Case Report
Management of Combined Therapy (Ceritinib, *A. cinnamomea*, *G. lucidum*, and Photobiomodulation) in Advanced Non-Small-Cell Lung Cancer: A Case Report

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Abstract: The 5-year survival rate of non-small-cell lung cancer (NSCLC) is still low (<21%) despite recent improvements. Since conventional therapies have a lot of side effects, combined therapy is strongly recommended. Here, we report a patient with advanced NSCLC who received combined therapy, including ceritinib, photobiomodulation (PBM), ACGL (*Antrodia cinnamomea* (*A. cinnamomea*), and *Ganoderma lucidum* (*G. lucidum*). Based on combined therapy, suitable doses of *A. cinnamomea*, *G. lucidum*, and PBM are important for tumor inhibition. This case report presents clinical evidence on the efficacy of combined therapy in advanced NSCLC patients, including computed tomography (CT) scan, magnetic resonance imaging (MRI), carcinoembryonic antigen (CEA), and blood tests. The effective inhibition of human lung adenocarcinoma cells is demonstrated. Our case highlights important considerations for PBM and ACGL applications in NSCLC patients, the side effects of ceritinib, and long-term health maintenance.

Keywords: non-small-cell lung cancer; photobiomodulation; *Antrodia cinnamomea*; *Ganoderma lucidum*; lung adenocarcinoma

1. Introduction

Non-small-cell lung cancer (NSCLC) is one of the leading causes of death worldwide, imposing grievous challenges for patients and clinicians. In NSCLC, multiple driver oncogenes have been identified, including epidermal growth factor receptor [1], anaplastic lymphoma kinase (ALK) [2], Kirsten rat sarcoma viral oncogene homolog [3], *c-*ros oncogene 1 [4], *v-*Raf murine sarcoma viral oncogene homolog B1 [5], erb-b2 receptor tyrosine kinase 2 gene [6], rearranged during transfection [7], and *c-*mesenchymal-epithelial transition factor [8]. In the United States, approximately 85% of lung cancer cases are NSCLC patients [9].

Lung adenocarcinoma is the major subtype of lung cancer and approximately two-thirds of patients have locally advanced or metastatic disease [10]. Patients usually receive conventional therapies (i.e., chemotherapy or radiation therapy). Henk and Ray reported that the mean total cost of treatment for more than 300 patients with advanced NSCLC ranged from USD 19,182 to USD 167,847 and USD 35,737 to USD 135,364 for first-line and second-line management, respectively [11]. Despite the fact that cancer therapy has been improved, the 5-year survival rate of lung cancer remains at a very low level (<21%) in the last four decades [12]. Thus, a suitable combined therapy in lung cancer treatment is necessary.

A suitable dose of photobiomodulation (PBM) can slow down tumor growth and prolong the life span of mice [13]. The immunoglobulin activity (IgA, IgM, and IgG) in 60 oncologic patients can be increased with PBM in the tumoural area or lymph nodes [14]. The ratio of IgA and IgG can be increased for nearly 1.86-fold and 6.33-fold, respectively.
by external irradiation with an 890 nm laser on the second day. In addition, the ratio of IgM can be increased nearly four-fold on the fifth day. Recently, PBM has been used for managing chemoradiotheray in head and neck cancer patients [15,16]. PBM with adequate radiation time can induce apoptosis in human lung adenocarcinoma cells in cell culture [17]. Therefore, a suitable PBM therapy can be used to treat cancer.

Polysaccharide has been used as an adjunctive therapeutic drug for the side effects during cancer treatment [18]. G. lucidum is an oriental fungus which has been widely used for promoting health. A highly antitumor activity from the polysaccharides of the fruiting body of G. lucidum was found in an animal model, which is mainly activated by the branched \((1\rightarrow3)-\beta-D-glucans \ [19,20]\). Previous studies report that the biologically active polysaccharides from G. lucidum show high antitumor activity while enhancing the host’s immune response \([20–22]\). In addition, A. cinnamomea also shows antitumor activity that promotes a Th1-dominant state and natural killer (NK) cell activities through its polysaccharide components [23]. The triterpenoids from G. lucidum show a cytotoxicity-based carcinostatic effect on hepatoma cells in vitro [20]. The triterpenoids profile of A. cinnamomea fruiting bodies is richer than that of mycelia [24], and dish-cultured A. cinnamomea caused the tumor to shrink substantially for one small-cell lung cancer patient. The patient survived for 32 months without relapse after a 6-month treatment. In the present study, a combined therapy was administered to a lung adenocarcinoma patient in stage IVa.

