

## ELECTROCARDIOGRAPHIC CHALLENGES IN PATIENTS WITH POTASSIUM ABNORMALITIES

Carmen GINGHINĂ<sup>1</sup>, Cătălina UNGUREANU<sup>1</sup>, Aurora - Maria VLĂDAIA<sup>1</sup>,  
Roxana ENACHE<sup>1</sup>, Bogdan Alexandru POPESCU<sup>1</sup>, Ruxandra JURCUȚ<sup>1</sup>

**Abstract.** *Potassium, the most abundant intracellular cation, is critically important for many physiologic processes, including maintenance of cellular membrane potential, homeostasis of cell volume, and transmission of action potentials in nerve cells. Therefore, potassium is necessary for the normal functioning of the muscles, heart, and nerves. A great number of metabolic disorders could be associated with potassium abnormalities.*

*Experimental and human studies have demonstrated that serum potassium imbalance is followed by progressively severe electrophysiological derangements in cardiac impulse generation and conduction. These electrophysiological changes are reflected in the electrocardiogram (ECG) manifestations, with specification that the ECG tracing reflects more faithfully the potassium extracellular concentration.*

*Though laboratory tests are “the gold standard” for the diagnosis of potassium abnormalities, they have the disadvantage of delivering the information with delay. Thus, the electrocardiogram (ECG) becomes a very useful instrument for diagnosis.*

**Keywords:** cation, hyperkalemia, hypokalemia, electrocardiogram (ECG), repolarization.

### 1. Introduction

Potassium (K) is the most abundant intracellular cation. Almost all (98%) potassium in the body is found inside the cells (intracellular) and only about 2% occurs in the fluids outside of the cells (extracellular). The concentration of potassium is often expressed in units of milliequivalents per liter (mEq/l), rather than in units of millimolarity (mM). Both units mean the same thing when applied to concentrations of potassium ions. Normally plasma potassium concentration ranges from: 3.5 – 5.0 mEq/l.

The contribution of potassium to resting membrane potential is related to this ratio of intracellular to extracellular potassium.

The mild to moderate changes in plasma potassium value are relatively poor associated with ECG tracing (10 - 30%), while the severe abnormalities have more specific ECG expression (90%).

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<sup>1</sup> Institute of Cardiovascular Diseases “ Prof. Dr. C.C.Iliescu”, Bucharest, Romania  
Corresponding author address: Carmen Ginghină, MD, Ph.D., FESC, FACC, 100, V. Lascăr Str.,  
020506 Bucharest, Romania, E-mail: carmenginghina2001@yahoo.com