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COORDINATION CHEMISTRY REVIEWS

Preface

The use of metals in medicine has grown impressively in recent years as the result of an advanced understanding of biological structure and function. Employing metal and lanthanide complexes as probes in diagnostic medical imaging techniques has been of great importance to the success of these techniques. While applications in magnetic resonance, nuclear medicine, and X-ray imaging have driven the development of new diagnostic tools, the fundamental design properties of these complexes are found in coordination chemistry.

Complexes that will ultimately prove successful in these applications must meet numerous criteria, including low metal toxicity, tissue and organ specificity, clearance, and overall image enhancement. Macrocyclic and chelate ligands that irreversibly bind the transition metal or lanthanide ions have addressed several of these issues. A barrier to the further development of coordination complexes as diagnostic tools in experimental biology and clinical settings is the delivery of the complexes to the region or cell of interest.

It is the aim of this issue to highlight the recent advances in the use of transition metal and lanthanide complexes as diagnostic tools. By familiarizing the reader with the current state of the art and uses of these complexes, it is hoped that a new generation of chemists will be attracted to this exciting field. In part, the future of diagnostic medicine relies on the development of new coordination compounds. The chemical diagnostic tools of the future will be physiologically inert, while providing precise information about anatomical features and physiology of the organism. This may include, but is not limited to, identification and localization of toxin and drug binding sites and performing rapid screens of the physiological response to drug therapy. From a clinical point of view, new noninvasive organ specific complexes can be envisioned that assess the physiological status of the particular organ or region and report that information in the form of an acquired image.

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