Today, dendrimers represent a promising and interesting organic material being used in developing new materials for pharmaceutical industry such as drug delivery systems and more recently, intelligent materials with sensing properties to proteins and haemometabolites. The intrinsic properties of dendrimers like as monodispersity, highly functional groups at macromolecule periphery and good biocompatible properties of these nanoparticles has led to their widespread use in a variety of applications in medicine and biotechnology. In this work glucose, cholesterol and urea biosensors based on bioconjugated polyglycerol (PGLD), poly(propylene imine) (PPID) and chitosan dendrimers (CHD) were developed. The dendrimers PGLD, PPID and CHD were bioconjugated with the enzymes glucose oxidase (GOx), cholesterol oxidase (COx) and urease to obtain dendrimers with glucose, cholesterol and urea sensing properties. The bioconjugated PGLD, PPID and CHD dendrimers were entrapped in polyaniline nanotubes (PANINT´s) during template electrochemical polymerization of aniline. PANINT´s were used as electron mediator due to their high ability to promote electron-transfer reactions involving enzyme catalysis. The current response observed in enzymes transformations at electrodes interfaces demonstrated that polyaniline nanotubes are an efficient mediator for biosensors design. The response current properties to haemometabolites glucose, cholesterol and urea of PGLD, PPID and CHD bioconjugated with GOx, COx and urease occurs at 400 mV, 700 mV and 600 mV, respectively. It was found that the response current of the PGLD, PPID and CHD bioconjugates easily reaches to steady state. The results about the current saturation peak for the PGLD biosensors are meaningfully higher than CHD and PPID bioconjugates. The apparent Michaelis–Menten constant (K^{app}_M), which gives an indication of the enzyme–substrate kinetics for the PPID, CHD and PGLD bioconjugates were calculated from the electrochemical Lineweaver–Burk equation. The based PGLD, PPID and CHD biosensors showed a good performance in glucose, cholesterol and urea concentrations of clinical interest. The enzyme affinity for the substrate (K_M^{app}) indicate that the enzyme catalytic activity declines in the crescent order PGLD>CHD>PPID. The results show that PGLD appears to be a very promising candidate for development of high-performance biosensors relatively to the CHD and PPID dendrimers. An artificial neural network Back-Propagation type with three layers of neurons was trained, and applied, in predicting the amount of haemometabolites glucose, cholesterol and urea in relation to the current response of developed biosensors. The neural network developed for

determining the haemometabolites was shown to be efficient in both, training phase and the test, respectively.