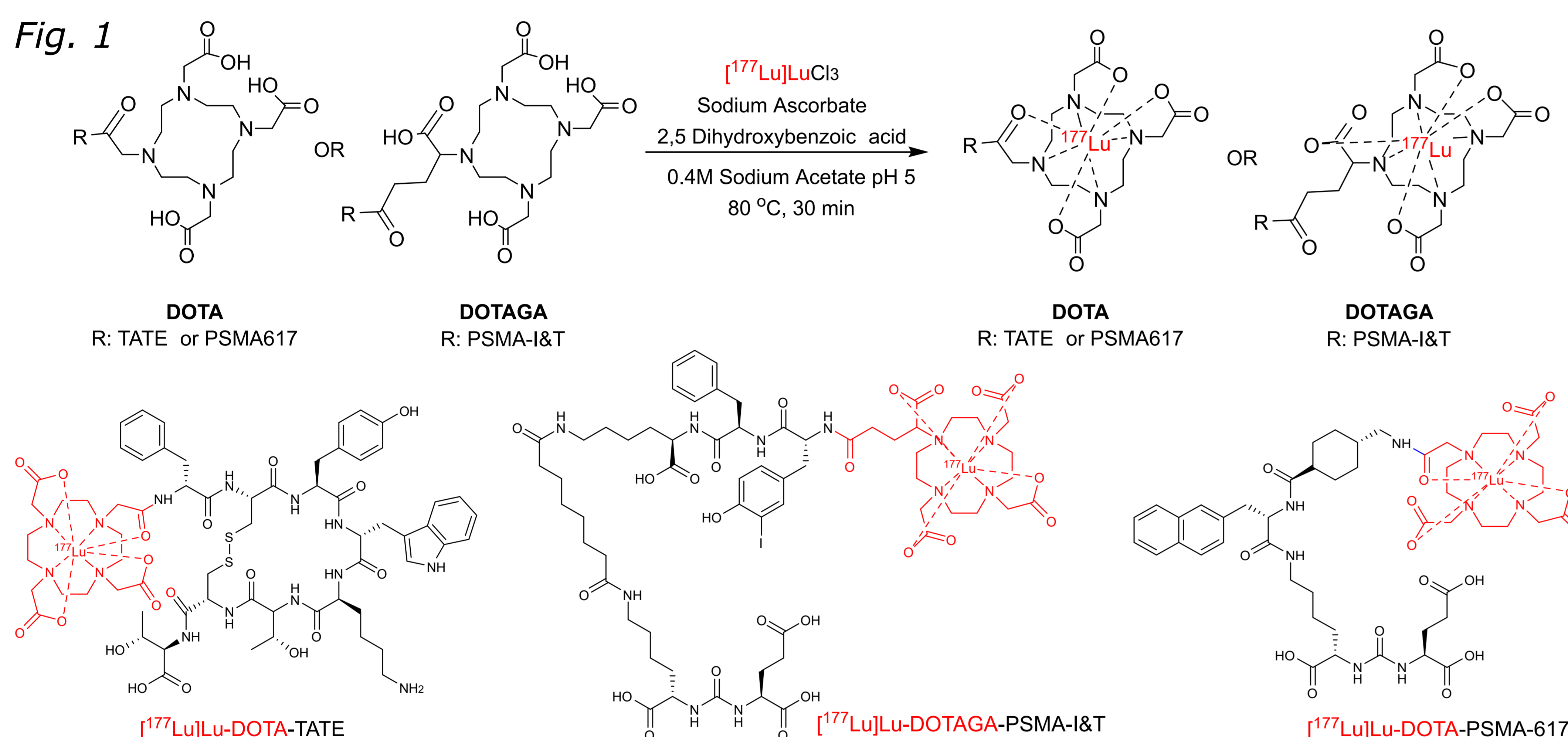


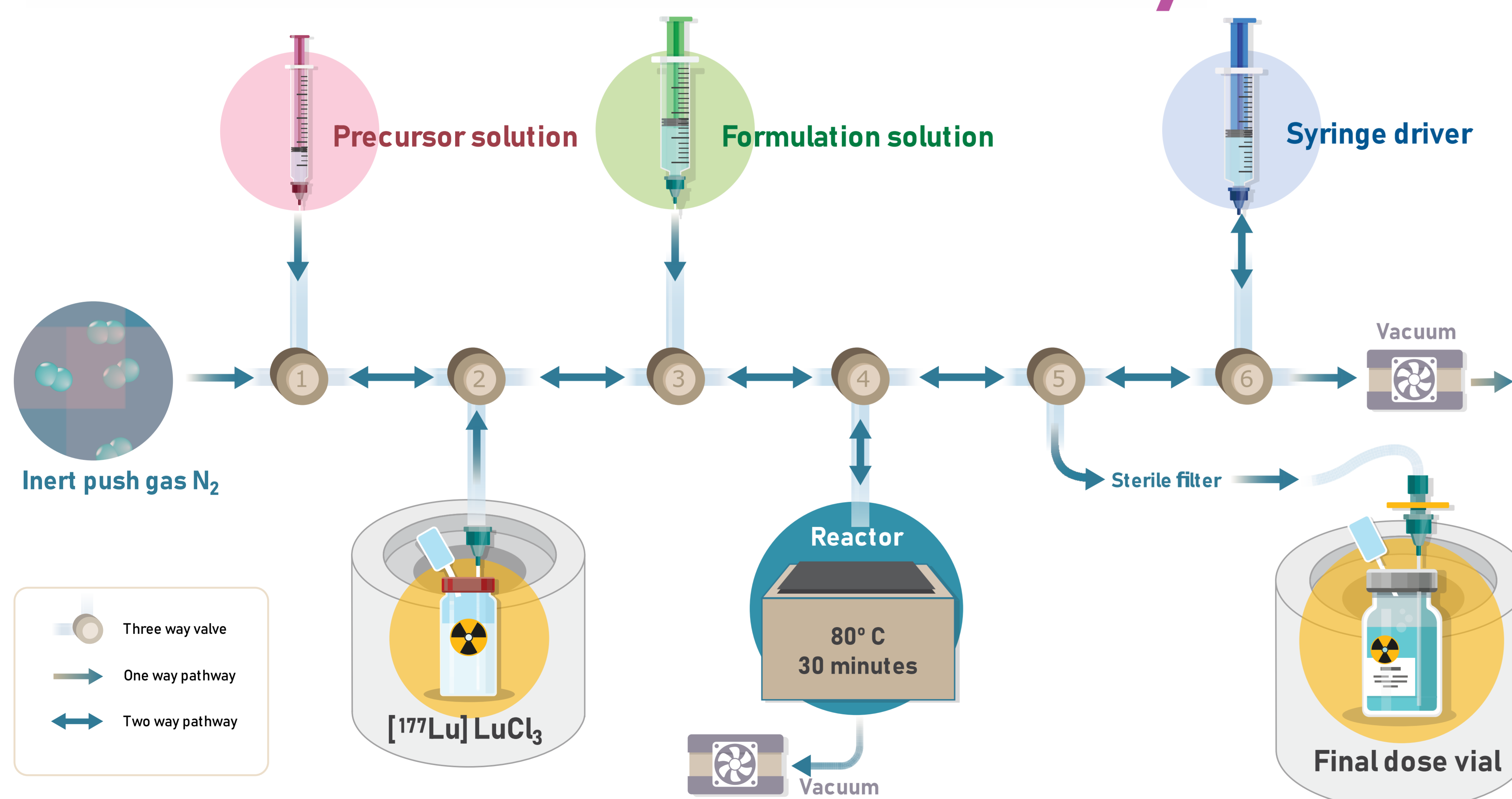
Overview

- Theranostics combines diagnostic and therapeutic agents with identical molecular targeting.
- Therapeutic component uses same targeting molecule with destructive radionuclide (¹⁷⁷Lu]lutetium, β⁻ emitter).
- Our clinic uses (fig. 1):
 - [¹⁷⁷Lu]Lu-DOTA-TATE for neuroendocrine tumors
 - [¹⁷⁷Lu]Lu-PSMA-I&T / [¹⁷⁷Lu]Lu-PSMA-617 for prostate cancer
- Demand surged with 1000+ patient treatments in 2024.
- Shifted from manual to automated production for DOTA/DOTAGA conjugated peptides.

