This may be Jupyter notebooks with LLM APIs, integrated tools (e.g. Semantic Scholar with AI plugins for literature search), or low-code platforms. Encourage developers to build **GPT assistants** (custom chatbots) for specific tasks. Moderna's creation of 750+ custom GPTs (e.g. a "Dose ID GPT" for trial dosing analytics) shows the potential of agile development on enterprise AI APIs intuitionlabs.ai.

- **Security and Compliance Controls:** Work with IT and security to ensure encryption, logging and monitoring. Use enterprise-grade offerings (OpenAI Enterprise, Google Vertex AI, Azure OpenAI) which offer data controls. Implement prompt filters to block sensitive data. Audit AI use: for regulated documents, maintain versioning and "chain-of-custody" records of AI-generated content. Indegene emphasizes "strong data security protocols" as core to GenAI initiatives resources.indegene.com.

In summary, treat GenAI tools as you would any critical IT system: integrate them with existing workflows, validate outputs, and ensure there are human oversight steps. Adopt multi-modal capabilities (text, images, even protein folding) where relevant – e.g. Google's Med-Gemini for radiology or Google's Bio-Gemini for text may open new channels, but these too must be validated in the lab context. For most tasks, however, text-based LLMs tied to life-science data will drive immediate benefit.

## 4. Culture Change, Training and Upskilling

Technology alone isn't enough; the human factor is often the **rate-limiter**. Many pilot projects fail to stick because end-users lack trust, skills, or clarity on how to use AI wipro.com wipro.com. A Wipro analysis concludes the main challenges in GenAI adoption are "not model selection or infrastructure – they are human" wipro.com. To overcome this:

- **Communicate Clearly:** Frame GenAI as an *augmentation* of human work, not a replacement. Emphasize how it automates tedious tasks (e.g. first-draft writing, data sifting) so staff can focus on higher-value analysis and decisions. Involve users early: gather input from lab scientists, clinicians, and regulators on pain points and involve them in designing AI tools. Wipro advises "co-design solutions with the teams who will use them daily" wipro.com. When employees feel included, they are likelier to embrace new workflows.

- **Rapid Training Programs:** Launch company-wide **AI literacy** initiatives. Johnson & Johnson ran mandatory GenAI training: over 56,000 employees completed courses on ChatGPT and prompt engineering, and 14,000 participated in six-week bootcamps for 37,000 training hours intuitionlabs.ai. Teams should learn both the *potentials and pitfalls* of AI: how to craft effective prompts, how to verify facts, and what constitutes sensitive data. Provide hands-on workshops and office hours with AI experts. Some orgs require AI certification for managers or role-based AI competence badges.

- **Governance and Guidelines:** Publish internal guidelines on acceptable use. Lilly's CIO succinctly told staff: "Use ChatGPT for work, but *never input anything you don't want to get out*" intuitionlabs.ai. Educate teams about compliance (e.g. "don't feed PHI or proprietary research into public chatbots"). Like Merck's example, ensure that any new AI tool or GPT assistant is approved and secured before use.

- **Embed AI Tools in Daily Work:** Provide easy access to approved AI assistants. Moderna's experience shows that broad adoption follows once tools are made available. After securing an enterprise ChatGPT instance, over **80% of Moderna employees** began using it for daily tasks, turning AI into "extensions of our team" intuitionlabs.ai intuitionlabs.ai. Celebrate early wins (e.g. "AI Sunday" productivity stories), and share metrics on time saved to motivate adoption.

- **Continuous Feedback and Iteration:** Maintain communication channels (Slack, Yammer, regular town halls) for users to report issues and suggest improvements. Indegene notes that "regular feedback loops" and performance reviews help AI initiatives adapt to emerging challenges resources.indegene.com. Quickly address any misinformation or bias flagged by users.

In sum, treat upskilling as a core pillar of your GenAI strategy resources.indegene.com resources.indegene.com. By investing in people (training, AI champions, cross-functional councils) and framing AI as a team effort, organizations can achieve sustained adoption. As one leader put it, building a "culture of AI" is just as important as the technology itself.

## 5. Pilot, Measure ROI, and Scale Up

With use cases selected and teams trained, run **proofs-of-concept (PoCs)** to validate impact. Start small, then expand what works. Indegene observes that leading pharma are moving from isolated pilots into production. For example, pilots in medical writing, literature review and content generation have shown enough value that companies are now scaling these solutions resources.indegene.com.

