

## Nanochemistry and biotechnology

### Cytotoxic effect of *cis*-Palladium(II) complex incorporating 3-(2-pyridyl)-5-methyl-1,2,4-triazole in combination with C<sub>60</sub> fullerene on leukemic cells

S.V. Prylutska<sup>1</sup>, I.I. Grynyuk<sup>1</sup>, A.G. Grebinyk<sup>2</sup>, V.V. Hurmach<sup>1</sup>, I.V. Raspertova<sup>1</sup>, B.V. Zakharchenko<sup>1</sup>, R.D. Lampeka<sup>1</sup>, Yu.I. Prylutskyi<sup>1</sup>, O.P. Matyshevska<sup>1</sup>, M.S. Slobodyanik<sup>1</sup>, M. Frohme<sup>2</sup>, U. Ritter<sup>3</sup>.

<sup>1</sup>Taras Shevchenko National University of Kyiv, 64 Volodymyrska Str., Kyiv, 01601, Ukraine

E-mail: [psvit@bigmir.net](mailto:psvit@bigmir.net)

<sup>2</sup>Technical University of Applied Sciences of Wildau, 1 Hochschulring Str., Wildau, 15745, Germany

<sup>3</sup>Technical University of Ilmenau, 25 Weimarer Str., Ilmenau, 98693, Germany

The creation of the new low toxic structural analogs of known anticancer drugs and modulation of their biological activity by nanostructures to enhance the pharmacological effect is important problem nowadays. *Cis*-Palladium(II) complex with 3-(2-pyridyl)-5-methyl-1,2,4-triazole (*cis*-Pd complex) is a promising compound in this regard.

Palladium compounds are less toxic compared to platinum complexes and exhibit high antitumor activity. C<sub>60</sub> fullerene is supposed to be a modulator of palladium complex biological action.

The aim of this study was to estimate the impact of *cis*-Pd complex on the viability of leukemic cells and to investigate its anticancer activity at combined action with C<sub>60</sub> fullerene.

*Cis*-Pd complex was synthesized and characterized using NMR and FTIR spectroscopy (the purity of compound was  $\geq 98\%$ ) at Taras Shevchenko National University of Kyiv (Ukraine). A highly stable water colloid solution of C<sub>60</sub> fullerene ( $10^{-4}$  M, purity  $>99.5\%$ , nanoparticles average size 50 nm) was synthesized at Technical University of Ilmenau (Germany).

Viability of leukemic CCRF-CEM cells was estimated using MTT test at 24, 48 and 72 h incubation after addition of *cis*-Pd complex in 0.5, 1, 1.5 and 2  $\mu\text{M}$  concentrations. Cytotoxic effect of *cis*-Pd complex at 1.5 and 2  $\mu\text{M}$  concentrations was demonstrated. 0.5  $\mu\text{M}$  *cis*-Pd complex did not affect the viability of CCRF-CEM cells, but it combined action with C<sub>60</sub> fullerene was followed by 50% decrease of cell viability after 48 h incubation. Reactive oxygen species (ROS) production was determined using a fluorescent probe DCF-DA: Increased ROS production in CCRF-CEM cells was detected 6 h after addition of 1  $\mu\text{M}$  *cis*-Pd complex. Thus, *cis*-Pd complex at high concentrations reduced viability of CCRF-CEM cells and intensified ROS production. C<sub>60</sub> fullerene intensified cytotoxic effect of *cis*-Pd complex at low concentration 0.5  $\mu\text{M}$ .