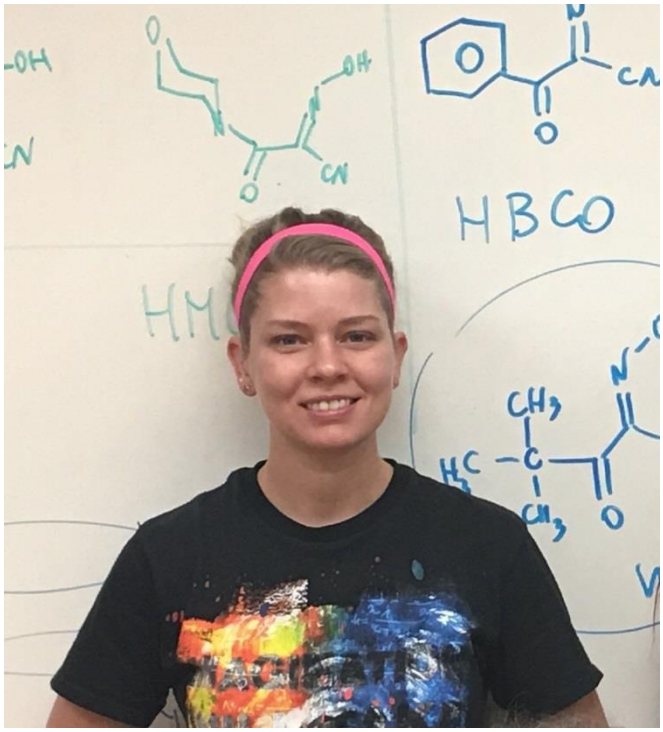


Stephanie Dannen, 2017-2018

Stephanie was enrolled at first in Undergraduate Research classes CHM 399 and CHM 499 and during two semesters working in my research laboratory. Her project was dedicated to ***in vitro* cytotoxicity studies of several previously made in the lab palladium and platinum cyanoximates.**

Several bivalent Pd and Pt complexes with two structurally similar cyanoxime ligands abbreviated as **H(DECO)**: 2-oximino-2-cyano-N,N'-diethylacetamide, and **H(PyrCO)**: 2-oximino-2-cyan-N-pyrrolidineacetamide were synthesized and characterized using spectroscopic methods, thermal analysis and X-ray crystallography. Structures revealed planar cis-geometry of studied complexes. Freshly obtained $Pt(DECO)_2$, $Pd(DECO)_2$, $Pt(PyrCO)_2$ and $Pd(PyrCO)_2$ complexes were used in for *in vitro* cytotoxicity assays using two different etiology human cancer HeLa and WiDr cells. The cisplatin was used as a positive control. Investigated compounds showed cytotoxicity levels at or above cisplatin.

Currently used in clinical practice or in different development stages Pt(II) complexes are presented in Figure 1 with cisplatin family indicated in blue color.

