6. Abstract

The influence of hypoxic-induced cerebral factors on renal synthesis of erythropoietin. A study in rats

Starting point. While the structure and function of erythropoietin are well documented, the mechanisms of the regulation of the renal synthesis of erythropoietin are poorly understood. Especially, the description of the localization and function of the O_2-sensitive sensor regulating in its turn the renal synthesis of erythropoietin is insufficient. A body of evidence suggests that extrarenal O_2-sensitive sensors, localized particularly in the brain-stem, play a pivotal role in this connexion. To support this concept, a high cerebral pressure with consecutive hypoxia in the area of the brain-stem was generated by insufflation of synthetic cerebrospinal fluid into the catheterised cisterna magna of rats. According to the hypothesis, this manoeuvre should be followed by an increased renal production rate of erythropoietin.

Results. When the cerebral pressure of the rats was above the level of their mean arterial blood pressure or the high cerebral pressure persisted for a longer period (≥ 10 min), the erythropoietin plasma concentration increased significantly. Bilateral nephrectomy abolished this effect. Systemic parameters (heart rate, blood pressure, p_aO_2, p_aCO_2, pH_a) were not affected. For the plasma concentration of glucose remained constant, the effect of the high cerebral pressure on the renal synthesis of erythropoietin seems to be specific.

Conclusions. Increasing the cerebral hydrostatic pressure leads to an increased renal synthesis of erythropoietin. It seems to be obvious that during hypoxia cerebral O_2-sensitive sensors release humoral factors triggering the renal synthesis of erythropoietin. The structure and function of these ‘erythropoietin-releasing-factors’ have to be characterized in future experiments.