Evolution of technology transfers – autologous Cell Therapy

Speaker intro

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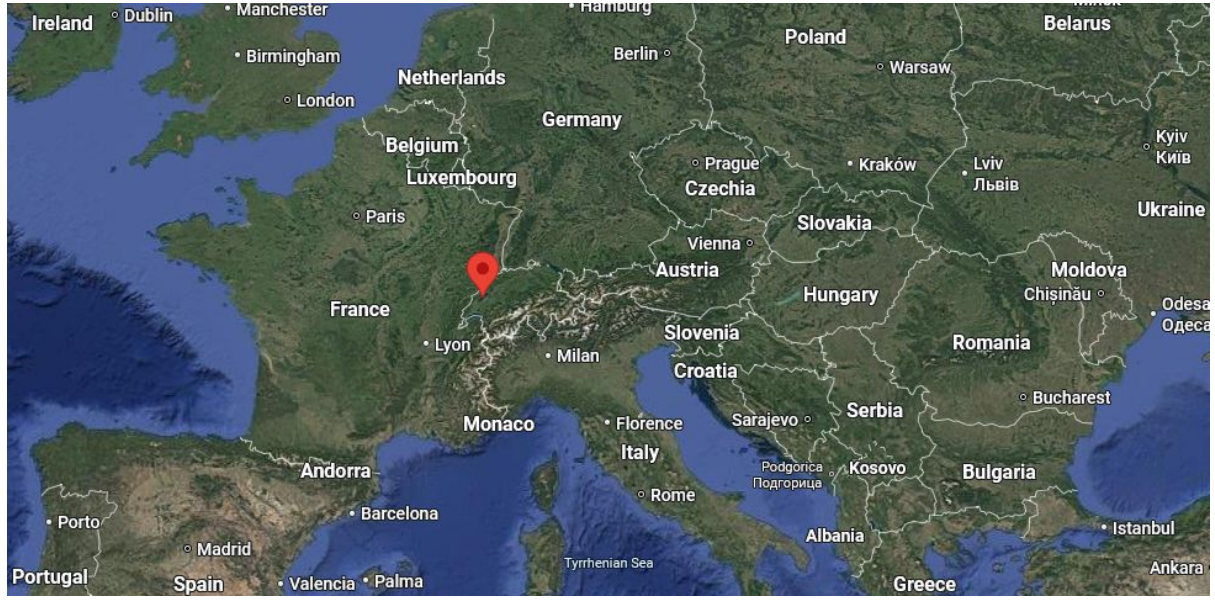