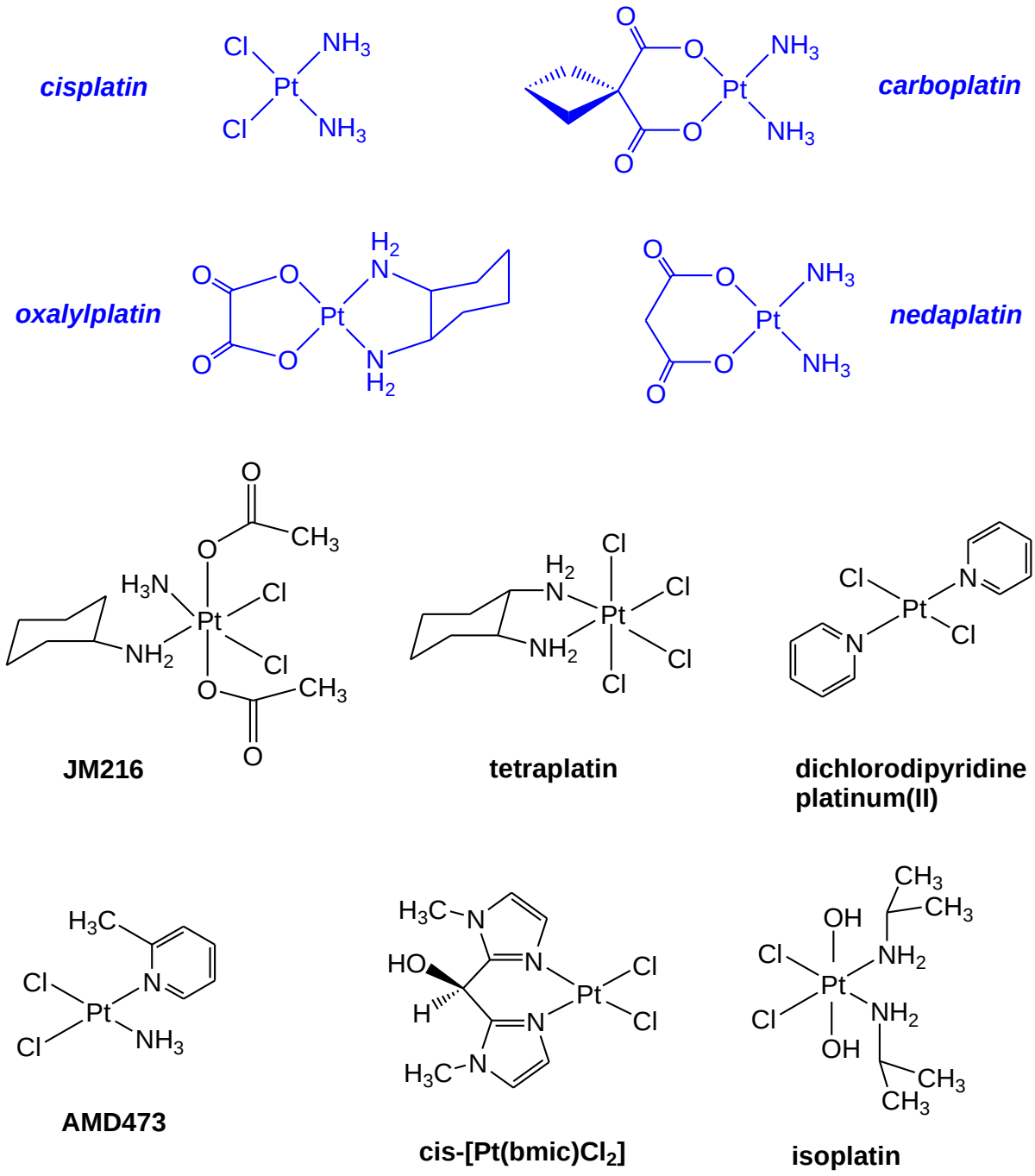
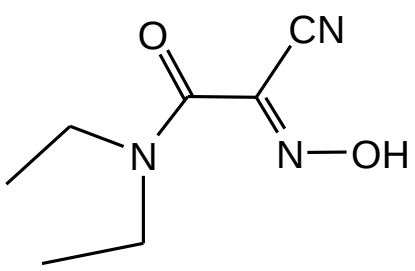


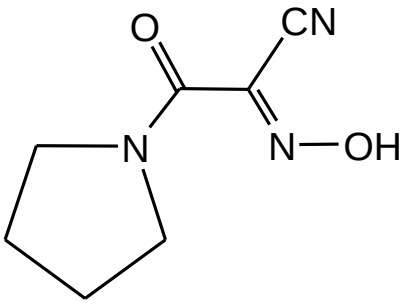
Figure 1. The cisplatin family of anticancer drugs (blue colored) and compounds that went through preclinical and clinical trials.