2. Case Presentation

A 60-year-old Asian woman, with a history of cough for 1 year, was admitted to a hospital in November 2020. Computed tomography (CT) scan (Figure 1a) was used to evaluate the adenocarcinoma in situ and multiple pulmonary metastases. The brain metastases in NSCLC were checked by magnetic resonance imaging (MRI). The size of the left upper lung cancer tissue was larger than 5 cm \((5.49 \times 3.04 \times 4.61 \text{ cm}^3)\). After guided needle biopsy of the primary lung tumor, the woman was diagnosed with lung adenocarcinoma in clinical stage IVa NSCLC. She was treated with combined therapies, including PBM therapy, targeted therapy (ceritinib), ACGL \((A. cinnamomea (50\%), and G. lucidum (50\%) \) at 450 mg ± 10%/capsule, manufactured by Well Shine Biotechnology Development Co., Ltd., Taipei, Taiwan). Three capsules of ceritinib per day (150 mg/capsule) and the oral administration of ACGL were prescribed. The dose of ACGL was increased to 12 capsules per day in August 2021. In addition, Multi-channel Laser Therapy System (Model: ID 310; wavelength: 830 nm and 650 nm; operation frequency: 10 Hz; 50% duty cycle; Jin-Ciang Technology Co., Ltd., Taiwan) was used to radiate on the apex of the lung and acupoints. The therapeutic protocol of the 830 nm laser was administered in four sequences once a day, each sequence for 10 min: (1) the Shaoshang (LU 11) and Zhongchong (PC 9) acupoints; (2) the Shaoshang (LU 11) and Guanchong (TE 1) acupoints; (3) the apex of the lung; and (4) the Feishu (BL 13) acupoint. The radiation position of the 830 nm laser is shown in Figure 2a. For transthoracic PBM therapy, the 830 nm array laser (7 laser diodes) was used to radiate on the chest (the apex of the lung) and the back area (BL 13 acupoint) for 10 min once a day.

According to the response evaluation criteria for tumor size (Figure 1b,c), the CT scans display a progressive decrease in the NSCLC tumor. The patient’s clinical course is presented in Table 1. The good correlation between tumor volumes calculated with the formula \(\pi/6 \times L \times W \times H\) and the actual tumor masses has been investigated [25]. After a year of combined therapy, the in situ volume of the adenocarcinoma tumor size became 47-fold smaller than the prior image on 10 November 2020 (Figure 3a). Carcinoembryonic antigen (CEA) was significantly reduced (Figure 3b). The blood tests for aspartate aminotransferase (AST), alanine aminotransferase (ALT), blood urea nitrogen (BUN), and creatinine (CRE) have also been checked for 1 year (Figure 3c).
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Carcinoembryonic

Figure 1. (a) Multiple pulmonary metastases of bilateral lung by chest CT. The CT scans of the patient whom received (b) 2 and (c) 10 months of combined therapy.

Figure 2. Schematics for the position of 830 nm laser on NSCLC patients. (a) Shaoshang (LU 11), Zhongchong (PC 9), Guanchong (TE 1), apex of lung and Feishu (BL 13) acupoints. The abnormal of ASL, ALT, and BUN levels can be modulated by 830 nm laser radiated on (b) Ganshu (BL 18) and Yongquan (KI 1) acupoints. (c) Tianshu (ST 25) and Zusanli (ST 36) acupoints and stomach area can be used for severe diarrhea treatment. (d) Shaoshang (LU 11) and Lieque (LU 07) acupoints can be used for severe dizziness treatment (The acupoints are marked by red arrows). Illustration created with BioRender.com (accessed on 8 April 2022).

