# Recommendations for the management of hypokalemia in patients with cancer

Sandra Espinoza-Muñoz[a], Ivonne Flores-Henriquez[a], Ruben Soto-Munizaga[b]*

[a] Instituto Oncológico Fundación Arturo López Pérez, Santiago, Chile
[b] Servicio de Medicina Interna, Instituto Oncológico Fundación Arturo López Pérez, Santiago, Chile

*** Corresponding author**
ruben.soto@falp.org

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**Postal address**
Infante 805, Providencia, Santiago, Chile

## Abstract

Hypokalemia is a common electrolyte disorder in cancer patients that may be associated with the primary disease or a complication of treatment. In this article, we provide a brief description of hypokalemia and its appropriate management in cancer patients.

## Main messages

- The main complications of hypokalemia are arrhythmias and neuromuscular disorders.
- This review provides an abbreviated summary of the main etiologies and treatment of hypokalemia.
- The limitations of this work are that it excludes patients with nephropathy.

## Hypokalemia in patients with cancer

Hypokalemia is defined as blood potassium levels below 3.5 mEq/lt; levels below 2.5 mEq/lt are considered severe hypokalemia and should be treated early and under strict monitoring of the patient, as it is associated with complications such as paralytic ileus, arrhythmias, and death [1].

Hypokalemia can occur in 40% of cancer patients, [2] due to cancer-specific causes, non-cancer-specific causes, or a combination of both [3]. Non-cancer-specific causes include chemotherapy, which can cause hypokalemia as an adverse effect. Specific cancer causes of hypokalemia include ectopic adrenocorticotropic hormone-secreting tumors and acute myeloid leukemia [4,5].

It should be noted that oncologic patients may have problems with oral intake due to nausea, mucositis, etc., so intravenous administration is often necessary [6].

Based on the above, institutional recommendations are presented in tables 1–3 on how to perform potassium loads in ambulatory oncologic patients treated at the Instituto Oncológico Fundación Arturo López Pérez.

It is important to note that these recommendations apply only to hypokalemia detected in the outpatient area and do not apply to patients with kidney disease. Intravenous infusion is the only recommended administration route, preferably through a central venous catheter or port-a-cath at less than 20 mEq/hour to avoid irritation and pain. Premix solutions are preferred when appropriate, but avoid adding additional drugs or solutions to them; use glucose-free solutions only to avoid hypokalemia due to metabolic effects. Monitoring serum potassium 2-3 hours after the infusion is recommended to assess whether another dose is required.

In cases where it is necessary to add magnesium to the solution, it should be done at the rate of 1 ampoule of magnesium sulfate 25%/5mL = 1.25 grams.

In mild to moderate hypokalemia without the need for urgency, oral administration at high doses (60 to 80 mEq/day) is recommended, which in this protocol were converted for the intravenous route (20 to 40 mEq/L), adjusted to a maximum administration of 3 hours by peripheral venous route, considering that post-infusion potassium should be measured once supplemented a maximum of 40 to 60 mEq before administering new potassium infusion rate are also relevant to avoid phlebitis and decreasing the morbidity associated with this procedure [7–9].

**Table 1.** General considerations on dosing and rate of potassium chloride infusion loads.

| Administration route | Peripheral venous catheter | Central venous catheter or port-a-cath |
|---|---|---|
| **Maximum infusion rate** | 10 mEq/hour<br>That is approximately 0.8 KCl ampoule per hour. | 40 mEq/hour<br>That is 3 KCl ampoules per hour.<br>>20 mEq/hour requires cardiac monitoring. |
| **Maximum concentrations** | 40 mEq/liter<br>That is, 3 KCl ampoules per liter of physiological saline solution over 4 hours | 400 mEq/liter |

KCL: potassium chloride. mEq: milliequivalent.
Source: Adapted by authors based on Kraft et al., Sur et al., and Hamill et al. [7–9].

