

A Novel Experimental and Computational Approach to Photobiosimulation of Telomeric DNA/RNA: A Biospectroscopic and Photobiological Study

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Opinion

This opinion is elaborated high intensity lasers effect in UV and IR regions and also period after laser emission beam off on a telomeric DNA/RNA activity of Calf and Salmon cells. Nemours researchers and scientists used various high intensity lasers for specific applications such as studying of their biostimulatory effect in variant experimental conditions before clinical usage [1–25]. These lasers instead of producing any heat, act through photochemical and photophysical reactions and simulate cells.

Also, in the current opinion, Calf and Salmon cells, as initial materials are investigated. The monolayer and multilayer cells are grown on glass surfaces and in spectral cuvettes. To obtain monolayer and multilayer cells of identical sensitivity to high intensity lasers effects need to prepare them close to in vivo conditions of Calf and Salmon cells. Therefore, He-Ne ($\lambda=665$ (nm)), Diode ($\lambda=675$ (nm)) and He-Cd ($\lambda=698$ (nm)) lasers with constant intensity (power density or $P=6mW/cm^2$) are used.

Furthermore, this opinion is shown that suitable laser parameters affecting Calf and Salmon cells (intensity and exposure time) of biological cells stimulated in whole laser wavelengths possible. Emission of the He-Ne and diode lasers ranged from 10–1000 (s) on the cells, stimulating the telomeric DNA/RNA activity is growing. Conversely, the cell telomeric DNA/RNA activity is destroyed using He-Cd laser beam.

The most important photobiological effect property of high intensity laser beam as a stimulator or a blocker is their reversible property. For example, cells' growth, maximum biological effects of radiation after 4 and 48 hours after laser emission beam off, telomeric DNA/RNA index in experimental and control samples virtually no different.

In addition, in this opinion, the impact theory of fixed high intensity laser radiation with different wavelengths on the chemical and physical performance of biological cells activity is studied. On the other hand, the metal complexes with polypyridyl as ligands have been playing an important role in development of coordination chemistry as a whole; also polypyridyl metal complexes have been widely studied subject, because of their applications in nanotechnology, solar cells, sol-gel methods for materials processing, biochemistry, genetics, pharmacology and pharmaceutical sciences and biology [26–46]. Meanwhile, Ruthenium (II) polypyridyl complexes containing a phenanthroline (phen) and derivations as phendiamine lies in their antibiotic and antitumor reagent in biological systems with interaction by telomeric DNA/RNA molecules. Moreover, in this opinion, we report synthesis, characterization and identification of new Ruthenium

(II) complexes with new polypyridyl ligands and derivations from phendiamine.

The ligand phendiamine was synthesized of phenanthroline (phen) conforming below schematics (Figure 1). Ruthenium (II) complexes synthesized and characterized by the elemental analysis, Differential Thermal Analysis–Thermal Gravim Analysis (DTA–TGA), Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy (ATR–FTIR), FT–Raman, UV–Vis, 1H NMR and ^{13}C NMR biospectroscopies and also DFT, ESI MS and PM5 studies. FT–Raman and Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy (ATR–FTIR) spectra for all of complexes prepared exhibited the characteristic band around 3385 cm^{-1} corresponding to $\nu(C-N)$ amine. The electronic spectra of complexes show the d–d transitions at 528 (nm) and $\Pi \rightarrow \Pi^*$ transfer around 320 (nm) for all of complexes. The 1H NMR and ^{13}C NMR spectra illustrate broad bands by chemical shift 0–50 (ppm) evidence paramagnetic complexes.

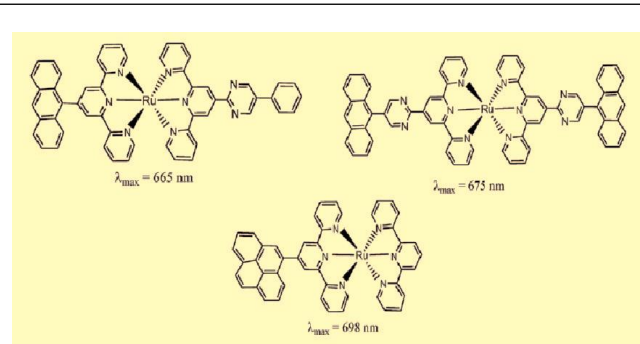


Figure 1: Ruthenium (II) polypyridyl complexes containing a phenanthroline (phen) and derivations as phendiamine lies in their antibiotic and antitumor reagent in biological systems with interaction by telomeric DNA/RNA molecules.

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