On the other hand, the lung meridian energy was evaluated in our case based on traditional Chinese medicine. According to the Meridian Energy Analysis Device (Model: ME–100; Medpex Inc., Taichung, Taiwan), when the current on an acupoint is less than 50 µA, it represents a deficiency syndrome of the relative meridian. A good progressive increase in the lung meridian was demonstrated (Figure 3d), changing from an extremely low (deficiency) to a normal state. Currently, the patient remains clinically stable, without any treatment-associated severe adverse events.
Table 1. The clinical course of the patient with combined therapy for 1 year.

| Time               | Image Modality | Clinical Findings                                                                 | Combined Therapy                                                                 |
|--------------------|----------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| 10 November 2020   | Chest CT       | Left upper lung cancer with lung-to-lung metastases. The size of left upper lung cancer tissue was larger than 5 cm. | ACGL and PBM therapy: (1) 6 capsules of ACGL per day; (2) 830 nm laser (30 mW, 10 Hz, 50% duty cycle) was used to radiate on the acupoints and the target (Once a day). 4 steps of 830 nm laser radiation: (i) LU11 and PC 9 acupoints; (ii) LU 11 and TE 1 acupoints; (iii) Apex of lung; (iv) BL 13 acupoint. |
| 20 November 2020   | -              | -                                                                                 | Increase ACGL dose: 8 capsules of ACGL per day.                                   |
| 27 November 2020   | Brain CT       | No definite metastatic lesion.                                                    | Increase ACGL dose: 10 capsules of ACGL per day                                   |
| 30 November 2020   | -              | -                                                                                 | Ceritinib, PBM and ACGL: (3) 3 capsules of ceritinib per day (150 mg/capsule); (4) 10 capsules of ACGL per day; (5) 830 nm laser is used twice a day. |
| 18 December 2020   | -              | Lung adenocarcinoma confirmed diagnosis (advanced NSCLC, Stage IVa)              | PBM therapy: (6) Red rashes disappeared after 650 nm laser (7 mW, 10 Hz, 50% duty cycle, 10 min, 8.84 J/cm²) radiated on the back of the hand 3 times a day for 10 days; (7) Severe diarrhea stopped after 830 nm laser radiated on ST 25 acupoint (30 mW, 10 min, 36.58 J/cm²), ST 36 acupoint (30 mW, 30 min, 109.74 J/cm²), and stomach area (30 mW, 20 min, 73.16 J/cm²). |
| 24 January 2021    | -              | (1) Red rash on the back of the hand (Side effect of Ceritinib). (2) Severe diarrhea (Side effect of Ceritinib). | Severe dizziness (Side effect of Loperamide HCL). PBM therapy: Severe dizziness stopped after 830 nm laser (30 mW, 20 min, 73.16 J/cm²) radiated on LU 11 and LU 07 acupoints. |
| 27 January 2021    | -              | Severe dizzinessness (Side effect of Loperamide HCL).                             | Red rashes on the back of the hand were significantly improved.                   |
| 3 February 2021    | -              | -                                                                                 | For chest CT: Left upper lung cancer with bilateral lung metastases is smaller than prior image on 10 November 2020. For brain CT: No definite metastatic lesion. |
| 19 February 2021   | Chest CT       | For chest CT: Left upper lung cancer with bilateral lung metastases is smaller than prior image on 10 November 2020. For brain CT: No definite metastatic lesion. | PBM therapy: The concentration of ASL, ALT, and BUN decreased after 830 nm laser radiated on BL 18 acupoint (30 mW, 10 min, 36.58 J/cm²) and KI 1 acupoint (30 mW, 30 min, 109.74 J/cm²) twice a day. |
| 16 April 2021      | -              | Higher concentration was found in ASL, ALT, and BUN.                             | A tiny enhancing nodule in right frontal subcortical region and another in left cerebellum. |
| 12 May 2021        | Brain MRI      | -                                                                                 | Increase ACGL dose: 12 capsules of ACGL per day.                                   |
| 14 May 2021        | Chest CT       | Left upper lung cancer is smaller than prior image on 19 February 2021.          | Stable tiny enhancing nodules in right frontal subcortical region and left cerebellum compared with prior image on 12 May 2021. |
| 3 August 2021      | Brain MRI      | -                                                                                 | Increase ACGL dose: 12 capsules of ACGL per day.                                   |
Table 1. Cont.

| Time             | Image Modality | Clinical Findings                                                                 | Combined Therapy                                                                 |
|------------------|----------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| 6 August 2021    | Chest CT       | A small decreased of left upper lung cancer with bilateral lung metastases         | Compared with prior image on 14 May 2021.                                          |
| 29 October 2021  | Chest CT       | No significant interval changes as compared with prior CT image on 6 August 2021   |                                                                                   |
| 25 November 2021 | Brain MRI      | Stable tiny enhancing nodules regions compared with prior image on 3 August 2021.  |                                                                                   |

LU 11: Shaoshang acupoint; PC 9: Zhongchong acupoint; TE 1: Guanchong acupoint; BL 13: Feishu acupoint; ST25: Tianshu acu-point; ST 36: Zusanli acupoint; LU 07: Lieque acupoint; BL 18: Ganshu acupoint; KI 1: Yongquan acupoint.

