**Contribution:**

In this study, we provided experimental evidence that glucosamine sulfate decreases ADAMTS5 expression and apoptosis in the IL-1β stimulated C-20/A4 chondrocytes. In addition, ginger root and copper sulfate decrease the Nox4 regulated proMMP1 expression. Molecular mechanisms could imply a downregulation of Nox4 activity by the antioxidant protein HO-1. These findings emphasize in vitro the potential beneficial effects of Cuivramine in osteoarthritis.

**Conclusions:**

1. **Nox4 Activity:**
   - CA displays an indirect antioxidant effect dependent on Copper and Ginger
   - CA and GS reduce IL-1β-induced caspase 3 activation

2. **MMP secretion:**
   - CA decreases ADAMTS5 secretion via GS and MMP1 secretion via Copper and Ginger

3. **Apoptosis:**
   - CA and GS increase HO-1 expression

**Potential targets of CA on C-20/A4 chondrocytes**

- **1- Nox4 activity**
- **2- MMP/ADAMTS**
- **3- Apoptosis**
- **4- HO-1 expression**