**Table 2.** Potassium chloride equivalents.

| Dose | KCL grams | KCL mEq | KCl Premix |
|---|---|---|---|
| 1 ampoule of KCl 10%/10 mL | 1 | 13.4 | 670 ml<br>(PSS 1000 mL + 1.5 g KCl) |
| 3 ampoules of KCl 10%/10 mL | 3 | 40 | 100 ml<br>(WFI 100 mL + 3 g KCl) |

KCL: potassium chloride. PSS: physiological solution. WFI: water for injections. g: grams. mL: milliliters. mEq: milliequivalent.
Source: Prepared by the authors.

**Table 3.** Recommendations for initial dosage and administration of potassium chloride in the outpatient area.

| Serum potassium concentration (mEq/L) | Peripheral venous catheter schedule | Central venous catheter schedule |
|---|---|---|
| **3.0** to **3.5** | Dose:<br>1 to 2 g of KCl<br>Preparation and administration:<br>1. 1 to 2 ampoules of KCl diluted in 1 liter of physiological solution to be administered in 3 hours<br>2. 1 to 1.5 g KCl Premix/1000 mL to be administered in 3 hours | Dose:<br>1 to 3 g of KCl<br>Preparation and administration:<br>1. 1 to 3 ampoules of KCl diluted in 250 mL physiological solution to be administered in 2 to 3 hours<br>2. 1 to 3 g KCl Premix/100 mL to be administered in 2 to 3 hours |
| **2.5 to 3.0** | Dose:<br>2 to 3 g KCl + 2.5 g MgO4S<br>Preparation and administration:<br>1. 2 ampoules of KCl + 2 of MgO4S diluted in 1 liter of physiological solution to be administered in 3 hours<br>2. 3 ampoules of KCl + 2 of MgO4S diluted in 1 liter of physiological solution to be administered in 4 hours.<br>3. 1 to 1.5 g of KCl Premix/1000 mL to be administered in 3 hours | Dosis: 3 g of KCl + 2.5 g of MgO4S<br>Preparation and administration:<br>1. 3 ampoules of KCl + 2 ampoules of MgO4S diluted in 250 mL of physiological solution to be administered in 2 to 3 hours |
| **< 2.5**[a] | Dose: 3 g of KCl + 2.5 g of MgO4S<br>Preparation and administration:<br>1. 3 ampoules of KCl + 2 of MgO4S diluted in 1 liter of physiological solution to be administered in 4 hours | Dosis: 3 to 4 g of KCl + 2.5 g of MgO4S<br>Preparation and administration:<br>1. 3 ampoules of KCl + 2.5 of MgO4S diluted in 250 mL of physiological solution to be administered in 2 to 3 hours<br>2. 4 ampoules of KCl + 2 of Mg04S diluted in 250 mL of physiological solution to be administered in 3 hours |

KCL: potassium chloride. L: liter. MgO4S: magnesium sulfate. g: grams mEq, milliequivalent. mL: milliliters.

[a] Evaluate if central administration is necessary (in cases where a dose increase is required due to signs or symptoms of hypokalemia).

Source: Adapted by authors based on Asmar et al., Kim et al., and Pearson et al. [10–12].

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Concomitant administration of magnesium is used to ensure optimal levels, as deficiency of this electrolyte may exacerbate potassium depletion, making ongoing potassium correction refractory [13].

## Conclusions

Hypokalemia is an electrolyte disorder that frequently affects cancer patients for multiple reasons. It can often be a serious and life-threatening disorder if not adequately treated. Diagnosis, proper treatment, and monitoring are essential. We would like to emphasize that the rate of infusion and the concentration of potassium administered must be taken into account for correction in order to avoid side effects due to incorrect administration

## Notes

### Contributor roles

SEM, IFH, and RSM: equally contributed with the conception and design of the study, literature review and analysis, drafting and critical revision and editing, and approval of the final version.

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# Recomendaciones para el manejo de la hipokalemia en pacientes con cáncer

## Abstract

La hipokalemia es un trastorno hidroelectrolítico común en pacientes con cáncer que puede estar asociado a la enfermedad primaria o a una complicación del tratamiento. En este artículo nos enfocamos en entregar una breve descripción de la hipokalemia y su adecuado manejo en pacientes con cáncer.