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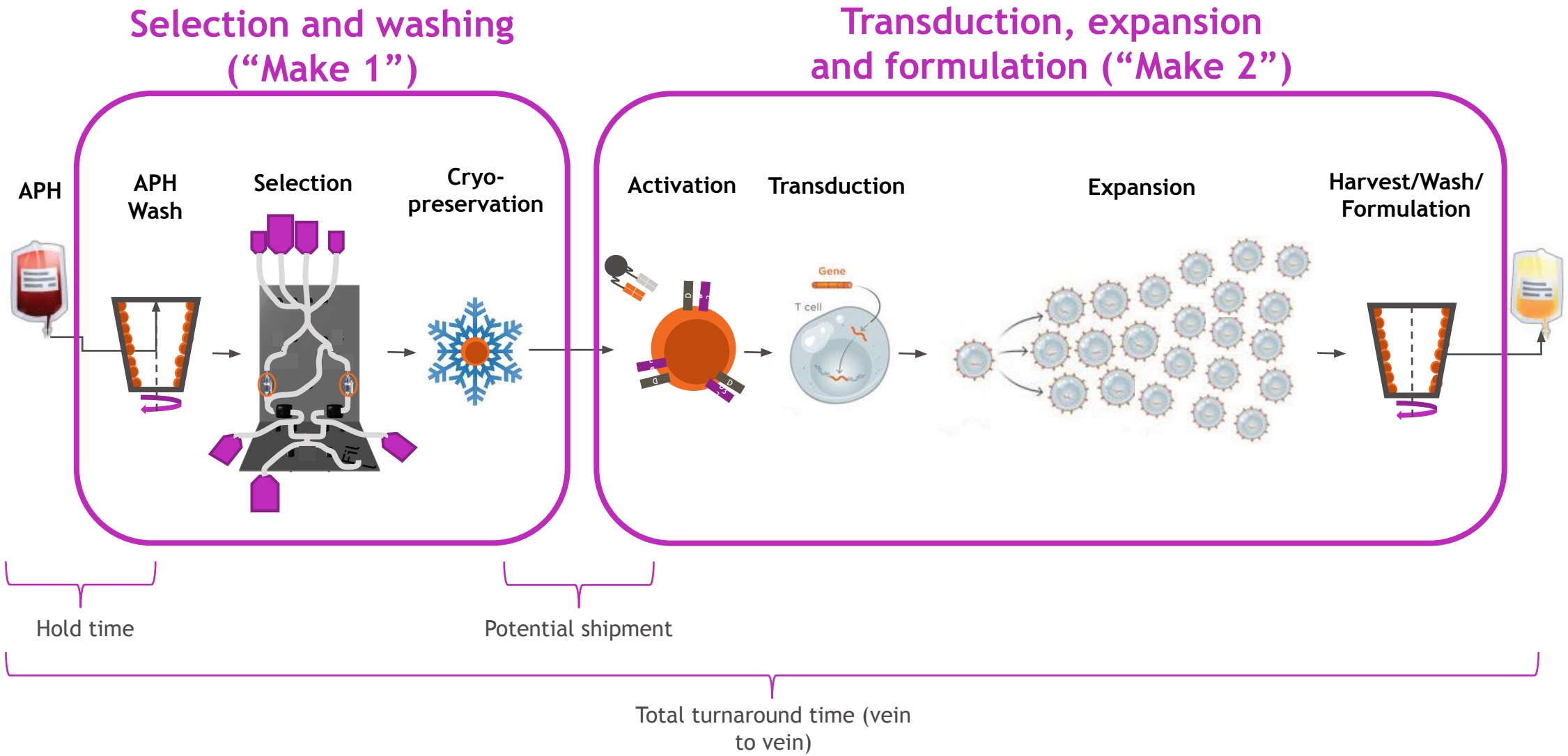
Typical autologous CAR-T product flow

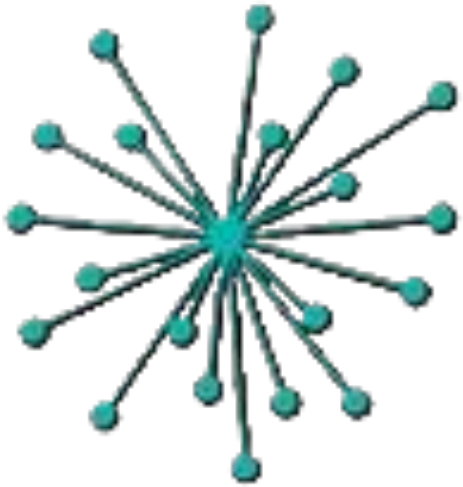


Autologous cell therapy manufacturing comes with network-related constraints – a few examples:

- Apheresis (starting material) shelf-life adds logistics constraints (flight duration, customs clearance etc.)
- Make-to-order => no possibility to store product, no safety stock
- Product is the patient's material – the patient is in our hands – failure is (almost) not an option
- Capacity flexibility / elasticity is a key factor (ability to adapt to fluctuating demand)
- Turnaround time is of paramount importance (patient health)
- New modality with few commercial players => limited CDMOs with commercial experience
- Minimum commercially viable volume creates challenges for small and remote populations
- And many more…

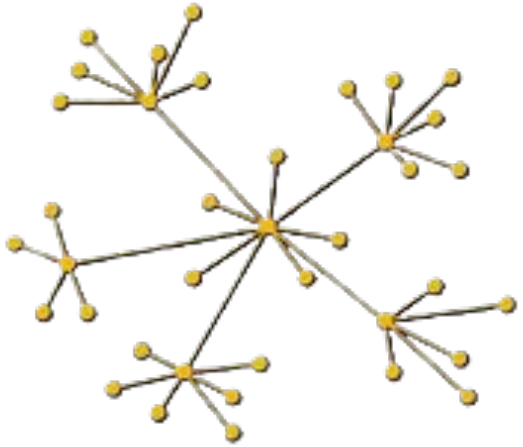
All models except centralized rely on efficient technology transfers

