Binding of Amoxicillin to Haemoglobin

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Haemoglobin is responsible for transporting oxygen throughout the body. Because of the enormous molecular weight and the structure of haemoglobin, there could be a possibility that the drug will not be reversibly released from the Hemoglobin molecule once bound. Because of its size, such a Hemoglobin bound drug will form a complex that will be unable to diffuse through blood arteries. As a result, the free concentration of the drug may be affected. The goal of this study is to determine the Amoxicillin binding capacity to Hemoglobin and to predict the free drug availability for pharmacological action. Equal volumes of amoxicillin (0.8 mg/mL) and Hemoglobin (4 mg/mL) in pH 7.4 buffer were mixed and incubated at 37 °C for 1,2,3 and 6 hours. 1 ml of the incubated reaction mixture was dialyzed (14-12 kDa) against pH 7.4 buffer solution for three hours. The concentration of Amoxicillin in the dialysate was measured using High-Performance Liquid Chromatography. The concentration of amoxicillin in the dialysate was constant from 1 to 6 hours, indicating that the amount of amoxicillin bound to the Hemoglobin was maximum at 1 hour and was a constant throughout. Since the initial drug concentration was sufficient to saturate the Hemoglobin, the ratio of the bound drug to the unbound drug was 1: 13. Further computations of the moles of bound drug and initial mols of haemoglobin revealed that two Amoxicillin molecules were bound to one Hemoglobin molecule confirming that Hemoglobin has two binding sites for amoxicillin.

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