3. Discussion

Previous studies have suggested that PBM may increase proliferation of cells in some malignant cell lines [26–28]. However, the results cannot directly conclude that PBM would aggravate the tumor cell in vivo [29] because the human immune system can also be induced by PBM [14]. In addition, the survival and recurrence rates of 41 patients with stage II and III breast cancer treated by PBM have been investigated [30]. The result showed a higher survival rate (100% in stage II and 94.44% in stage III) with PBM radiation before and after the surgery for 2 years.

In targeted therapy, ceritinib is highly selective for driver oncogenes of ALK in NSCLC. Ceritinib led to the suppression of ALK phosphorylation, as well as the downstream
signaling pathways that is active against ALK-positive cancer cells [31]. However, the treatment of ceritinib caused many adverse effects (AEs). Elevated transaminase is one of the AEs associated with the oral administration of ceritinib, which was manifested by the increase in AST and ALT. In addition, ceritinib increased BUN, red rashes, and severe diarrhea. Although diarrhea can be improved with the oral administration of Loperamide HCL, there will be the side effect of dizziness. In the present study, PBM was radiated on the target or acupoints to reduce the AEs. The concentration of ASL, ALT, and BUN returned to the normal state (Figure 3c) after an 830 nm laser was radiated on BL 18 (36.58 J/cm$$^2$$) and KI 1 (109.74 J/cm$$^2$$) acupoints twice a day for 1 month (Figure 2b). In addition, there were red rashes on the back of the hands associated with the oral administration of ceritinib for 1 month. A 650 nm laser (8.54 J/cm$$^2$$) was used to radiate on the target three times a day. The red rashes disappeared after a 10-day treatment. In addition, severe diarrhea stopped after the use of an 830 nm laser radiated on ST 25 acupoint (36.58 J/cm$$^2$$), ST 36 acupoint (109.74 J/cm$$^2$$), and stomach area (73.16 J/cm$$^2$$) (Figure 2c), and severe dizziness stopped after an 830 nm laser (73.16 J/cm$$^2$$) radiated on LU 11 and LU 07 acupoints (Figure 2d).

*A. cinnamomea*’s antitumor activity has been studied [32,33]. It can induce the apoptosis of human breast cancer cells [32] and effectively impede the proliferation of human NSCLC [33]. An ethanol extract of *A. cinnamomea* has also been shown to inhibit the migration of highly metastatic CL1-5 human lung adenocarcinoma cells by reducing the expression of matrix metalloproteinase-2/9 via the mitogen-activated protein kinase and phosphatidylinositol-3–kinase/Akt signaling pathways [34]. Antcin K is the most abundant triterpenoid, and it can be extracted from *A. cinnamomea* [35]. This extract was able to inhibit the metastasis of human hepatoma cells through the suppression of integrin-mediated adhesion, migration, and invasion. On the other hand, scientists have investigated *G. lucidum*’s high antitumor activity and its pathways in cancer cells [36–39]. Polysaccharides from *G. lucidum* can increase protein kinase C, p38 mitogen-activated protein kinase, and other tyrosine kinase (Hck and Lyn) activities [36]. Ganoderan B (a glycan of *G. lucidum* fruit bodies) significantly inhibits the growth, invasion, and migration of, as well as induces apoptosis inm NSCLC cells through the extracellular signal-regulated protein kinase signaling pathway [37]. Moreover, the dose-dependence of *G. lucidum* demonstrated different inhibition rates of Sarcoma-180 cells [40]. *G. lucidum* at 5.4 g per day for 12 weeks was administered to different patients with advanced cancer [38]. The results show a series of cellular immunological enhancements, including interleukin (IL)-2, IL-6, and interferon-γ secretion in plasma and NK cell activity, but the levels of IL-1 and tumor necrosis factor-α decreased in 30 assessable patients after *G. lucidum* treatment. In addition, the same dose of *G. lucidum* was given to advanced colorectal cancer patients [39]. A similar pathway can be found in the previous study [38]. The downregulation of TNF-α and IL-1 improved cancer cachexia [41,42]. Thus, *A. cinnamomea* and *G. lucidum* show a great potential for antitumor activity. The dose of *G. lucidum* in previous studies (5.4 g per day) [38,39] was consistent with ACGL (*A. cinnamomea* (50%) and *G. lucidum* (50%; 450 mg/capsule × 12 capsules = 5.4 g per day) in our study.