Centralized



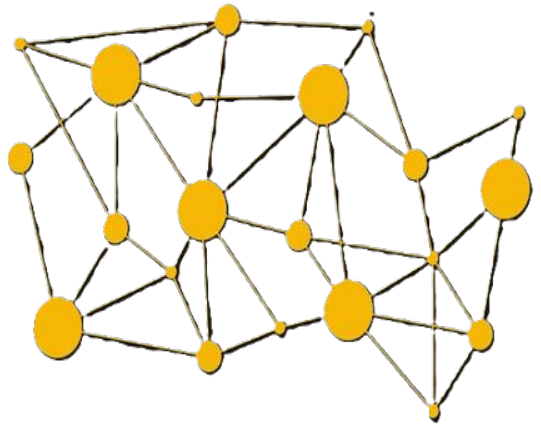
(+) Capacity management
(+) Fewer technology transfers
(-) Limited geographical reach due to cell shelf-life
(-) or Need for cryopreservation at collection sites

(Semi-) decentralized



(+) Efficient cell logistics
(+) Wide geographical reach
(-) Challenges in regulatory and quality management
(-) Highest number of tech transfers
(-) Complex materials logistics

(Semi-) Distributed



(+/-) 80/20 geographical reach
(+/-) Regional manufacturing
(+/-) Requires tech transfers

What comes first to mind when thinking of a tech transfer?

Technical aspects

Process / technical transfer

Analytical methods

Quality

In-process / QC / specifications

Release process

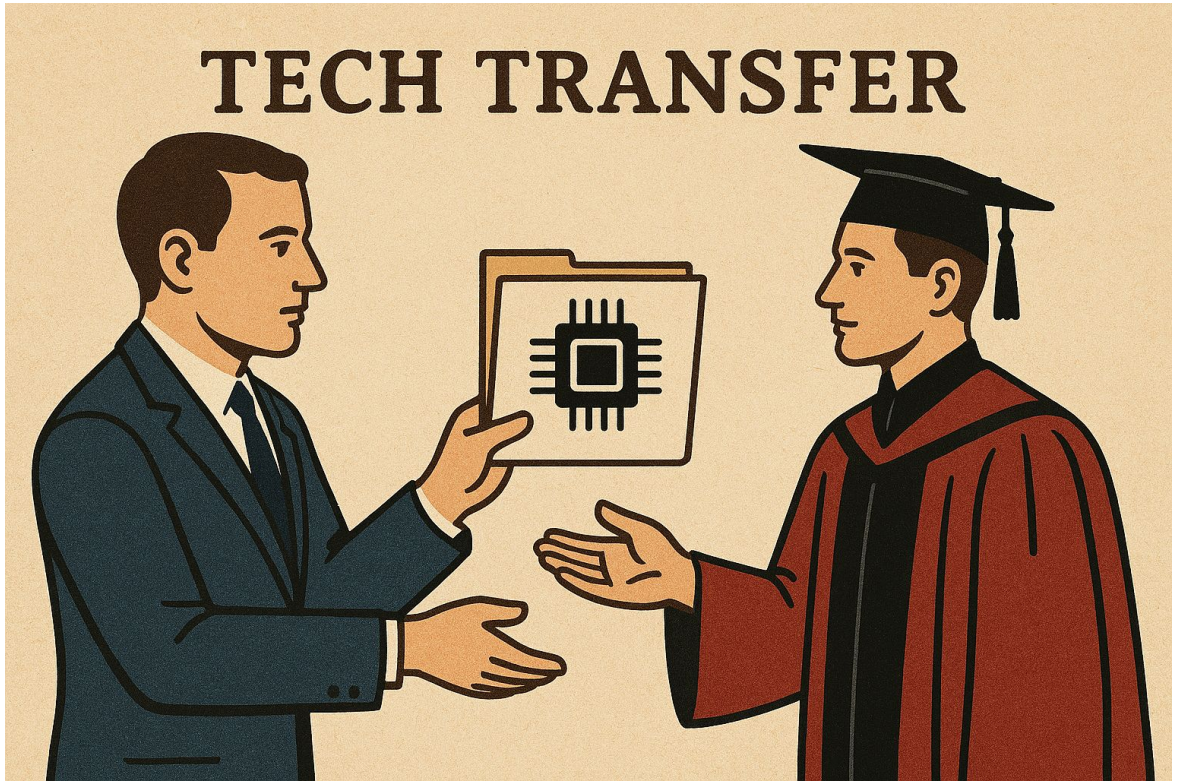
Regulatory / CMC

Facility, CMC / PPQ / comparability

Some supply chain aspects

Materials

Shipping



MS Copilot's vision of a tech transfer - looks a bit outdated

What keeps me up at night during tech transfers – not process or analytical method transfers

