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Determination of vancomycin in human plasma, bone and fat by liquid chromatography/tandem mass spectrometry

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A liquid chromatography/tandem mass spectrometry (LC-MS/MS) assay was developed for the determination of vancomycin in human plasma, bone and fat tissue. For vancomycin in plasma, sample was treated with methanol to precipitate the proteins. After centrifugation, the supernatant was diluted with water, and then injected into the LC-MS/MS system. For vancomycin in bone and fat, the pulverized bone/fat samples were immersed in phosphate buffered saline pH 7.3 at 4°C overnight. After centrifugation, the supernatant of bone/fat tissue suspension was treated in the same way as the plasma samples. Vancomycin and aminopterin, the internal standard, were resolved on a C18(2) column using gradient elution of 0.05% formic acid and methanol. The two compounds were detected using electrospray ionisation in the positive mode. Standard curves were linear over the concentration range 0.05 to 50 mg/L ($r^2 > 0.99$) in plasma, bone and fat. Bias was $\leq \pm 10\%$ from 0.05 to 50 mg/L, intra- and inter-day coefficients of variation (imprecision) were $< 10\%$, and the limit of quantification was 0.05 mg/L. The assay has been used successfully in a clinical study to investigate the regional delivery of vancomycin in bone and fat after prophylactic administration of vancomycin through intraosseous route or systemic route, during total knee arthroplasty.

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