This study shows the following integrative effects. Owing to ceritinib, PBM, and ACGL, the size of the adenocarcinoma in situ was reduced from 40.26 to 4.07 cm$$^3$$ within 100 days. On the other hand, CEA was reduced from 97.37 to 1.40 (ng/mL) in a year.

4. Conclusions

In view of the supporting evidence for PBM and ACGL in cancer therapy, combined therapy was used to effectively inhibit human lung adenocarcinoma cells in this case. According to the chest CT and CEA marker, the primary lesion of the tumor responded well to combined therapy. The size of the adenocarcinoma in situ and multiple pulmonary metastases were reduced, and the CEA tumor marker level decreased rapidly. We recommend PBM and ACGL as complementary medicines for NSCLC patients. The present case may help clinicians develop a strategy for NSCLC treatment. However, more scientific evidence is needed to clarify the therapeutic strategies of PBM and ACGL.
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References
1. Yamamoto, H.; Toyooka, S.; Mitsudomi, T. Impact of EGFR mutation analysis in non-small cell lung cancer. Lung Cancer 2009, 63, 315–321. [CrossRef] [PubMed]
2. Soda, M.; Choi, Y.L.; Enomoto, M.; Takada, S.; Yamashita, Y.; Ishikawa, S.; Fujiwara, S.I.; Watanabe, H.; Kurashina, K.; Hatanaka, H.; et al. Identification of the transforming EML4-ALK fusion gene in non-small-cell lung cancer. Nature 2007, 448, 561–566. [CrossRef] [PubMed]
3. Johne, W.; Paz-Ares, L.; Schmid-Bindert, G. KRAS-mutant non-small cell lung cancer: From biology to therapy. J. Thorac. Oncol. 2013, 8, 574–583. [CrossRef]
4. Pasquini, G.; Giaccone, G. C-MET inhibitors for advanced non-small cell lung cancer. Expert Opin. Investig. Drugs 2018, 27, 363–375. [CrossRef]
5. Molina, J.R.; Yang, P.; Cassivi, S.D.; Schild, S.E.; Adjei, A.A. Non-small cell lung cancer: Epidemiology, risk factors, treatment, and survivorship. Mayo Clin. Proc. 2008, 83, 584–594. [CrossRef] [PubMed]
6. Morgensztern, D.; Ng, S.H.; Gao, F.; Govindan, R. Trends in stage distribution for patients with non-small cell lung cancer: A national cancer database survey. J. Thorac. Oncol. 2010, 5, 29–33. [CrossRef]
7. Henk, H.J.; Ray, S. Treatment patterns and healthcare costs among patients with advanced non-small-cell lung cancer. Lung Cancer Manag. 2013, 2, 189–197. [CrossRef]
8. Lu, T.; Yang, X.; Huang, Y.; Zhao, M.; Li, M.; Ma, K.; Yin, J.; Zhan, C.; Wang, Q. Trends in the incidence, treatment, and survival of patients with lung cancer in the last four decades. Cancer Manag. Res. 2019, 11, 943–953. [CrossRef] [PubMed]
9. Mikhailov, V.A.; Skobelkin, O.K.; Denisov, I.N.; Frank, G.A.; Volchenko, N.N. Investigations on the influence of low level diode laser irradiation on the growth of experimental tumours. Laser Ther. 1993, 5, 33–38. [CrossRef]
10. Skobelkin, O.K.; Mikhailov, V.A.; Zakharov, S.D. Preoperative activation of the immune system by low reactive level laser therapy (LLLT) in oncologic patients: A preliminary report. Laser Ther. 1991, 3, 169–175. [CrossRef]
