

## **SUPPLEMENTARY MATERIAL**

# **Alginate/lignin: Antioxidant Activities, Anticancer Activity, Physico-chemistry Characteristics, and Acute Toxicity**

Nguyen Xuan Hoan <sup>1</sup>, Le Thi Hong Anh <sup>2</sup>, Hoang Thai Ha <sup>3,\*</sup>, and Dang Xuan Cuong <sup>4</sup>

<sup>1</sup> Faculty of Biology and Environment, Ho Chi Minh City University of Food Industry, 140 Le Trong Tan, Tan Phu District, Ho Chi Minh 70000, Vietnam; hoannx@hufi.edu.vn

<sup>2</sup> Faculty of Food Technology, Ho Chi Minh City University of Food Industry, 140 Le Trong Tan, Tan Phu District, Ho Chi Minh 70000, Vietnam; anhlth@hufi.edu.vn

<sup>3</sup> Faculty of Food Technology, Ho Chi Minh City University of Food Industry, 140 Le Trong Tan, Tan Phu District Ho Chi Minh 70000, Vietnam; haht@hufi.edu.vn

<sup>4</sup> Dept. Science and Technology, Ho Chi Minh City University of Food Industry, 140 Le Trong Tan, Tan Phu District, Ho Chi Minh 70000, Vietnam; cuongdx@hufi.edu.vn

\* Correspondence: haht@hufi.edu.vn; Tel.: +84-932.082.199 (H.T.H.)

Received: date; Accepted: date; Published: date

**Abstract:** Alginate/lignin is a synthetic polymer rich in the biological activity of great interest. Alginate is extracted from seaweed and lignin is extracted from corn stalks and leaves. Antioxidant activities of alginate/lignin were evaluated such as total antioxidant activity, reducing power activity, DPPH free radical scavenging activity, and  $\alpha$  – glucosidase inhibition activity. Anticancer activity was evaluated on four cell lines (Hep G2, fibroblast, MCF-7, and NCI H460). Physicochemistry characteristics of alginate/lignin were determined through FTIR, DSC, SEM\_EDS, SEM\_EDS mapping, XRD, XRF, and <sup>1</sup>H-NMR. Acute toxicity of alginate/lignin was studied on *Swiss albino* mice. The results showed alginate/lignin possessed antioxidant activity such as total antioxidant activity, reducing power activity, especially,  $\alpha$  – glucosidase inhibition activity, and no free radical scavenging activity. Alginate/lignin did not be typical in cancer cell lines. Alginate/lignin existed in a thermally stable regular spherical shape in the investigated thermal region. Some specific functional groups of alginate and lignin did not exist in alginate/lignin crystal. Elements such as C, O, Na, and S were popular in the alginate/lignin structure. LD<sub>0</sub> and LD<sub>100</sub> of alginate/lignin in mice were 3.91 g/kg and 9.77 g/kg, respectively. Alginate/lignin is the potential for application as pharmaceutical materials, functional foods, and supporting diabetes treatment.

**Keywords:** antioxidant; anticancer; glucosidase, physico-chemistry characteristics, acute toxicity

Table S1. Mass and atom of elements in alginate/lignin on SEM\_EDS mapping.

Display name		Standard data	Quantification method	Result	Type
Map_007_wholespectrum		Standardless	ZAF		Metal
Element		Mass%			
C	K	22.16±0.08		31.20±0.11	
O	K	41.55±0.13		43.91±0.13	
Na	K	27.62±0.12		20.32±0.09	
S	K	8.66±0.08		4.57±0.04	
Total		100.00		100.00	
Map_007_wholespectrum		Fitting ratio 0.0210			