Currently available anticancer therapies are inadequate and spur demand for improved technologies. Among others, the utilization of nanocarriers for anticancer drug delivery has shown great potential in cancer treatment. Nanocarriers can improve the therapeutic efficiency of the drugs with minimization of the undesirable side effects. To evaluate potential application of this technology, two forms of nanocarriers have been studied: multi-walled carbon nanotubes (MWCNTs) and apoferritin. The aim of this study was to determine, whether given cytostatics (ellipticine, etoposide and doxorubicin) are bound to these nanotransporters and how are they released from them, especially depending on pH. Since the pH of the tumor cells is lower than the pH of healthy cells it would be preferred that the drugs would release from nanocarriers at the lower pH while at the physiological pH the release of the drug would be eliminated. The results found show that ellipticine is actually released from its MWCNT- and apoferrtin-encapsulated form at acidic pH (5.0), while at pH 7.4 its interaction with nanocarriers is stable. Ellipticine released from MWCNT is activated by microsomal enzymes to reactive metabolites (13-hydroxyellipticine and 12-hydroxyellipticine) forming DNA adducts. The results indicate that both nanotransporters (nanotubes MWCNT and apoferritin) seem to be promising to be used in cancer treatment. However, their potential in the clinical use needs to be proven by additional *in vitro* and especially *in vivo* experiments.