Editorial

Personalised CRISPR in 2025: From "One-Size-Fits-All" to Therapy-for-One Medicine

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The promise of precision medicine has long rested on a deceptively simple idea: treat the patient, not the disease. In 2025, that aspiration has taken a decisive—almost audacious—turn with the emergence of personalised CRISPR therapies. For decades, pharmacotherapy has pursued standardisation; now, genome editing seems intent on making every treatment a limited edition—occasionally, a single copy.

CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats)-based genome editing has evolved from a laboratory innovation into a clinically relevant therapeutic platform. What distinguishes recent developments is not merely improved accuracy or efficiency, but the shift toward **patient-specific interventions**, often described as "therapy-for-one." This transition has profound implications not only for clinical medicine but also for community pharmacy practice, where accessibility, cost, and ethical considerations intersect[1].

A Landmark Year for Personalised CRISPR

The year 2025 will likely be remembered as the moment personalised CRISPR crossed from theoretical ambition to clinical reality. A landmark case involved an infant with carbamoyl phosphate synthetase 1 (CPS1) deficiency who received a **fully customized CRISPR-based therapy designed, validated, and administered within six months**. The treatment successfully corrected the patient-specific mutation and demonstrated clinical improvement. If speed is the hallmark of modern medicine, then designing a bespoke genomic therapy faster than most hospital procurement cycles is either a triumph—or a gentle indictment of the systems around it. This case exemplifies the feasibility of **rapid, individualized gene-editing pipelines**, suggesting that CRISPR can function as a modular platform adaptable to rare and ultra-rare diseases. Importantly, such approaches challenge the traditional drug development paradigm, which relies on large patient populations and standardized formulations.

Technological Advances Driving Personalisation[2]

Recent developments in CRISPR technology have made personalization more practical, if not yet routine:

- **Base editing and prime editing** now enable precise nucleotide changes without double-stranded DNA breaks, improving safety profiles
- **Lipid nanoparticle (LNP) delivery systems** allow non-viral, targeted in vivo editing, particularly in hepatic diseases
- **Artificial intelligence (AI)-assisted guide RNA design** enhances specificity and reduces off-target effects, addressing one of CRISPR's most persistent limitations[3] .

Together, these advances suggest that the technology is evolving not just toward precision, but toward **predictability**—a quality that regulators and clinicians have been quietly demanding all along.

Expanding Clinical Applications

While early CRISPR therapies focused on relatively common genetic disorders such as sickle cell disease, personalised CRISPR is redefining therapeutic scope:

- **Rare genetic disorders**: Custom therapies targeting unique mutations are now feasible, particularly for metabolic and neuromuscular diseases[4]
- **Oncology**: Personalised CRISPR strategies are being used to engineer immune cells and modulate tumor microenvironments[5]
- **Infectious diseases**: CRISPR systems are being explored to selectively eliminate viral genomes, including HIV)

In theory, this breadth of application suggests universality. In practice, it highlights a paradox: the more individualized therapies become, the harder it is to generalize their implementation.

Implications for Community Pharmacy

For community pharmacy, personalised CRISPR introduces both opportunity and disruption:

- **Shift from dispensing to coordination**: Pharmacists may increasingly act as intermediaries in complex biologic and gene therapy supply chains
- **Patient counselling**: Genetic literacy will become essential, as patients require guidance on benefits, risks, and long-term monitoring
- **Pharmacovigilance**: Monitoring gene-editing outcomes—including delayed adverse effects—will demand new frameworks

One might say the pharmacist of the future will dispense fewer tablets and more explanations—an evolution that is either deeply rewarding or quietly exhausting.

Challenges: Precision Meets Reality

Despite remarkable progress, personalised CRISPR faces significant barriers:

- **Cost and scalability**: Custom therapies remain prohibitively expensive and difficult to mass-produce
- **Regulatory complexity**: Traditional approval pathways are ill-suited for individualized treatments
- **Safety concerns**: Off-target effects and immune responses remain critical risks
- **Ethical considerations**: Questions around equity, access, and potential misuse persist

Even as science advances at genomic speed, policy and infrastructure appear committed to a more reflective pace[6].

The Road Ahead

The trajectory of personalised CRISPR suggests a future where therapies are not only targeted but **bespoke**—designed for individuals rather than populations. Integration with AI, advanced delivery systems, and real-time genomic diagnostics will likely accelerate this transition.

However, the success of personalised CRISPR will ultimately depend on its translation beyond specialized centers into broader healthcare systems. For community pharmacy, this means adapting to a model where medicines may no longer arrive in bulk shipments, but as individualized interventions with unprecedented specificity[7].

Conclusion

Personalised CRISPR in 2025 represents both a scientific breakthrough and a systemic challenge. It has transformed the concept of treatment from standardized protocols to individualized genetic correction. Precision medicine, it seems, has finally become personal. Whether it becomes practical is the next question—one that community healthcare systems must now prepare to answer.

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