

【Google NotebookLM 效率王競賽】作業格式	
作業主題	Lung Adenocarcinoma
成果報告	1. 資料來源： ✓ Google 文件 ✓ 文字 Lung adenocarcinoma is the most common primary lung cancer seen in the United States. It falls under the umbrella of non-small cell lung cancer (NSCLC) and has a strong association with previous smoking. While incidence and mortality have declined, it remains the leading cause of cancer death in the United States. Adenocarcinoma of the lung usually evolves from the mucosal glands and represents about 40% of all lung cancers. It is the most common subtype to be diagnosed in people who have never smoked. Lung adenocarcinoma usually occurs in the lung periphery, and in many cases, may be found in scars or areas of chronic inflammation. ✓ Youtube 影片 ➤ https://youtu.be/n-FTyS7AqJI?feature=shared ➤ https://youtu.be/QKUOYpsbROk?feature=shared ✓ 網頁連結 ➤ https://www.sciencedirect.com/science/article/pii/S1368764624000153?via%3Dihub ➤ https://pmc.ncbi.nlm.nih.gov/articles/PMC10487838/ ➤ https://www.mmh.org.tw/know_health_view.php?docid=622 ✓ PDF 文件 ➤ 柯獻欽、鄭高珍 (2018)。晚期非小細胞肺癌之化學治療與標靶治療。內科學誌，29(3)，143-152。https://doi.org/10.6314/JIMT.201806_29(3).04 ➤ Arends J, Bachmann P, Baracos V, Barthelemy N, Bertz H, Bozzetti F, Fearon K, Hütterer E, Isenring E, Kaasa S, Krznaric Z, Laird B, Larsson M, Laviano A, Mühlebach S, Muscaritoli M, Oldervoll L, Ravasco P, Solheim T, Strasser F, de van der Schueren M, Preiser JC. ESPEN guidelines on nutrition in cancer patients. Clin Nutr. 2017 Feb;36(1):11-48. ➤ Cheng M, Zhang S, Ning C, Huo Q. Omega-3 Fatty Acids Supplementation Improve Nutritional Status and Inflammatory Response in Patients With Lung Cancer: A Randomized Clinical Trial. Front Nutr. 2021 Jul 30;8:686752. ➤ Tao X, Zhou Q, Rao Z. Efficacy of ω-3 Polyunsaturated Fatty Acids in Patients with Lung Cancer Undergoing Radiotherapy and Chemotherapy: A Meta-Analysis. Int J Clin Pract. 2022 Jul 8;2022:6564466. ➤ Troesch B, Eggersdorfer M, Laviano A, Rolland Y, Smith AD, Warnke I, Weimann A, Calder PC. Expert Opinion on Benefits of Long-Chain Omega-3 Fatty Acids (DHA and EPA) in Aging and Clinical Nutrition. Nutrients. 2020 Aug 24;12(9):2555. ➤ Calder PC. n-3 PUFA and inflammation: from membrane to nucleus and from bench to bedside. Proc Nutr Soc. 2020 Jun 22:1-13. ➤ van der Meij BS, Langius JA, Smit EF, Spreeuwenberg MD, von Blomberg BM, Heijboer AC, Paul MA, van Leeuwen PA. Oral nutritional supplements containing (n-3) polyunsaturated fatty acids affect the nutritional status of patients with stage III non-small cell lung cancer during multimodality treatment. J Nutr. 2010 Oct;140(10):1774-80. ➤ de Aguiar Pastore Silva J, Emilia de Souza Fabre M, Waitzberg DL. Omega-3 supplements for patients in chemotherapy and/or radiotherapy: A systematic review. Clin Nutr. 2015 Jun;34(3):359-66.
	2. 操作步驟、Prompt 設計： A. 操作步驟 ➤ 註冊 Google 帳號後登入，將文件與參考資料，例如 Google 文件、Google 簡

報、純文字、PDF、網站連結或 YouTube 影片新增至 NotebookLM。

- 對話與互動：直接向 NotebookLM 提問，AI 會自動擷取內容，提供摘要、答案與來源。
- 記事與標記：依據內容生成標籤，於文字下方點選儲存至記事，可快速分類與記憶。

