Assessment of the stability of 30 antipsychotic drugs in stored blood specimens

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The stability of 30 common antipsychotics (APs) in spiked whole blood was investigated over ten weeks in a preliminary experiment (designated "P experiment"). Pools of blank blood spiked with drugs at two different therapeutic levels were stored at four different temperatures: 20 °C, 4 °C, -20 °C, and -60 °C and extracted once weekly in duplicate, using a previously published method. A loss of >15% of the initial drug concentration was considered to indicate possible instability and the respective drugs were selected for further investigation in a final experiment (designated "F experiment"). Eight APs (chlorpromazine, chlorprothixene, fluspirilene, droperidol, olanzapine, thioridazine, triflupromazine, and ziprasidone) were incorporated into the F experiment. The same conditions were used in both experiments, however only a high therapeutic drug concentration was chosen for the F experiment and the storage time was extended to 20 weeks. All drugs of interest in the F experiment showed significant losses after 20 weeks of storage under at least one storage condition. The most notable results involved olanzapine, where losses of almost 100% in all storage temperatures were observed. Drug degradation in fluspirilene samples was significant after 20 weeks under all storage conditions. Overall, extensive degradation was seen with approximately 80% drug loss when stored at 20 °C and 4 °C with samples also seriously affected by degradation of up to 50% when stored at -20 °C and -60 °C, respectively. Ziprasidone remained stable when stored at 4 °C, -20 °C, and -60 °C over 9 weeks, however significant degradation was observed when stored at 20 °C, with a loss of almost 100% after 20 weeks of storage. The time period and temperature of storage of biological samples can have a significant influence on the stability of several APs. It is therefore important to be aware of potential changes in drug concentrations during storage when interpreting analytical results.