Synthesis, antimicrobial and antiproliferative activity of novel silver(I) tris(pyrazolyl)methanesulfonate and 1,3,5-triaza-7-phosphadamantane complexes.

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Streszczenie

Five new silver(I) complexes of formulas [Ag(Tpms)] (**1**), [Ag(Tpms)(PPh_3)] (**2**), [Ag(Tpms)(PCy_3)] (**3**), [Ag(PTA)][BF_4] (**4**), and [Ag(Tpms)(PTA)] (**5**) {Tpms = tris(pyrazol-1-yl)methanesulfonate, PPh_3 = triphenylphosphane, PCy_3 = tricyclohexylphosphane, PTA = 1,3,5-triaza-7-phosphaadamantane} have been synthesized and fully characterized by elemental analyses, ^{1}H, ^{13}C, and ^{31}P NMR, electrospray ionization mass spectrometry (ESI-MS), and IR spectroscopic techniques. The single crystal X-ray diffraction study of **3** shows the Tpms ligand acting in the N_3-facially coordinating mode, while in **2** and **5** a N_2O-coordination is found, with the SO_3 group bonded to silver and a pendant free pyrazolyl ring. Features of the tilting in the coordinated pyrazolyl rings in these cases suggest that this inequivalence is related with the cone angles of the phosphanes. A detailed study of antimycobacterial and antiproliferative properties of all compounds has been carried out. They were screened for their in vitro antimicrobial activities against the standard strains *Enterococcus faecalis* (ATCC 29922), *Staphylococcus aureus* (ATCC 25923), *Streptococcus pneumoniae* (ATCC 49619), *Streptococcus pyogenes* (SF37), *Streptococcus sanguinis* (SK36), *Streptococcus mutans* (UA159), *Escherichia coli* (ATCC 25922), and the fungus *Candida albicans* (ATCC 24443). Complexes **1**–**5** have been found to display effective antimicrobial activity against the series of bacteria and fungi, and some of them are potential candidates for antiseptic or disinfectant drugs. Interaction of Ag complexes with deoxyribonucleic acid (DNA) has been studied by fluorescence spectroscopic techniques, using ethidium bromide (EB) as a fluorescence probe of DNA. The decrease in the fluorescence of DNA–EB system on addition of Ag complexes shows that the fluorescence quenching of DNA–EB complex occurs and compound **3** is particularly active. Complexes **1**–**5** exhibit pronounced antiproliferative activity against human malignant melanoma (A375) with an activity often higher than that of $AgNO_3$, which has been used as a control, following the same order of activity inhibition on DNA, i.e., **3** > **2** > **1** > **5** > **$AgNO_3$** ≫ **4**.