

# Nalytical analysis of anti-depressants in human plasma using liquid-liquid chroma...

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Antidepressants are drugs used for treating patients diagnosed with depression. Most antidepressants function by inhibiting the action of neurotransmitters using a range of mechanisms that target intermediate compounds. Antidepressants are usually categorized on the basis of their chemical structure and an example of drugs in this group is the tricyclic antidepressants. Anti-depressants can also be categorized on the basis of their function and an example of drugs in this group is the monoamine oxidase inhibitors. Recently a new method of categorizing antidepressants has attracted significant interest. The method is the grouping of antidepressants on the basis of their pharmacological function. Most antidepressants show optimal function within a given plasma concentration range (Koteel 92). Measuring of the serum concentrations of antidepressants is therefore important to ensure that physicians are able to administer the correct dosage for the treatment of depression (Pokar M. Kabra 83). For instance the plasma concentration of tricyclic antidepressants range between 20 to 200 $\mu$ / L. Liquid-liquid chromatography is a method that has been used to measure the plasma concentration of both the antidepressants and the resulting metabolites. Liquid-liquid chromatography is basically used in the extraction and analysis of antidepressants. The process involves the extraction of the drugs in neutral forms to ensure that the pH does not alter the chemical composition and structure of the drugs. The extraction involves the use of an appropriate solvent that will solvate the drug from the plasma. Liquid-Liquid chromatography is a technique within chromatography where both the mobile and the stationary phases are liquid. The liquids used in the two phases must be immiscible. The experiment will outline the analysis of

tricyclic antidepressants from the serum. The first step is to separate the drugs from the serum sample. The extraction process involves the prior treatment of the sample to facilitate the extraction. The prior treatment is important to ensure that the drugs are isolated effectively and that they are concentrated to facilitate further analysis of the sample. Usually two approaches can be used to facilitate the extraction and concentration of the sample. The experiment will utilize the liquid-liquid approach. The first step in this approach is to ensure that an appropriate pH is determined and the pH of the organic phase has been determined. The appropriate pH will be determined by looking at the pK of the specific tricyclic drugs being used in the experiment. Most tricyclic antidepressants have very close Pk values and therefore it will be important to ensure that only a single drug is present in the serum at a given time. The tricyclic antidepressants that will be used in the experiment include; Amitriptyline, Clomipramine, and Trimipramine. These drugs have Pk values of 9.4 each. The general realization is that the tricyclic drugs used in the experiment will be fully protonated at pH 3. Therefore, the appropriate pH that will be used during the extraction will be a pH of 9.4 for each of the drugs. During liquid-liquid extraction the realization is that polar drugs are usually screened by the polar solvents. The solvent that will be used for the extraction in this case will be ether. According to (Hughes 187), ether is the most preferred solvent for use in the extraction of antidepressants from serum for further analysis. The separation was also facilitated using ammonium sulphate. The experiment used 2.0ml of serum. The buffer used in the experiment was ammonium chloride of pH 9.5. The sample was then shaken with the

reagents and then centrifuged for a few minutes. The separation of the organic and the mobile layers was achieved through the use of a freezer. The organic layer was then removed through evaporation and then the solution was placed in the mobile phase for elution. The extraction method used led to the realization of 87% of the three tricyclic antidepressants from the serum. The flow rate of the drugs in the mobile phase was recorded at 1.8 ml per minute. An absorbance of 24nm was used to ensure the characterization of the drugs after separation. During the procedure the excess serum was removed by washing the columns used for elution of the drugs. The general realization is that liquid-liquid chromatography is an effective technique for the extraction and separation of tricyclic antidepressants for further analysis. The extraction rate recorded was 87% which provides a substantial amount of the drugs for further analysis. Therefore, the method is fairly good for the extraction of the drugs for analysis. The separation and extraction of antidepressants is important because it allows physicians to establish the optimal quantities that should be administered to patients for effective treatment. The serum quantities of tricyclic drugs is also important because it allows physicians to study the pharmacological characteristics of the drugs. After extraction other methods such as can be used to further analyze and characterize the antidepressants. The major challenge that was encountered during the experiment was that the pK values of the antidepressants were similar and it was therefore difficult to extract all of them at once. Works Cited Hughes, Rosemary J. " Comparison of Methods for the Analysis of Tricyclic Antidepressants in Small Whole Blood Samples." *Journal of Analytical Toxicology* (2007): 77-83. Koteel, P. " Sample preparation and

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