FEV$_1$ 800 (32%) and FEV$_1$/FVC 32. Chest radiography presented signs of chronic bronchopathy without any other findings of interest, and the stomach was visualized in its anatomically correct location. The patient reported continuous cough over the course of the last year, with little expectoration. The cough had increased, even interfering with sleep and making it impossible to speak normally. The existence of gastro-esophageal reflux had been ruled out by esophageal pH. The patient had come to the hospital's Emergency Department reporting suffocating cough and dyspnea and was therefore hospitalized with the diagnosis of COPD exacerbation. Arterial gasometry showed: pH 7.40, PO$_2$ 64 mmHg with O$_2$ at 2 l/min through nasal cannulae, PCO$_2$ 44 mmHg. The complementary studies done (chest radiograph, ECG, blood analysis) did not show relevant alterations or changes compared with previous studies. Given the intensity of the cough and its accentuation with oxygen therapy, we decided to administer O$_2$ to the patient with AIRVO$^\text{®}$ equipment (Fisher & Paykel, Auckland, New Zealand). The air flow from the device is regulated at 35 l/min and the O$_2$ flow of the flow meter at 3 l/min, in order to achieve an estimated FiO$_2$ of 28%. The clinical response was spectacular, with the complete disappearance of the cough 5 min after initiating the therapy. The patient continued with the treatment for one week and was later discharged with conventional HOT. One month afterwards, the patient was seen in the outpatient consultation. The cough had reappeared, but was much milder and tolerable.

**Discussion**

We present a COPD patient with HOT and chronic cough related with the administration of O$_2$ after having ruled out other causes of chronic cough at both the pulmonary and digestive levels. The administration of O$_2$ at body temperature and 100% relative humidity made the cough disappear almost instantaneously, a situation which was maintained for a prolonged period. It is well known that the medical O$_2$ that patients receive is a cold, dry gas. Its temperature is 15 °C, and the absolute humidity is 0.3 mg/l. The effect of adding a cold bubbler improves the absolute humidity of the gas, reaching values of 15 mg/l, although this is far from the 44 mg/l achieved in the organs from hypoxemia, such as pulmonary hypertension, chronic cor pulmonale, congestive heart failure, heart rate disorders or polycythemia (hematocrit >55%), or those with lower intellect, would be ideal candidates. In this group of patients, HOT has demonstrated its benefits in terms of survival and improvement of the clinical parameters.$^1$

These universally-accepted criteria are valid at sea level. However, many of our patients do not live at sea level, and one must contemplate whether these criteria are equally applicable at other altitudes. Studies have been done to estimate the degree of hypoxemia that a patient can reach when moved to a certain altitude, basically aimed at evaluating the need for the administration of oxygen (O$_2$) during airplane travel.$^2,3$ However, the prediction equations of a certain level of PaO$_2$ that are based on a baseline PaO$_2$ value obtained at sea level cannot be applied inversely. We cannot estimate the PaO$_2$ that a patient would have at sea level by using his/her PaO$_2$ determined at a certain altitude.

Our group has worked with patients residing in Madrid at an altitude of 723 m with criteria for respiratory failure whose arterial saturation has ostensibly improved at sea level. That is to say that patients with criteria for HOT in Madrid may no longer meet said criteria when the altitude effect is cancelled out (Table 1). Many of these patients would not receive HOT if they lived at sea level, which leads us to suppose that there is an excess of indications for

<table>
<thead>
<tr>
<th>Table 1</th>
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<tbody>
<tr>
<td><strong>Criteria for Home Oxygen Therapy</strong></td>
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<tr>
<td>PaO$_2$ &lt; 55 mmHg</td>
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<td>PaO$_2$ &gt; 55 mmHg</td>
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*Please cite this article as: Díaz-Lobato S, Mayoralas Alises S. ¿Deberíamos reconsiderar los criterios de oxigenoterapia crónica domiciliaria en función de la altitud? Arch Bronconeumol. 2011;47:421–2.*
### Table 1
Characteristics of 84 COPD Patients With Determination of SatHb in Madrid and at Sea Level.

<table>
<thead>
<tr>
<th>COPD Patients</th>
<th>FEV₁, ml</th>
<th>FEV₁, %</th>
<th>SatHb at 723 m above Sea Level</th>
<th>SatHb at Sea Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>84</td>
<td>920 ± 450</td>
<td>45 ± 12</td>
<td>82 ± 5</td>
<td>91 ± 6</td>
</tr>
</tbody>
</table>

FEV₁: forced expiratory volume in 1 s; and SatHb: arterial saturation of hemoglobin.