Ability to run large volumes from launch and to ramp up

PPQ / comparability runs do not demonstrate ability to scale up (or out)
Complexity of managing many lots per day
Ramp-up frequency and speed is key to supply and cost of goods
Hiring and training

Ability to deliver / release rapidly

Failure is not an option – we process patient's material
No time for lengthy investigations, patient is waiting
Ability / competence to deal with issues on the spot

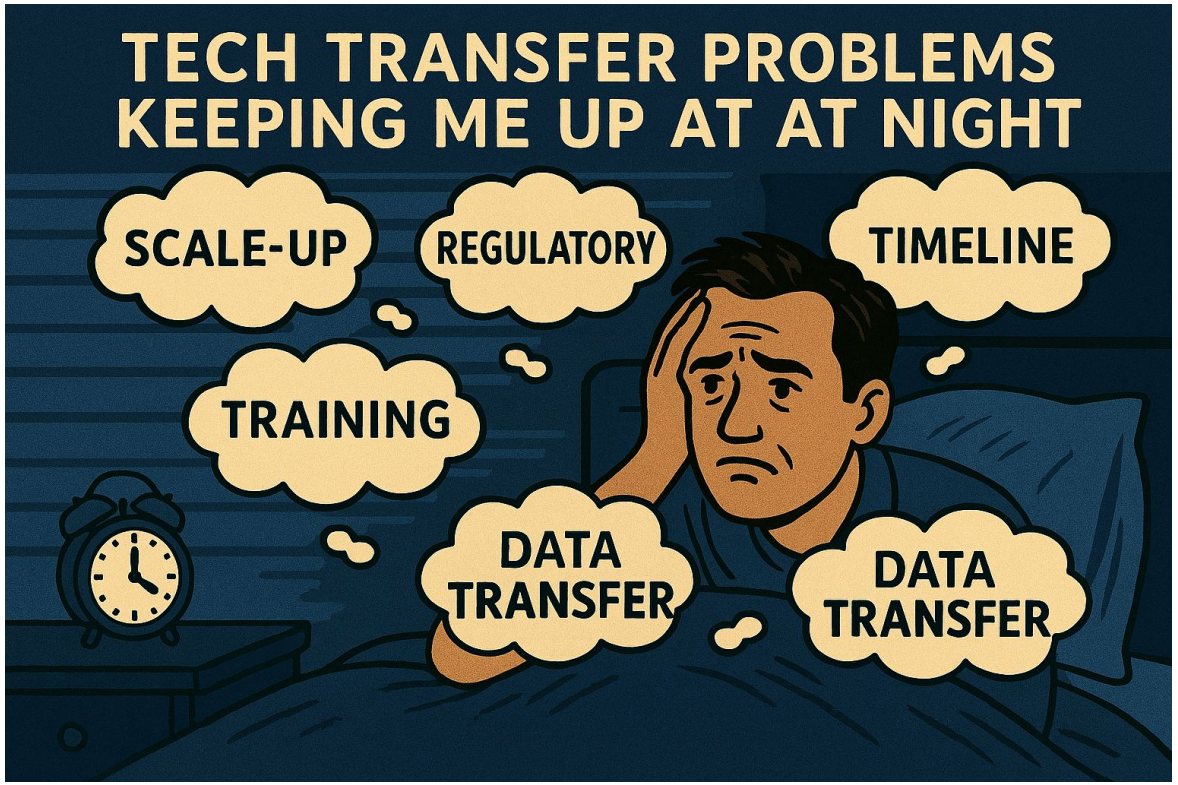
Compatibility between different sites

Hospital to different "Make 1" sites (network capacity and resilience)
"Make 1" site to different "Make 2" sites (network capacity and resilience)

Real-life cost of goods (versus info in request for proposal)

Complexity higher than anticipated, particularly support functions
"Optimistic" CMO responses
Materials in-country availability and cost

Project timelines and cost (well, not very original…)



What Copilot thinks is keeping me up at night - partially right

Make-to-order model drives volume and time pressure

Make to order shifts the need for collaboration between companies

High transaction volume: one patient = one or several batches;

Manufacturing progression communicated to treatment centres;

Timeliness of information, impact to scheduling and patient treatment;

Digital platforms and data collaboration tools required for scale out and control cost;

Key processes requiring integration and data exchange (examples)

Patient-centric system: scheduling, chain of identity, lot identifiers, manufacturing / testing tracking, logistics, apheresis collection and with treatment centers

ERP: purchase orders, invoices, batch/PO info, shipment info, materials consumption etc.

