Editorial: hypoxia in kidney disease

Health & Medicine

Editorial on the Research Topic

Hypoxia in Kidney Disease

Introduction

Oxygen was first described by Carl Wilhelm Scheele as " Fire air" since it supported combustion. He obtained oxygen by heating mercuric oxide, silver carbonate, and nitrate salts. Scheele communicated his findings to Lavoisier, who realized the significance of this finding. Scheele's discovery of oxygen (ca. 1771) was chronologically earlier than the corresponding work of Priestley and Lavoisier, but he did not publish this discovery until 1777, after both of his rivals had already published their findings (West, 2014). Because others generally are accredited for the discovery of oxygen, and a number of other discoveries, he was nicknamed " hard-luck Scheele."

Oxygen is essential for aerobic metabolism, a fundamental mechanism for energy production. The delivery of optimal levels of oxygen to tissues is tightly regulated as both hypoxia and hyperoxia are detrimental for cellular function. Indeed, tissue hypoxia has been found during pathological conditions such as cancer (Liu et al., 2016), diabetes (Palm et al., 2003), hypertension (Welch et al., 2001), chronic kidney disease (CKD) (Milani et al., 2016), and stroke (Ferdinand and Roffe, 2016). In the 90's Fine et al. proposed kidney hypoxia as a mediator of progressive kidney disease (Fine et al., 1998). Since then, experimental and clinical studies have solidified the view that kidney hypoxia plays a critical role during the genesis and progression of both acute and CKD. This research field is currently at the beginning of integrating pre-clinical with clinical research in which kidney hypoxia related mechanisms are quantified by non-invasive imaging. In combination with the fact that some key questions remain unanswered, this offers exciting new research perspectives that are waiting to be explored. With this Frontiers Research Topic we discuss and identify potential mediators/controllers of hypoxia in kidney disease. If we understand more about the sequence of events leading to kidney hypoxia, its regulation and consequences in renal disease, we might be able to have a major impact in clinical practice. I. e., more accurate and earlier diagnosis, novel treatment targets, and novel therapies.

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