HOT in Madrid simply due to the altitude effect. A somewhat similar situation has been demonstrated in critical patients with regards to the PaO₂/FiO₂ ratio. Pérez Padilla⁴ has clearly observed that the patients have a lower shunt and presumably a lower degree of lung injury than residents at sea level when meeting the criteria for progressive adult respiratory distress syndrome with a PaO₂/FiO₂ ratio of 200 mmHg. This author suggests keeping in mind the effect of altitude when comparing these patients in published studies as there can be important differences in the results obtained.

The effect of acclimatization or adaptation to heights of humans is well known. There are two fundamental mechanisms developed by subjects living at moderate altitudes, these being the increase in ventilation and the decrease in plasma volume, with consequent hemoconcentration.⁵ The increase in red blood cells maintains the total oxygen content of the blood and guarantees the transport of oxygen to the tissue. What is attractive is the hypothesis that the absolute PaO₂ value in a COPD patient would not be the best indicator for whether to receive home oxygen therapy. Instead, the degree of efficacy of the compensatory mechanisms of the patient and his/her degree of adaptation to the altitude in which he/she lives would be a better indication. It is necessary to develop studies that more thoroughly analyze these physiological adaptation mechanisms in order to establish dynamic criteria for considering HOT.

Currently, HOT is prescribed by extrapolating the criteria established at sea level to the entire population. Thomas Petty said on an occasion: “If we applied the HOT criteria in Denver (Colorado – 1,609 m above sea level), we would have to give O₂ to the entire population.”⁶ Does this make sense? We should reconsider HOT criteria according to altitude.

### References

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doi:10.1016/j.arbr.2011.05.001

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**Skeletal Muscle Metastasis as Initial Presentation of Non-Small-Cell Lung Carcinoma**

Metástasis en músculo esquelético como presentación inicial de un carcinoma no microcítico de pulmón

Dear Editor:

Although muscle tissue makes up more than 50% of the total body mass, metastatic extension to the skeletal muscle is an exceptional event in solid organ neoplasms, with an accumulated incidence of less than 1.5% in recent series, and it is usually limited to advanced phases of the disease.¹–³ Due to their clinical and radiological appearance, skeletal muscle metastases (SMM) are similar to soft tissue sarcomas, entities with greater prevalence in which case surgical resection offers potentially curative results.² This differential diagnosis takes on special relevance if the SMM is the initial manifestation of a primary tumor that had been clinically silent until that moment, a situation that has been infrequently reported in the literature.⁴–⁶

Our patient is a 69-year-old male ex-smoker, whose medical history included the presence of arterial hypertension, dislipidemia and polymyalgia rheumatica. The patient reported the appearance of a tumor on the left thigh, with slow progressive growth and accompanied by continuous dull pain. With the exception of an unquantified weight loss, the patient denied any other systemic symptoms. After several weeks, he also reported the appearance of a second smaller lesion on his right calf. The physical examination showed that the patient was in a state of good general health, with no findings on the cardiopulmonary auscultation or palpable lymphadenopathies. On the outer side of the left thigh, there was a stone-like mass that was not painful to touch (10 cm × 5 cm), with scarce mobility on deeper planes and no signs of local inflammation, which was covered with skin that was intact. A second lesion (2 cm × 1 cm) with similar characteristics was on the right leg. A cytology obtained from this latter lesion, using fine-needle aspiration (FNA), was consistent with a poorly differentiated carcinoma. Later, an incisional biopsy of the thigh mass confirmed infiltration by an epidermoid carcinoma with complex epithelial phenotype in the immunohistochemistry study (positivity for high molecular weight keratins, pankeratins AE1–AE3, thrombomodulin, carcinoembryonic antigen and p53). The study was completed with a thoracoabdominal computed tomography study that revealed multiple bilateral pulmonary nodules indicative of metastasis, among which there was a larger lesion in the right upper vertex (3 cm × 3.2 cm) with spiculated contours that was identified as a probable primary tumor. By means of transthoracic FNA, a sample was obtained, whose cytological study was compatible with a scarcely differentiated carcinoma. With the determination of the lesion as a stage IV non-small-cell lung cancer

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