Reaction Scheme

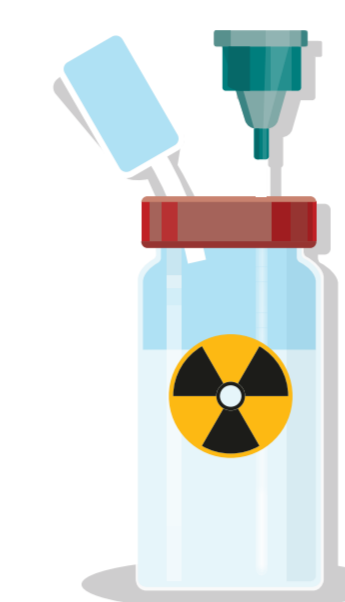


Generalized Cassette Assembly



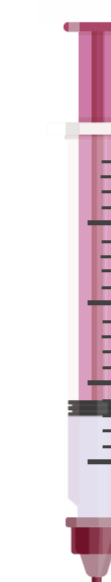
>95% Radiochemical yield	>90% (HPLC) >98% (TLC) Radiochemical purity	100 GBq Max Production Activity of [¹⁷⁷ Lu]LuCl ₃	Compatible with: NCA & CA Lu-177 DOTA/DOTAGA conjugated peptides	>8 h Stability	>1000 cycles administered into patients in 2024	>10 Clinical trials
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Lu-177 source



This protocol accommodates the use of either non carrier or carrier added sources of Lu-177 from different suppliers (ANSTO, Isotopia, ITM, IDB). This Protocol is compatible with activities from 5 GBq to 100 Gbq.

Prepared Solutions



Precursor solution contains:

- DOTA/DOTAGA conjugated peptide (15 µg/GBq for non-carrier added vs 25 µg/GBq for carrier added ¹⁷⁷Lu)
- 2,5-dihydroxybenzoic acid (4 mg)
- Sodium L-ascorbate (20 mg)
- Sodium acetate buffer (0.4M, pH 5.0; 1 ml)



Formulation solution contains:

- Sodium L-Ascorbate (480 mg)
- Water for injection (9.9 ml)
- DTPA solution (1 ml of 1 mg/ml solution)

Automation

1. Transfer [¹⁷⁷Lu]LuCl₃ from the source vial to the reactor using reactor vacuum.
 2. Rinse the [¹⁷⁷Lu]LuCl₃ vial with a portion of the precursor solution using the syringe driver.
 3. Transfer rinse contents from the [¹⁷⁷Lu]LuCl₃ vial to the reactor via vacuum.
 4. Deliver the remaining precursor solution to the reactor using the syringe driver, followed by a nitrogen push to clear residuals.
 5. Heat the reactor contents to 80°C for 30 minutes to enable chelation.
 6. Quench the reaction with a portion of the formulation solution using the syringe driver.
 7. Transfer the mixture to the final formulation vial via syringe driver.
 8. Rinse the reactor twice with formulation solution, sending each rinse to the final vial, using the syringe driver.
- For more specific detail please refer to our protocol. ¹

Results

N => 500 batches

Quality indicator	Acceptance Criterion	Results
Activity	≤105 GBq	5-100 GBq
Appearance	Clear and colorless (slightly yellow)	Conform
pH	4-8	Conform
TLC radiochemical purity	>98%	>99%
HPLC Radiochemical identity	±1 min of reference standard	Conform
HPLC radiochemical purity	>90%	>94%
Filter integrity test	>50 psi	Pass
Sterility	Sterile	No growth
Bacterial Endotoxins	≤17.5 EU/mL	Conform