Key steps:

- **Define Success Metrics:** Before each pilot, set clear KPIs. Metrics might include time saved (e.g. hours per report), error reduction (e.g. QA edits per document), or business outcomes (e.g. enrollment rates, submission speed). Indegene suggests tracking tangible outputs (reduced manual review time, higher compliance scores) to "showcase cost and time savings" resources.indegene.com resources.indegene.com.

- **Ensure Human-in-the-Loop:** Initially use GenAI as a co-pilot. For instance, have writers draft with ChatGPT and then edit, or have scientists vet AI-generated hypotheses. The goal is to build trust: as accuracy is proven, you can gradually automate more. Merck's policy is that *all* AI-drafted clinical reports are reviewed by experts before submission intuitionlabs.ai – a model of cautious scaling.

- **Iterate Quickly:** If a pilot underdelivers, refine the prompt, expand data sources, or adjust the model. Common pitfalls like hallucinations or irrelevant output can often be solved with prompt tuning or adding context. For example, linking ChatGPT to internal documents (GPTeal, AZ ChatGPT) greatly improved result relevance intuitionlabs.ai intuitionlabs.ai.

- **Quantify the Benefit:** Once a pilot yields positive results, quantify ROI and build the business case for rollout. Indegene's ROI framework advises valuing AI by cost savings (e.g. FTEs), speed improvements, quality gains and risk mitigation resources.indegene.com resources.indegene.com. For example, reducing regulatory response time by 80% translates directly to faster approvals resources.indegene.com. Compile case studies internally to demonstrate value to skeptics.

After success, **scale up** by extending the AI tool to other teams or sites. Moderna provides a textbook example: after the "mChat" pilot, they rolled ChatGPT Enterprise and ~750 personalized GPTs out company-wide, covering R&D, manufacturing, legal, and commercial intuitionlabs.ai intuitionlabs.ai. Similarly, Pfizer gradually expanded its "Charlie" marketing assistant across regions once it proved 5x faster content creation intuitionlabs.ai.

Throughout scaling, maintain governance: only certified/trained employees should have access, and audits should ensure compliance. Keep refining the CoE's playbook with lessons learned. Indegene underscores that scaling requires a **value-chain approach** (not fragmented labs) and ongoing alignment of AI investments with workflows resources.indegene.com resources.indegene.com.

## 6. Ethical, Security and Compliance Considerations

In biotech and pharma, rigorous ethics and compliance cannot be an afterthought. Key guidelines include:

- **Data Privacy and Security:** Never expose patient PHI or proprietary IP in public LLMs. Use secured enterprise AI platforms or on-premises models for sensitive tasks (as Merck's GPTeal and Novartis's internal "NovaGPT" do intuitionlabs.ai intuitionlabs.ai). Enforce strong encryption, access controls and no-logging features. Train staff on not including identifiable data in prompts. All AI usage must comply with HIPAA (US), GDPR (EU) and company data policies resources.indegene.com zs.com.

- **Regulatory Guidance:** Stay abreast of evolving rules. The FDA has issued draft guidance on AI/ML in medical products (and is considering GenAI use in submissions) fda.gov. The new EU AI Act (2024) classifies certain healthcare AI as high-risk, requiring stringent documentation of development, testing and post-market monitoring zs.com. In practice, this means keeping thorough records of AI model versions, training data, and validation outcomes – similar to software validation in GxP. Treat key GenAI tools as regulated systems: maintain SOPs for their use, and include AI outputs in audit trails.
- **Accuracy and Reliability:** LLMs can "hallucinate" – producing plausible but false statements. In scientific applications this risk is critical. A JMIR study found ChatGPT's literature search retrieved only ~0.5% relevant studies versus 40% for Bing AI (with a human benchmark of 100%) medinform.jmir.org. Thus, always fact-check AI outputs: verify citations, cross-check facts, and have domain experts edit results. Use LLMs primarily for drafting and ideation, not final content without review. Techniques like prompt engineering to cite sources (or using retrieval) can mitigate hallucination.
- **Bias and Fairness:** AI models trained on past data may reflect historical biases. In patient stratification or discovery, ensure algorithms are evaluated for bias against any group. Incorporate diverse datasets where possible, and include ethicists/clinicians in reviews of AI-driven decisions.
- **Accountability:** Define who is responsible for AI-generated work. For example, even if an AI draft is used, the author of the final document is accountable for its content. Document the human-AI workflow: who prompted, who reviewed, and who approved. This accountability is crucial for regulatory scrutiny and legal compliance.

