

## Study of the effect of thermal water on magnesium content of fibroblast cells (VERO E6).

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### Abstract

Fibroblast cells (VERO E6) were cultivated by using thermal, deionized and tap water. Despite of the higher magnesium contents found in thermal water, its use did not show any effect on the magnesium contents of the cells.

*Key words: thermal water, fibroblast, magnesium.*

### Introduction

Thermal water is a type of water originated in the deep layers of soils with constant physical and chemical composition. The water emerges from the depths, crossing a geological layer composed mainly by calcium and magnesium carbonate (dolomite)<sup>1</sup>. So, thermal water is known for presenting high concentrations of these elements. Magnesium is one of the most abundant elements in human cells, found mainly in the form of the ATP complex and phosphonucleotides, being directly involved in metabolic and bioenergetics processes<sup>2</sup>. In this way, this work aims to evaluate the effect of the use of thermal water in cultures of fibroblast cells (VERO E6) in order to verify if the use of this type of water would enhance the Mg uptake by the cells.

### Results and Discussion

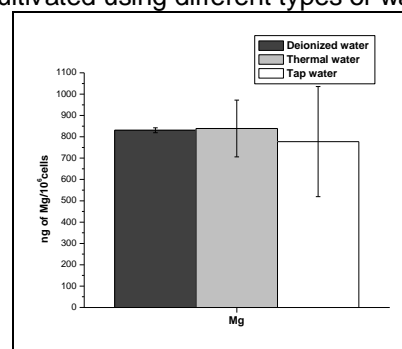
The fibroblast cells (VERO E6) were cultivated during 7 days in culture flasks of 75 cm<sup>2</sup> by using culture mediums (DMEM) prepared with different types of water (deionized, thermal and tap). After reaching the confluence, the cells were dissociated by using Tripsin/EDTA and counted before the analysis. The Mg contents of the samples of water, culture mediums and cells were determined by Inductively Coupled Plasma Optical Emission Spectrometry (ICP OES). The mediums and the cells were previously treated using acid mineralization assisted by microwave radiation. The Mg contents are shown in Table 1 and the uptake by the cells is presented in Figure 1.

**Table 1.** Magnesium contents of different types of water and their respective culture mediums.

Type of water	Sample	Culture medium
Deionized	< LOD*	12.87 ± 0.07
Thermal	8.68 ± 0.05	17.0 ± 0.1
Tap	4.46 ± 0.01	15.4 ± 0.3

\*below the limit of detection of the method.

**Figure 1.** Magnesium contents found in fibroblast cells, cultivated using different types of water.



The Mg contents found in the cells cultivated by using the different types of water were very similar, despite of the different contents of this element found in the water samples, suggesting that the levels of intracellular Mg is tightly regulated.

### Conclusions

Thermal water presented significant concentrations of Mg. Despite of the highest levels found in this type of water, its use did not influence in the Mg uptake by fibroblast cells (VERO E6). Apparently, the cellular Mg content is tightly regulated through homeostasis and the cells showed to be able to maintain the Mg levels even when there is a lower Mg concentration in the extracellular environment.

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<sup>1</sup> Summa V. Tateo F. *Appl. Clay Sci.* **1998**, *5*, 403–417.

<sup>2</sup> Sigel, A.; Sigel, H.; Sigel, R. K.O. *Interrelations between essential metal ions and human diseases*, Springer, **2013**.