11. Zecha, J.A.E.M.; Raber-Durlacher, J.E.; Nair, R.G.; Epstein, J.B.; Sonis, S.T.; Elad, S.; Hamblin, M.R.; Barasch, A.; Migliorati, C.A.; Milstein, D.M.J.; et al. Low-level laser therapy/photobiomodulation in the management of side effects of chemoradiation therapy in head and neck cancer: Part 1: Mechanisms of action, dosimetric, and safety considerations. Support. Care Cancer Ther. 2016, 24, 2781–2792. [CrossRef] [PubMed]
12. Zecha, J.A.E.M.; Raber-Durlacher, J.E.; Nair, R.G.; Epstein, J.B.; Elad, S.; Hamblin, M.R.; Barasch, A.; Migliorati, C.A.; Milstein, D.M.J.; Genot, M.T.; et al. Low-level laser therapy/photobiomodulation in the management of side effects of chemoradiation therapy in head and neck cancer: Part 2: Proposed applications and treatments protocols. Support. Care Cancer Ther. 2016, 24, 2793–2805. [CrossRef]
13. Wang, F.; Chen, T.S.; Xing, D.; Wang, J.J.; Wu, Y.X. Measuring dynamics of caspase-3 activity in living cells using FRET technique during apoptosis induced by high fluence low-power laser irradiation. Lasers Surg. Med. 2005, 36, 2–7. [CrossRef]
14. Zhang, Y.; Jiang, Y.; Zhang, M.; Zhang, L. Ganoderma sinense polysaccharide: An adjunctive drug used for cancer treatment. Prog. Mol. Biol. Transl. Sci. 2019, 163, 165–177.
15. Sone, Y.; Okuda, R.; Wada, N.; Kishida, E.; Misaki, A. Structure and antitumor activities of the polysaccharides isolated from fruiting body and the growing culture of mycelium of Ganoderma lucidum. Agric. Biol. Chem. 1985, 49, 2641–2653.
20. Mizuno, T.; Wang, G.; Zhang, J.; Kawagishi, H.; Nishitoba, T.; Li, J. Reishi, *Ganoderma lucidum* and *Ganoderma tsugae*: Bioactive substances and medicinal effects. *Food Rev. Int.* 1995, 11, 151–166. [CrossRef]  
21. Ooi, V.E.; Liu, F. Immunomodulation an anti-cancer activity of polysaccharide-protein complexes. *Curr. Med. Chem.* 2000, 7, 715–729. [CrossRef] [PubMed]  
22. Sun, L.X.; Lin, Z.B.; Li, X.J.; Li, M.; Lu, J.; Duan, X.S.; Ge, Z.H.; Song, Y.X.; Xing, E.H.; Li, W.D. Promoting effects of *Ganoderma lucidum* polysaccharides on B16F10 cells to activate lymphocytes. *Basic Clin. Pharmacol. Toxicol.* 2011, 108, 149–154. [CrossRef] [PubMed]  
23. Liu, J.J.; Huang, T.S.; Hsu, M.L.; Chen, C.C.; Lin, W.S.; Lu, F.J.; Chang, W.H. Antitumor effects of the partially purified polysaccharides from *Antrodia camphorata* and the mechanism of its action. *Toxicol. Appl. Pharmacol.* 2004, 201, 186–193. [CrossRef] [PubMed]  
24. Long, H.; Hu, C.T.; Weng, C.F. *Antrodia Cinnamomea* Prolongs Survival in a Patient with Small Cell Lung Cancer. *Medicina* 2019, 55, 640. [CrossRef]  
25. Tomayko, M.M.; Reynolds, C.P. Determination of subcutaneous tumor size in athymic (nude) mice. *Cancer Chemother. Pharmacol.* 1989, 24, 148–154. [CrossRef]  
26. Henriques, A.C.G.; Ginani, F.; Oliveira, R.M.; Keesen, T.S.L.; Galvão Barboza, C.A.; Oliveira Rocha, H.A.; Castro, J.F.L.; Della Coletta, R.; Almeida Freitas, R. Low-level laser therapy promotes proliferation and invasion of oral squamous cell carcinoma cells. *Lasers Med. Sci.* 2014, 29, 1385–1395. [CrossRef]  