B. Prompt 問題

- 就肺癌的分類與分期而言，不同時期與系統的主要區別與演變為何？
就肺癌的分類與分期而言，主要區別在於組織學分類（小細胞肺癌與非小細胞肺癌）以及疾病擴散程度的分期系統的演變。
組織學分類的主要區別：
肺癌主要分為兩大類：小細胞肺癌 (Small Cell Lung Cancer, SCLC) 與 非小細胞肺癌 (Non-Small Cell Lung Cancer, NSCLC)
在治療選項上，醫師通常使用更簡單的兩期系統來區分小細胞肺癌，即「局限期」和「廣泛期」（或稱擴散期）。
局限期指癌症僅限於一側肺部且淋巴結僅位於同一側胸部。
廣泛期則指癌症已擴散到另一側肺部、對側胸部的淋巴結、遠處器官，或者有惡性肺水包繞肺部。
根據 YouTube 頻道 "Dirty Medicine" 的資訊，小細胞肺癌與特定的副腫瘤症候群相關，例如 SIADH 和 Lambert-Eaton 症候群，後者會造成肌肉無力，但在肌肉使用後會改善記憶小細胞肺癌時，可以使用口訣 SCL (Small Cell Lung)，代表 S (SIADH)、C (Cushing's syndrome 或類 Cushing's 症候群，來源未在你的資料中)、L (Lambert-Eaton syndrome)，以及與吸菸、chromogranin A 和 ELM 基因突變的相關性。
非小細胞肺癌的分類則更細，主要包括腺癌、鱗狀細胞癌等。YouTube 頻道 "Dirty Medicine" 指出，腺癌可能與 肥厚性骨關節病變 (Hypertrophic Osteoarthropathy) 相關，表現為杵狀指（趾）。腺癌通常發生在肺部周邊，更常見於女性和非吸菸者，且相較於其他肺癌類型，預後相對較好。
疾病分期系統的主要區別與演變（以非小細胞肺癌為主）：
非小細胞肺癌的分期系統經歷了多次修訂。根據「肺癌分期.pdf」的記載，重要的版本包括：
1997 年修訂版（美國癌症聯合委員會 (AJCC) 2002 年第六版系統），此系統將非小細胞肺癌分為一至四期，主要依據原發腫瘤的大小和位置 (T)、淋巴結轉移情況 (N) 以及是否有遠處轉移 (M)。
例如，第三期肺癌在第六版中可能包括腫瘤不大但合併惡性肋膜積水的情況。
最新的進展是 2009 年發表的第七版肺癌 TNM 分類 (UICC 版本)。第七版與第六版的主要區別在於對 T 分期和 M 分期的更詳細劃分。
T 分期更加細分腫瘤的大小，例如將 T2 再分為 T2a（腫瘤直徑介於 >3cm 和 ≤5cm）和 T2b（腫瘤直徑介於 >5cm 和 ≤7cm），並將原先歸類於 T4 的某些情況（如同側肺葉內有獨立的腫瘤結節）重新歸類於 T3，而原先在同側肺但不同肺葉的腫瘤結節則從 M1 重新歸類於 T4。
M 分期也更加細分遠處轉移的情況。惡性肋膜積液、心包膜積液或肋膜腫瘤結節在第六版中可能屬於第三期 (IIIB)，但在第七版中則被歸類為 M1a 期（胸膜播散），代表已有遠處轉移，因此屬於第四期同樣地，原發腫瘤對側肺葉出現衛星結節也被歸類為 M1a，而肺和胸膜以外的其他器官轉移則屬於 M1b。
「晚期非小細胞肺癌之化學治療與標靶治療.pdf」強調，肺癌在初診斷時，約六成即屬於無法手術切除的晚期肺癌（通常指第三期或第四期），治療目標在於延長存活期、增進生活品質與減少治療副作用。標靶治療的出現，尤

其針對具有驅動因子突變的晚期肺腺癌，因其療效顯著且副作用通常低於化學治療，已成為重要的治療選擇。

總而言之，肺癌的分類首先區分小細胞肺癌和非小細胞肺癌，兩者在治療策略和預後上有顯著差異。在非小細胞肺癌的分期方面，系統不斷演進，最新的第七版 TNM 分類對腫瘤大小、局部侵犯和遠處轉移的定義更加精確，這直接影響了疾病的期別判定和後續的治療決策。

➤ 晚期非小細胞肺癌的化學治療目標為何？

根據「晚期非小細胞肺癌之化學治療與標靶治療.pdf」，對於無法手術切除的晚期肺癌（通常指第三期或第四期），化學治療的主要目標在於：

延長存活期。

增進生活品質。

減少治療的副作用。

此文件亦指出，約有六成的肺癌在初診斷時即屬於無法手術切除的晚期肺癌。因此，化學治療在晚期非小細胞肺癌的治療中扮演著重要的角色，旨在控制疾病進展，減輕患者的痛苦，並盡可能延長其生命。

➤ Omega-3脂肪酸如何影響肺癌病患？

Omega-3 脂肪酸可能透過多種途徑影響肺癌病患，主要表現在改善營養狀況、調節發炎反應以及潛在輔助癌症治療等方面。

改善營養狀況：

在有體重流失風險或營養不良的晚期癌症化療病患中，補充長鏈 N-3 脂肪酸或魚油可能穩定或改善食慾、食物攝取量、瘦體重和體重。這項建議的證據等級為低，但有專家共識一項針對肺癌病患的隨機臨床試驗顯示，Omega-3 脂肪酸補充組相較於安慰劑組，在介入 12 週後，體重顯著增加 (66.71 ± 9.17 公斤 vs. 61.33 ± 8.03 公斤, $p = 0.021$)。同一研究也觀察到 Omega-3 補充組的血清白蛋白顯著升高 (4.74 ± 0.80 g/dL vs. 4.21 ± 0.77 g/dL, $p = 0.013$) 和三酸甘油酯顯著升高 (130.90 ± 25.17 mg/dL vs. 119.07 ± 14.44 mg/dL, $p = 0.032$)。一項針對接受放化療的肺癌病患的統合分析也指出， ω -3 PUFAs 在介入結束時能顯著改善體重變化和白蛋白變化。