Quality management and batch disposition: EBRs, change controls, deviations, QC/LIMS

Analytics: process and analytical data, CPV, expanded analysis

Off-the-shelf collaboration software not always fitting Cell Therapy full scope

Expanded capabilities needed to exchange patient status data and manufacturing status

Increased focus on operational workflow automation via collaboration software

Inconsistent software depending on manufacturing sites (internal vs CMO)

(Partially-) distributed model requires cross-site alignment

Consistent Data, synchronization and compatibility

Complex logistics as products circulate from site to site…
… and so do data.
Different sites use different software.
Product and data compatibility and synchronization are a must.

Standardize processes or standardize touch points?

Standardizing processes simplifies product and data circulation but complexifies change and may “jam” operational excellence initiatives.
Touch-points standardization is a minimum denominator.
Alignment between alternative manufacturing sites (distributed model).

System Integrity and Reliability

(Patient) chain of identity is not negotiable: direct patient safety impact.
Same for data integrity.
Timeliness is key for personalized medicine.

So, what are the rising focus areas?

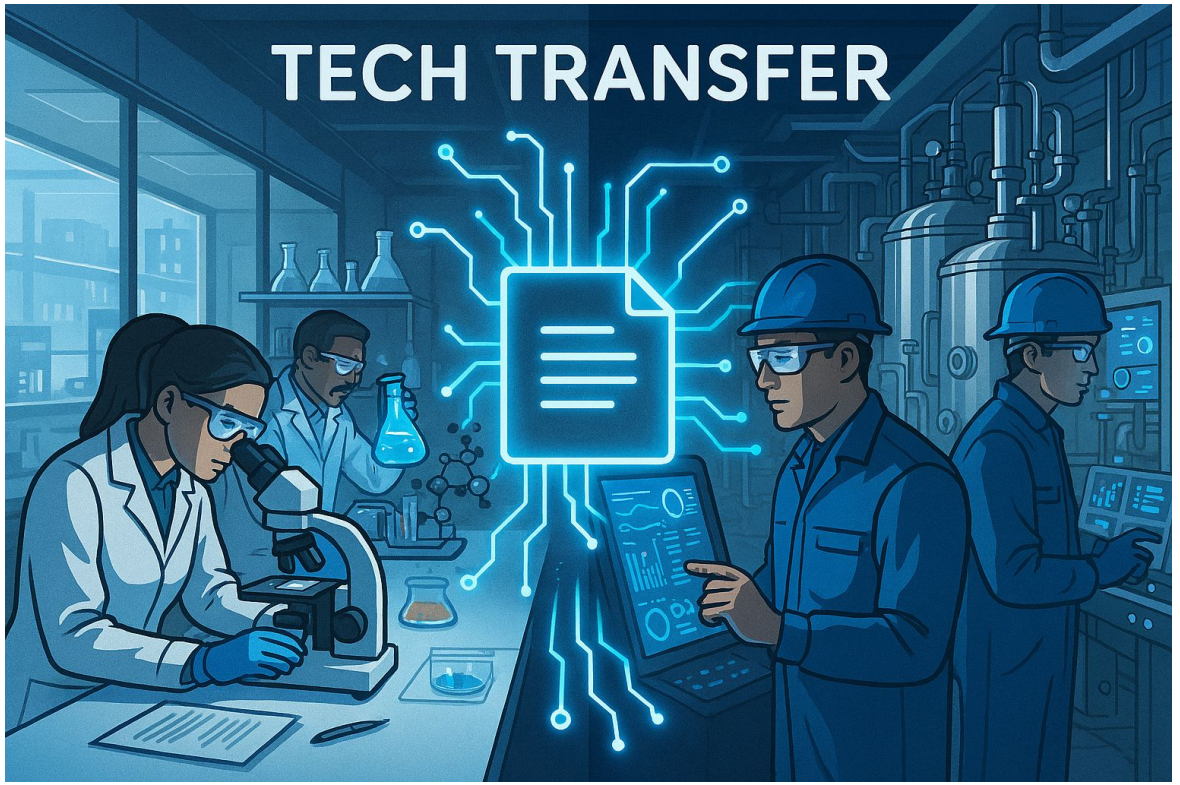
Business processes, business processes, business processes…
Connect the different workstreams
Enable seamless touch-points, physical (product) and data
Enable ability to deal with complexity of managing many lots per day
Enable ramp-up speed and frequency
Anticipate deviations including material review boards

