Junk-DNA with functions within the immune system?

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The genome of an organism encodes its inheritable information coding amongst others for every protein in the body. For a long time, it was only focused on the proteins encoding regions of the genome (genes). It was a big surprise after deciphering mammalian genomes that most of the DNA present was not encoding for proteins and the term “Junk-DNA” was coined. However, over the years it got more and more obvious that some non-coding RNAs might be very important pieces of “junk”. These RNAs can be divided into several groups among them long non coding RNAs (lncRNAs) which came into focus in recent years. LncRNAs can have various functions including involvement in HIV infections and cancers. LncRNA can be very specific for parts of the organism like brain, liver etc. but can be even more specific e.g. for certain cell types. The cell type investigated in this thesis were regulatory T cells (T_{regs}) which are important players in the adaptive immune system.

Within this study two lncRNAs were investigated called simply *lncRNA1* and *lncRNA2*. These two lncRNAs were found to be very specific for the mentioned T_{regs} and were not found in other white blood cells. The DNA region which attracts the enzymes leading to transcription of *lncRNA1*(the promoter region) was investigated in this study. The promoter region and the molecules binding the promoter region can give clues on the function of the lncRNA. Further research will, however, be necessary in order to determine the promoter region. Another part of the thesis was to find the localization of the *lncRNA1* within the cell. Identifying the subcellular localization of lncRNAs also allows for drawing conclusions on the function of the lncRNA because cytoplasmic lncRNAs often have different functions than lncRNAs localizing to the nucleus. The research into the localization is still ongoing. However, expression of an evolutionary conserved region of one of the two lncRNAs was found in humans. Conservation over millions of years indicates a function of the lncRNA because non-functional DNA mutates over time. Mutations are small changes in the DNA. DNA-changes are not conserved if they are disadvantageous because the individual may be sick and has reduced chances to pass its genes on in the following generation (mating). So the DNA is only preserved if the RNA has a function. This function still has to be found and the research is continued in order to fill the white spots in the genome of humans and other organisms. Enhancing our knowledge on lncRNAs is of great importance in order to find novel treatments for major diseases as HIV and cancers.

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