Synthesis, characterization, biological and radical scavenging activities of new palladium complexes

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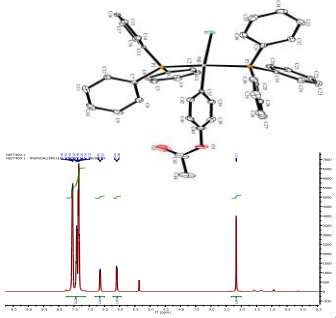
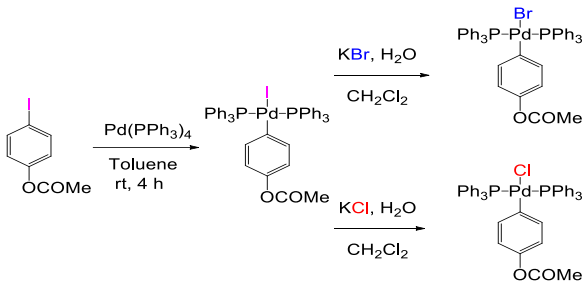
Introduction

In recent years, there has been considerable interest in the chemistry of transition metal complexes containing novel ligands. In this contribution, we will present the synthesis of new palladium complexes and evaluate their radical scavenging activities in ABTS and DPPH tests. The cells toxicity of complexes was evaluated using trypan blue test and WST-1 assay.

Synthesis and characterization

The complex with iodide anion was obtained by oxidative addition of 4-$OAcC_6H_4I$ on $Pd(PPh_3)_4$. While bromo- and chloro-containing palladium complexes were prepared by anion metathesis from the iodide. All compounds have been characterized by ^1H,^{13}C and ^{31}P NMR and by X-ray diffraction.

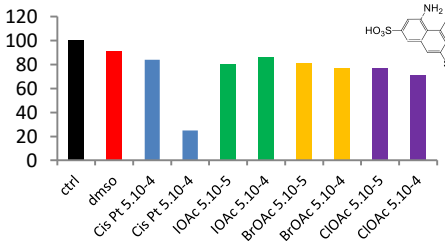


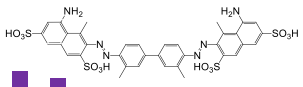


Biological and radical scavenging activities tests

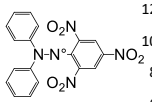
Cells toxicity of the 3 complexes was evaluated using trypan blue and WST-1 tests. Cells were incubated with solutions of complexes during one day for trypan blue test and 2 hours for WST-1 test.

Some antioxydant properties were studied.[1] After 30 min. of incubation at room temperature, absorbances were measured at 734 nm for ABTS and at 517 nm for DPPH.[2]

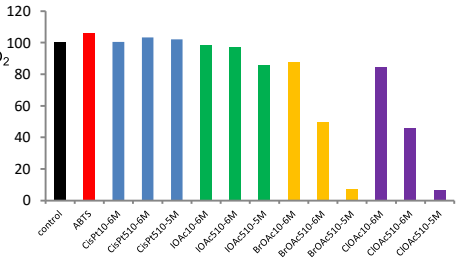


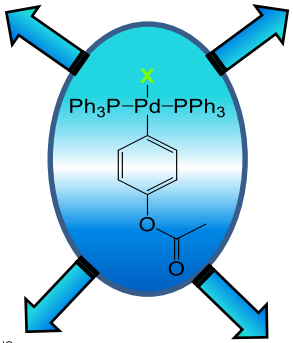


Trypan blue



DPPH

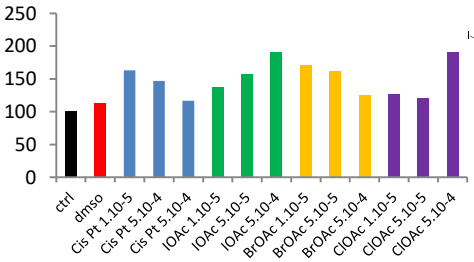


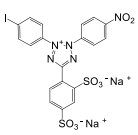


$[PdCl(PPh_3)_2(4\text{-}OAcC_6H_4)]$ complex showed the highest toxicity but mortality remains below 25%, instead of *cis*-platine which shows aprox 75% of mortality at the same concentration.

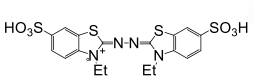
For WST-1 test, recorded absorbance attest that $[PdBr(PPh_3)_2(4\text{-}OAcC_6H_4)]$ complex shows the same behavior that observed for *cis*-platine.

In ABTS free radical scavenging tests, $[PdI(PPh_3)_2(4\text{-}OAcC_6H_4)]$ showed the highest activity. Conversely, bromo- and chloro-containing complexes showed the most interesting free radical scavenging properties in DPPH tests. All the measured values were compared to that obtained with *cis*-platine.

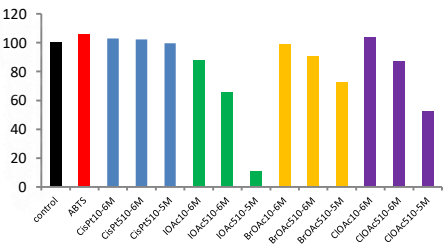




WST-1



ABTS



Conclusion

A series of novel palladium complexes of general formula $[PdX(PPh_3)_2(4\text{-}OAcC_6H_4)]$ have been synthesized and fully characterized. ABTS and DPPH free radical scavenging tests were performed, showing the highest activity for the iodo-containing complex in the ABTS tests, whereas the chloro complex was the most efficient for the DPPH test. In the WST-1 versus Trypan blue test, there is no correlation for the cellular toxicity in spite of the low toxicity of compounds. Action mode of those complexes in WST-1 test is currently investigated.

References

[1] W. Han, P. Mayer, A. R. Ofial, *Angew. Chem. Int. Ed.* **2011**, *50*, 2178-2182.
[2] R. Re, N. Pellegrini, A. Proteggente, A. Pannala, M. Yang, C. Rice-Evans, *Free Radic. Biol. Med.* **1999**, *26*, 1231-1237.