Abstract

Charles University

Faculty of Pharmacy in Hradec Králové

Department od Biochemical

Sciences Candidate: Bc. Adéla Jansová

Supervisor: PharmDr. Anna Jirkovská, Ph.D.

Title of thesis: Using PCR to study the DNA damage

Key words: functions of DNA, DNA damage, PCR, SINE elements

The transmission of genetic information to future generations is possible thanks to DNA replication using enzymes, mainly DNA polymerase. The most important function of DNA is the biosynthesis of proteins that perform specific functions throughout the cell. The coding DNA sequences are the source for protein synthesis. These are produced by transcription of a DNA sequence using RNA polymerase and then translated into amino acids by translation. Non-coding sequences have mainly regulatory functions, they are functional DNA molecules (rRNA, tRNA, snRNA) and regulatory regions (promoters, enhancers and silencers) as well as transposons (SINE, LINE) and pseudogenes.

DNA damage is caused by UV radiation, ionizing radiation, chemicals (cisplatin-based drugs, alkylating agents, etc.), reactive oxygen species, and DNA damage by base deamination. When damage occurs, repair processes are activated to remove mismatches, adducts and breaks. If the damage is not repaired by repair processes, the damage leads to mutation formation, senescence or cell death.

To determine DNA damage can be used several methods, depending on the type of damage. Damage can also be determined and quantified by PCR (polymerase chain reaction), which is one of the most commonly used methods. Along with PCR is often used gel electrophoresis, comet assay, chromatography in tandem with mass spectrometry and highly specific methods such as LAMP or NGS.