27. Renno, A.C.M.; McDonnell, P.A.; Parizotto, N.A.; Laakso, E.L. The Effects of Laser Irradiation on Osteoblast and Osteosarcoma Cell Proliferation and Differentiation in Vitro. *Photomed. Laser Surg.* 2007, 25, 275–280. [CrossRef]  
28. Pinheiro, A.L.B.; Nascimento, S.C.; Vieira, A.L.B.; Brugnera, A., Jr.; Zanin, F.A.; Rolim, A.B.; Silva, P.S. Effects of Low-Level Laser Therapy on Malignant Cells: In Vitro Study. *J. Clin. Laser Med. Surg.* 2002, 20, 23–26. [CrossRef]  
29. Hode, L. Low-Level Laser Therapy May Have Cancer Fighting Role. *Photomed. Laser Surg.* 2006, 34, 221–222. [CrossRef]  
30. Mikhailov, V.A.; Denisov, I.N.; Frank, G.A.; Volkchenko, N.N. Results of treatment of patients with second- to third-stage breast cancer by combination of low-level laser therapy (LLLT) and surgery: Ten-year experience. In *Laser Florence ’99: A Window on the Laser Medicine World, Proceeding of the SPIE Laser Florence ’99*, Florence, Italy, 28–31 October 1999; Proceedings of SPIE: Bellingham, WA, USA, 2000; Volume 4166, pp. 40–42.  
31. Friboulet, L.; Li, N.; Katayama, R.; Lee, C.C.; Gainor, J.F.; Crystal, A.S.; Michellys, P.Y.; Awad, M.M.; Yanagitani, N.; Kim, S.; et al. The ALK inhibitor ceritinib overcomes crizotinib resistance in non-small cell lung cancer. *Cancer Discov.* 2014, 4, 662–673. [CrossRef]  
32. Hseu, Y.C.; Chen, S.C.; Chen, H.C.; Liao, J.W.; Yang, H.L. *Antrodia camphorata* inhibits proliferation of human breast cancer cells in vitro and in vivo. *Food Chem. Toxicol.* 2008, 46, 2680–2688. [CrossRef] [PubMed]  
33. Wu, H.; Pan, C.L.; Yao, Y.C.; Chang, S.S.; Li, S.L.; Wu, T.F. Proteomic analysis of the effect of *Antrodia camphorata* extract on human lung cancer A549 cell. *Proteomics* 2006, 6, 826–835. [CrossRef] [PubMed]  
34. Chen, Y.Y.; Liu, F.C.; Chou, P.Y.; Chien, Y.C.; Chang, W.S.W.; Huang, G.J.; Wu, C.H.; Sheu, M.J. Ethanol extracts of fruiting bodies of *Antrodia cinnamomea* suppress CL1-5 human lung adenocarcinoma cells migration by inhibiting matrix metalloproteinase-2/9 through ERK, JNK, p38, and PI3K/Akt signaling pathways. *Evid. Based Complement. Altern. Med.* 2012, 2012, 378415.  
35. Huang, Y.L.; Chu, Y.L.; Ho, C.T.; Chung, J.G.; Lai, C.I.; Su, Y.C.; Kuo, Y.H.; Sheen, L.Y. Antcin K, an Active Triterpenoid from the Fruiting Bodies of Basswood-Cultivated *Antrodia cinnamomea* Prolongs Survival in a Patient with Small Cell Lung Cancer. *Medicina* 2019, 55, 640. [CrossRef]  
36. Gao, Y.; Gao, H.; Chan, E.; Tang, W.; Xu, A.; Yang, H.; Huang, M.; Lan, J.; Li, X.; Duan, W.; et al. Antitumor activity and underlying mechanisms of ganopoly, the refined polysaccharides extracted from *Ganoderma lucidum*, in mice. *Immunol. Invest.* 2005, 34, 171–198. [CrossRef]  
37. Haslett, P.A. Anticytokine approaches to the treatment of anorexia and cachexia. *Semin. Oncol.* 1998, 25, 53–57.  
38. Gelin, J.; Moldawer, L.L.; Lönroth, C.; Sherry, B.; Chizzonite, R.; Lundholm, K. Role of Endogenous Tumor Necrosis Factor α and Interleukin 1 for Experimental Tumor Growth and the Development of Cancer Cachexia. *Cancer Res.* 1991, 51, 415–421. [PubMed]