Bioactive Properties of Lepista inversa
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Introduction
Some mushrooms are known to have strong antioxidant capacity [1]. There is an accepted relationship between the physiopathology of several chronic diseases and oxidative stress. Therefore, the use of foods such as those mushrooms with antioxidant capacity, as phytochemical protectors, may be relevant for the prevention of oxidative stress related diseases such as cancer. Additionally, mushrooms have been described as a source of potential antitumour molecules, making them attractive candidates for drug discovery [2,3]. However, there are no such studies on the Portuguese wild mushroom Lepista inversa.

Objective
The aim of the present work was to study extracts obtained from the wild mushroom Lepista inversa for the in vitro antioxidant activity and growth inhibitory activity in human tumour cell lines.

Materials and methods
Lepista inversa (Scop.: Fr.) Pat. (Tricholomataceae) was collected in Bragança (Northeast Portugal), in autumn 2008. Taxonomic identification was made according to different authors and representative voucher specimens were deposited at the herbarium of Escola Superior Agrária of Instituto Politécnico de Bragança. This is a saprotrophic and edible species. The samples were lyophilised and reduced to a fine dried powder.

The extracts studied were methanolic, ethanolic and polysaccharidic.

For the antioxidant activity the following assays were used: evaluation of DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging capacity, reducing power and inhibition of lipid peroxidation (LPO) measured in liposome solutions [4].

For the analysis of extract-induced cell growth inhibition the SRB (sulforhodamine B) assay [5] was used, following treatment of four tumour cell lines (lung, breast, colon and gastric cancer) with the different extracts.

Results and discussion
The polysaccharidic extract presented the strongest antioxidant capacity (EC50 < 1.8 ± 0.1 mg/ml). Regarding the capacity to inhibit the growth of human tumour cell lines, the methanolic extract was the most effective, presenting the lowest GI50 values (GI50 < 134.8 ± 10.9 µg/ml).

Table 1. Antioxidant activity of Lepista inversa extracts.

<table>
<thead>
<tr>
<th>Extracts</th>
<th>η (%)</th>
<th>Phenolics (mg GAE/g)</th>
<th>DPPH scav. activity</th>
<th>Reducing power</th>
<th>LPO inhibition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methanolic</td>
<td>39.0</td>
<td>3.6 0.1</td>
<td>10.6 1.1</td>
<td>2.9 0.1</td>
<td>1.1 0.1</td>
</tr>
<tr>
<td>Ethanol</td>
<td>4.6</td>
<td>0.5 10.8</td>
<td>9.3 0.5</td>
<td>1.4 0.1</td>
<td>1.5 1.1</td>
</tr>
<tr>
<td>Polysaccharid</td>
<td>32.2</td>
<td>3.1</td>
<td>1.8 0.1</td>
<td>0.7 0.0</td>
<td>0.9 0.1</td>
</tr>
</tbody>
</table>

Results are expressed as EC50 (concentrations of extract in µg/ml that cause 50% of growth inhibition of human cancer cells), and show means ± SDE of 3 independent observations.

Table 2. Effects of Lepista inversa extracts on the growth of human tumour cell lines.

<table>
<thead>
<tr>
<th>Extracts</th>
<th>NCI-H460 (lung cancer)</th>
<th>MCF-7 (breast cancer)</th>
<th>HCT-15 (colon cancer)</th>
<th>AGS (gastric cancer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methanolic</td>
<td>36.3 ± 3.1</td>
<td>45.2 ± 3.1</td>
<td>39.7 ± 4.6</td>
<td>67.4 ± 5.5</td>
</tr>
<tr>
<td>Ethanol</td>
<td>118.3 ± 2.5</td>
<td>79.1 ± 1.8</td>
<td>42.3 ± 4.5</td>
<td>58.5 ± 3.3</td>
</tr>
<tr>
<td>Polysaccharid</td>
<td>155.0 ± 3.5</td>
<td>137.6 ± 1.3</td>
<td>77.4 ± 5.5</td>
<td>99.9 ± 7.8</td>
</tr>
</tbody>
</table>

Results are expressed as GI50 (concentrations of extract in µg/ml that cause 50% of growth inhibition of human cancer cell lines), and show means ± SDE of 3 independent observations performed in triplicates.

Conclusions
In summary, polysaccharidic extract of Lepista inversa was the most potent as antioxidant, while the methanolic extract was the most potent as inhibitor of growth of human tumour cell lines. This interesting growth inhibitory activity proves that this mushroom, particularly the ethanol extract is a promising source of bioactive compounds. As far as we know, there are no reports of growth inhibitory activity of the studied species against lung, colon and gastric human cancer cells. Future work will elucidate the mechanism of action of these extracts leading to the observed cell growth inhibition.

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References