Mushroom foraging is very popular in some regions of the world. Sometimes toxic and edible mushrooms are mistaken by mushroom collectors, leading to serious human poisoning. The group of mushrooms highly dangerous for human health includes *Amanita phalloides*. This mushroom produces a toxic octapeptide called α-amanitin which is an inhibitor of nuclear RNA polymerase II. The inhibition of this polymerase results in the abortion of mRNA synthesis. The ingestion of *A. phalloides* causes liver failure due to the fact that most of the toxin is uptaken by hepatocytes. The hospitalization of poisoned patients involves the removal of the toxin from the digestive tract, its dilution in the circulatory system and the administration of therapeutic adjuvants. Since there is no effective antidote against amanitin poisoning, in this study we developed a DNA aptamer exhibiting specific binding to α-amanitin. This aptamer was selected using the SELEX (Systematic Evolution of Ligands by Exponential Enrichment) method. Next, its ability of toxin removal from aqueous solution was confirmed by pull-down assay. The aptamer region sufficient for α-amanitin binding was determined. Finally, the dissociation constant of the α-amanitin/DNA aptamer complex was calculated.

**Key words**: α-amanitin, mushroom poisoning, aptamer, SELEX

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**Abbreviations**: SELEX, Systematic Evolution of Ligands by Exponential Enrichment; HCSA, high capacity streptavidin agarose