Standardization and digitalization
Automation and interfacing releases time for issues and improvements
Standardization (where it makes sense) simplifies cross-site connections

People
Whatever the process, human performance plays a role
Hire ahead of due dates and go-live, train at sending site, maintain training
Use sending site experienced / best employees, send them on (receiving) site

Simulation, pilot, ramps
Perform early clinical/commercial readiness runs, learn the lessons
Pilot and study your capacity runs

Cross-functional project governance (well, not very original…)



Digital helps focusing on early business processes definition, standardization and continued cross-functional alignment

Early business process alignment

Digital solutions require prior definition of business processes, early in the tech transfer process lifecycle.

Interoperability and compatibility between sites is a key constraint.

Collaborative planning and innovation

Early and continued cross-functional collaborative planning required since digital solutions span through most workstreams (ex.: scheduling -> manufacturing status -> QA -> logistics -> treatment center info -> invoicing etc.)

Operational excellence data, process performance, reporting (e.g., CPV)

Inclusion of digital strategies in most workstreams

Incorporating digital strategies from the start required for constant alignment between business requirements and digital / IT constraints.

Tech transfer governance plays an even greater role

Structured tiered governance is key

Clear workstreams with leader, project manager and functional sponsor each

Clear overall project leader, project manager and sponsor

In-house and joint (with CMO) planned and structured touch-points

Enforce meetings, attendance, scope (and out of scope)

Practice, simulate, ramp up

Clinical / commercial readiness simulation to identify interface / touch-point issues

Ramp-up studies to verify business / quality processes

Anticipate hiring and training (but impact to cost)

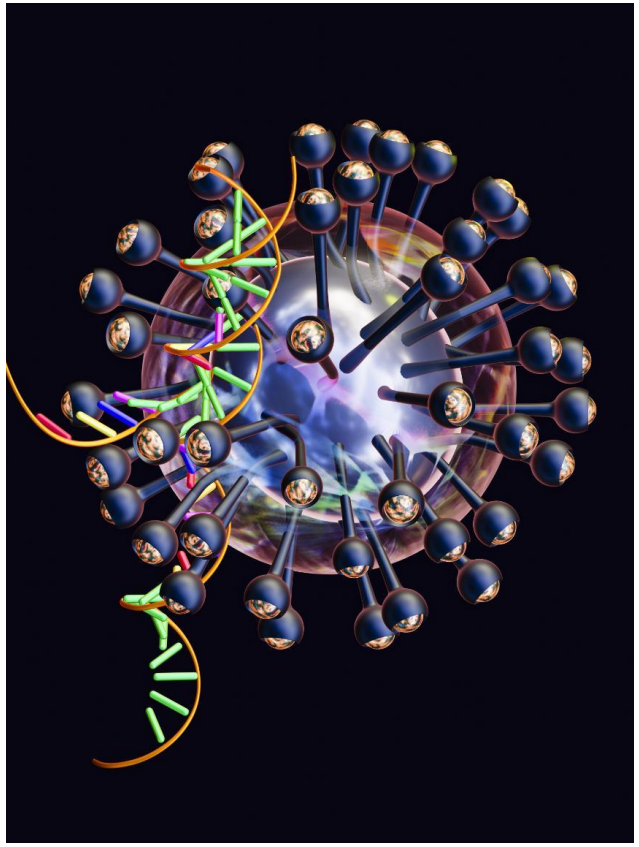
On-site presence of the right staff

(Too) remote rarely works.

Staff your transfer team with people who have experience in execution. Details, tips and tricks go a long way for successful execution and to prevent issues.

And protect the team through a specific project budget!

Conclusion & key takeaways



Successful Tech Transfers in Autologous Cell Therapy Require More Than Technical Excellence

Early and ongoing business process definition, standardization, and alignment are critical to manage complexity at scale.

Digital integration must be prioritized from the start to ensure interoperability, automate workflows, and enable real-time data exchange.

Effective governance is essential—structured, tiered project oversight, clear leadership, and disciplined collaboration with partners drive execution and readiness.

People remain at the heart of success: invest in experienced teams, robust training, and simulation to anticipate and resolve challenges.

Rigorous and disciplined cross-functional governance required, anticipating and simulating real-life conditions.

Thank you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