By proactively addressing these considerations, companies not only avoid pitfalls but can gain a competitive edge. As ZS Consulting notes, complying with the AI Act and similar regs "largely mirror" principles of responsible AI that life sciences companies should follow zs.com. In effect, early adopters who build "safe and reliable" AI pipelines will establish trust with regulators and patients alike.

## 7. Summary Table of Key Use Cases

The table below summarizes representative GenAI use cases by function, with industry examples:

| Function/Dept. | GenAI Applications | Industry Example (Source) |
|---|---|---|
| **R&D/Discovery** | Literature review, knowledge mining, target identification, drug design | AZ's *AZ-ChatGPT* queries in-house data on targets intuitionlabs.ai; protein folding (AlphaFold2) on all-known proteins mckinsey.com |

| Function/Dept. | GenAI Applications | Industry Example (Source) |
|---|---|---|
| **Preclinical/Medical Affairs** | Scientific content (CSRs, reports, medical info, training materials) | Leading pharma used GenAI to draft medical review documents, cutting review time ~60% resources.indegene.com |
| **Clinical Ops** | Protocol/informed consent drafting, patient stratification, report summaries | AI platforms optimized protocols (–40% amendments, +25% enrollment) resources.indegene.com; Lilly used ChatGPT to draft protocols and consents intuitionlabs.ai |
| **Regulatory Affairs** | Submission modules (IND, NDA, CTD), query response drafting, compliance checks | GenAI cut HA response time by ~80% resources.indegene.com; Merck's GPTeal enables safe LLM use to generate first drafts for submissions intuitionlabs.ai |
| **Pharmacovigilance/Safety** | Case report narrative drafting, PSURs, signal detection | Top pharma used GenAI to draft Periodic Safety Update Reports, reducing submission timing >20 days resources.indegene.com |
| **Marketing/Commercial** | Digital content generation, HCP/patient communications, chatbots | Pfizer's "Charlie" GPT drafts ads/emails with built-in compliance flags intuitionlabs.ai; Indegene cites 40% cost savings and 2× speed in localized video content resources.indegene.com |

| Function/Dept. | GenAI Applications | Industry Example (Source) |
|---|---|---|
| **Manufacturing/Quality** | SOP writing, troubleshooting documentation, process optimization | Moderna used GPT assistants in manufacturing to troubleshoot documents; legal teams summarize regs intuitionlabs.ai |
| **HR/Admin** | HR policies, job descriptions, newsletters, internal comms | Novartis "NovaGPT" drafts HR documents and announcements, saving hours on routine writing intuitionlabs.ai intuitionlabs.ai |

This non-exhaustive table illustrates that virtually every life-science function can leverage generative AI in some capacity. Companies should customize this mapping to their specific processes and systems.

## 8. Change Management and Continuous Learning

Finally, recognize that GenAI adoption is an ongoing journey. The technology will continue to evolve (e.g. multimodal agents, fine-tuned domain models), so embed a culture of continuous learning. Encourage R&D/IT teams to pilot emerging tools (e.g. AI code generators for bioinformatics pubmed.ncbi.nlm.nih.gov pubmed.ncbi.nlm.nih.gov) and share findings. Maintain a pulse on regulatory and public sentiment: some early uncertainties remain about AI in regulated settings resources.indegene.com. Engage with external communities (academic, conferences, alliances) to keep skills sharp.

In summary, the path to upskilling and adopting GenAI in life sciences involves **leadership alignment**, **cross-functional governance**, **targeted use cases**, and **rigorous training and ethics practices**. By following a structured roadmap—starting from vision to pilot to scale—organizations can safely harness generative AI's power to accelerate innovation and productivity across R&D, clinical, regulatory, and commercial operations. As one industry report concludes, "the time to move from experimentation to enterprise-scale adoption has arrived" resources.indegene.com, provided companies invest in both technology and people to make AI an enduring part of their workflows.

**Sources:** Industry whitepapers and case studies from Indegene resources.indegene.com resources.indegene.com resources.indegene.com resources.indegene.com, McKinsey reports mckinsey.com, expert blogs (Wipro) wipro.com wipro.com, IntuitionLabs analysis of pharma AI

case studies intuitionlabs.ai intuitionlabs.ai intuitionlabs.ai intuitionlabs.ai intuitionlabs.ai intuitionlabs.ai, and industry news (Applied Clinical Trials appliedclinicaltrialsonline.com, Takeda takeda.com, ZS Consulting zs.com). These sources provide real-world examples and best practices for deploying generative AI in regulated life-science settings.

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