



A New Cu(II)-Coordination Polymer: Prevention Ability on Diabetic Retinopathy by Inhibiting *Bcl-2* Gene Expression in Retinal Cells

Mei-Li GAO¹, Zuo-Fen WANG², Xiao-Ni CHI¹, Jing LIU¹ & Xia TIAN^{1*}

¹ Department of Ophthalmology, Weihai Central Hospital,
Weihai, Shandong, China

² Department of Ophthalmology, Zibo Central Hospital,
Zibo, Shandong, China

SUMMARY. In the current research, a new Cu(II)-containing coordination polymer (CP) $\{[\text{Cu}(\text{IPT})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}\}_n$ (**1**), has been successfully prepared by reaction of the $\text{Cu}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$ with a heterotopic imidazole-tetrazole-bifunctional ligand 5-(3-(1H-imidazol-1-yl)phenyl)-1H-tetrazolate (HIPT). The prepared complex **1** has been studied via the single crystal X-ray diffraction along with the elemental analysis. The treatment activity of the compound on diabetic retinopathy (DR) was evaluated and the related specific mechanism was explored. Firstly, the relative expression of the *bcl-2* gene in retinal cells was measured with real time RT-PCR. In addition to this, the retinal cell apoptosis was further determined with cell apoptosis assay. The molecular docking simulation are employed and potential interacting modes are presented with detailed contacting information.

RESUMEN. En la investigación actual, un nuevo polímero de coordinación (CP) que contiene Cu(II) $\{[\text{Cu}(\text{IPT})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}\}_n$ (**1**), se ha preparado con éxito por reacción del $\text{Cu}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$ con un ligando heterotópico imidazol-tetrazol-bifuncional 5-(3-(1H-imidazol-1-il) fenil)-1H-tetrazolato (HIPT). El complejo preparado **1** se ha estudiado mediante la difracción de rayos X de cristal único junto con el análisis elemental. Se evaluó la actividad de tratamiento del compuesto sobre la retinopatía diabética (DR) y se exploró el mecanismo específico relacionado. En primer lugar, la expresión relativa del gen *bcl-2* en las células de la retina se midió con RT-PCR en tiempo real. Además de esto, la apoptosis celular de la retina se determinó adicionalmente con el ensayo de apoptosis celular. Se utiliza la simulación de acoplamiento molecular y se presentan modos de interacción potenciales con información de contacto detallada.

KEY WORDS: Coordination polymer, diabetic retinopathy, molecular docking, X-ray diffraction,

* Author to whom correspondence should be addressed. *E-mail:* Xtian002@126.com