Complexes that she studied structurally resemble those shown in Figure 1, but the acido-ligands represent cyanoximes (Figure 2). In previous research conducted in my group we found that these anionic ligands form stable cis-geometry complexes with both Pd and Pt, so there was a

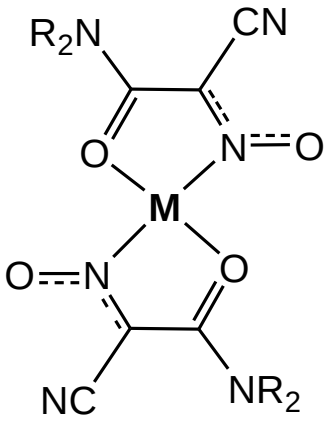
great need to continue investigations in this area since our "old" compounds were strongly cytotoxic against human cancers.



H(DECO)

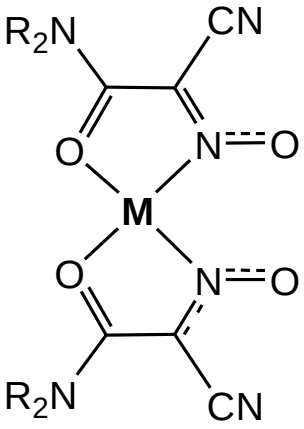


H(PyrCO)



trans-

M = Pd, Pt



cis-

Figure 2. **Chemical formulas of two structurally closely related cyanoximes used in this study and two observed geometries in these complexes.**

A very promising results of carried out investigations in Professor Paul Durham laboratory in the Biology Department are presented in two tables below. Activities of both Pd and Pt complexes are similar or even better than that for cisplatin drug that was used as positive control.

Table 1. Viability of WiDr cells after 24-hour incubation with experimental complexes.

WiDr Cells		
Compound	Avg # Viable	Avg % Viable
Media	1120	99%
DMSO, as co-solvent	929	97.1%
Cisplatin 0.1 mM, control	861	93.6 %
$Pt(DECO)_2$ 0.1 mM	774	97.5 %
$Pd(DECO)_2$ 0.1 mM	853	93.2 %
$Pt(PyrCO)_2$ 0.1 mM	170	47.6 %
$Pd(PyrCO)_2$ 0.1 mM	787	91.3 %
Cisplatin 1 mM, control	466	87.7 %
$Pt(DECO)_2$ 1 mM	15	5.7 %
$Pd(DECO)_2$ 1 mM	9	1.8 %
$Pt(PyrCO)_2$ 1 mM	23	3.6 %
$Pd(PyrCO)_2$ 1 mM	528	94.9 %

Table 2. Viability of HeLa cells after 24 and 48-hour incubation (actual count and average %) with experimental complexes.

Hela Cells				
Compound	Alive 24 hrs	Alive 48 hrs	Alive 24 hrs	Alive 48 hrs
Media	927	1556	97.7 %	93.3 %
DMSO, as co-solvent	1026	1838	96.5 %	88.1 %
Cisplatin, 0.1 mM	819	730	93.8 %	84.8 %
$Pt(DECO)_2$ 0.1 mM	962	1208	93.4 %	92.1 %
$Pd(DECO)_2$ 0.1 mM	307	112	53.6 %	14.4 %
$Pt(PyrCO)_2$ 0.1 mM	1115	1450	93.0 %	88.1 %
$Pd(PyrCO)_2$ 0.1 mM	49	60	40.3 %	77.5 %
Cisplatin, 1 mM	273	240	44.0 %	25.7 %
$Pt(DECO)_2$ 1 mM	184	172	37.8 %	29.8 %
$Pd(DECO)_2$ 1 mM	27	138	4.8 %	16.1 %
$Pt(PyrCO)_2$ 1 mM	47	48	5.6 %	5.9 %
$Pd(PyrCO)_2$ 1 mM	9	0	14.4 %	0 %

Results of these studies will be published in a research paper that is currently in preparation.