This thesis studies an important tumor suppressor, p53, and its interaction partner, nucleophosmin (NPM), in living cells. Proteins are studied using fluorescence confocal microscopy techniques such as fluorescence lifetime imaging and fluorescence anisotropy measurements. The primary focus of the research is on a specific variant of the p53 protein called p53-L344P, which is generated by a point mutation from its original form (p53wt). We investigate the oligomerization state of p53-L344P *in vivo*, which appears to be monomeric, confirming the results of *in vitro* experiments from other studies. Further, we show that p53wt and p53-L344P can form complexes with each other. We compare the interaction of the NPMmutA protein with p53wt and p53-L344P proteins. Our findings reveal that the L344P mutant is not transferred from the nucleus to the cytoplasm in the presence of NPMmut, as is p53wt. Furthermore, we investigate the oligomerization state of p53wt when it is in the cytoplasm and propose avenues for further research into this interaction.