1. SUMMARY

The presented dissertation thesis shows an interesting connection of two research fields that seem totally different from the first sight: analytical chemistry and medicine. However, the second sight could show that both branches might exist very closely to each other and their cooperation can be even useful for both sides.

The initial part of the thesis deals with theoretical basics of HPLC and chromatographic instrumentation bringing a short overview of important principles of liquid chromatography including a brief introduction of crucial parts of an HPLC instrument. Due to the fact that the heart of the chromatographic system is an analytical column, another part of the text deals with different types of stationary phases and analytical sorbents. A separate chapter is focused on monolithic columns and other materials representing a new and original trend of chromatographic techniques. The main advantages and disadvantages of monolithic columns are then summarized in the published papers listed in the Experimental part (Enclosures 1, 2 and 9). Finally, the technical section of my thesis is concluded by a review of new trends in the chromatographic instrumentation presented e.g. by Ultra Performance Liquid Chromatography, columns filled with sub-2-micron particles or automatization or miniaturization of complete HPLC systems.

The second part of the thesis deals with different ways of biological material withdrawal and treatment. Different factors influencing the final analytical results are discussed and a short description of analyzed matrix (human serum and urine) is presented. The next chapter (3.5.2) summarizes possible procedures of bio-matrix treatment using different extraction modes. Here, a practical comparison of LLE and SPE techniques is stressed out showing their alternative ways of performance.

The final section of the theoretical part is focused on a detailed characterization of analyzed substances comprising vitamin A, retinol esters, vitamin E and neopterin. Besides the physicochemical properties of these analytes, their biological activity, metabolism and therapeutic use are also mentioned. For each analyte, current possible ways of its analytical determination found in the literature are reviewed.

The Experimental part is separated into two thematic sections. The first one comprises comments on analytical publications and, chiefly, describes the methods of determination of the studied substances. The second section presents a summary of biomedicinal papers which were published using results obtained by previously described analytical methods.

The last chapter – Enclosures – shows a collection of twelve publications further completed by an overview of oral presentations and the most important poster presentations realized within my postgraduate studies including a list of grants.