Physicochemical stability of vancomycin hydrochloride solutions in elastomeric devices at 37.5 mg/mL in 0.9% sodium chloride and dextrose 5% in water

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Introduction
In some severe infections, the dose of vancomycin may be 60 mg/kg/day. To allow a home care service and a better quality of life for the patient after hospitalization, administration of concentrated vancomycin solutions in elastomeric devices should be considered.

Stability of concentrated vancomycin solutions in 0.9% NaCl and D5W in elastomeric devices is unknown.

Objective
To study the stability of vancomycin solutions at 37.5 mg/mL diluted in 0.9% NaCl and in D5W, stored in elastomeric devices, protected from light, at 37°C after a 48-hour storage.

Materials and Method

1. RP-HPLC with DAD detector at 220 nm
   - Column: C18 LiChrospher® 12.5 cm, Ø = 4 mm, particle size = 5 µm at 30°C
   - Mobile phase: 92% of phase A and 8% of acetonitrile

   Phase A: Monopotassium phosphate (KH₂PO₄) buffer at 0.1 M, adjusted at pH 3.5 with orthophosphoric acid 85%
   - Flow rate at 1.5 mL/min
   - Injection volume: 10 µL

2. Validation of the method as recommended by ICH Q2(R1)
   - Forced degradation
     - Acidic degradation
     - Alkaline degradation
     - Heat degradation
   - Linearity: standard curve with 5 points: 50-150 µg/mL
   - Repeatability and intermediate precision: 3-point measurement (50, 100, 150 µg/mL)

3. pH measurements (Bioblock Scientific pH meter)
   - Analysis times: 0, 24 and 48 hours

Results

1. Validation of the method: RP-HPLC method
   - Linearity: R² > 0.999
   - Repeatability: [0.03 % - 1.65 %], Intermediate precision: [1.70 % - 2.48 %]
   - Retention time of vancomycin: 6.40 min

2. Stability indicating capacity
   - Chromatogram of 100 µg/mL vancomycin without stressed conditions.
   - Chromatogram of 100 µg/mL vancomycin after alkaline stressed conditions (NaOH 1.0 M, 1h) with degradation products.

3. HPLC Results
   - 0.9% NaCl
   - Chromatograms of solutions 37.5 mg/mL vancomycin in 0.9% NaCl after preparation (A) and after 48 hours (B) with degradation products.

4. pH measurement: no modification
   - Sub-visual aspect: no significant difference
   - Visual aspect: No colour change was observed

Conclusion
Vancomycin solutions at 37.5 mg/mL in 0.9% NaCl and D5W in elastomeric devices at 37°C, protected from light, are stable for 48 hours.