調節發炎反應：

Omega-3 脂肪酸，特別是 EPA，是環氧化酶和脂氧化酶的受質，產生發炎活性較小的 3 系列和 5 系列類二十烷酸。EPA 是 N-6 花生四烯酸的競爭性拮抗劑，後者會轉化為強烈促發炎的 2 系列和 4 系列類二十烷酸。

Omega-3 脂肪酸可能透過競爭性拮抗 N-6 脂肪酸，來調節具有不同發炎效力的類二十烷酸平衡，包括前列腺素 E2 的產生，而前列腺素 E2 已被證明會促進腫瘤細胞增殖。

研究顯示，魚油和長鏈 N-3 脂肪酸可以減輕癌症病患的發炎反應，表現為發炎標記物（如介白素 6 或 C 反應蛋白）和靜息能量消耗的降低。

上述針對肺癌病患的隨機臨床試驗發現，Omega-3 補充組的 C 反應蛋白 (CRP) 和腫瘤壞死因子 α (TNF- α) 水平顯著降低。該研究的結論認為，Omega-3 脂肪酸的抗發炎作用是改善病患營養狀況的重要媒介。

一項針對接受放化療的肺癌病患的統合分析也顯示， ω -3 PUFAs 能顯著降低 CRP 和 TNF- α 的變化。

Omega-3 PUFAs 可能透過抑制表皮生長因子受體 (EGFR) 的活化，進而抑制生長因子受體結合蛋白 2 (Grb2) 的磷酸化，在發炎抑制中發揮作用。

Omega-3 PUFAs 還可能透過抑制 Toll 樣受體、下調 NF- κ B 訊號通路和減少發炎基因的表達來抑制發炎。

潛在輔助癌症治療：

臨床前模型顯示，長鏈 N-3 脂肪酸可能透過增加氧化壓力來增強幾種化學治療藥物的細胞毒性。

體外胰腺癌細胞模型顯示，含有魚油的脂質溶液能改善吉西他濱的抗增殖和抗侵襲作用。

一些非隨機臨床試驗顯示，補充魚油的肺癌病患的化學治療反應有所改善。

一項隨機試驗比較含有魚油（2 克/天 EPA）的口服營養補充劑與標準口服營養補充劑，但未能發現對肺癌化療（紫杉醇和順鉑或卡鉑）反應的影響。

有報告指出，魚油對化學治療引起的毒性具有保護作用，例如可能對幾種化療藥物引起的神經病變具有神經保護作用。一項小型乳癌隨機試驗發現，口服 N-3 脂肪酸補充劑能降低紫杉醇治療引起的神經病變發生率。

Omega-3 LCPUFAs 可能作為癌症治療的輔助手段，被認為可以透過多種機制影響腫瘤活性。有證據顯示，Omega-3 LCPUFAs 作為化療的輔助手段，對腫瘤治療反應、預防治療相關毒性和維持生活品質有益。

Omega-3 LCPUFA 補充劑的進一步益處可能包括減輕癌症相關疼痛以及減少癌症診斷引起的壓力和焦慮所導致的重度憂鬱症。

安全性：

在常用劑量下，魚油和長鏈 N-3 脂肪酸通常耐受性良好，但可能會有輕微的胃腸道不適，如魚腥味或打嗝。

歐洲食品安全局 (EFSA) 在 2012 年的結論認為，EPA 和 DHA 合併補充劑量高達 5 克/天，以及單獨補充 EPA 劑量高達 1.8 克/天，不會增加成人自發性出血或出血併發症的風險。

然而，正在接受 ibrutinib 治療慢性淋巴細胞白血病的病患應避免魚油補充劑，因為 ibrutinib 與魚油補充劑的使用相關。

重要注意事項：

儘管有初步證據支持 Omega-3 脂肪酸對肺癌病患的潛在益處，但現有證據強度在許多方面仍不一致。許多研究的結果差異可能歸因於劑量、時間、持續時間、基線 Omega-3 狀態以及其他營養素的攝取等多種因素。

目前證據不足以支持 Omega-3 補充劑具有預防癌症發生的作用。因此，研究結果應被視為 Omega-3 脂肪酸可能透過抑制發炎反應來改善肺癌病患的營養狀況，屬於姑息治療，有助於提高其生活品質。

需要更多設計完善的介入研究，以確定 Omega-3 脂肪酸在特定肺癌病患群體中的具體效果，並制定更個人化的使用策略。

總結來說，Omega-3 脂肪酸補充劑可能對肺癌病患在改善營養狀況和調節發炎反應方面有潛在益處，並且可能作為癌症治療的輔助手段，但其確切效果和最佳使用方式仍需更多臨床研究證實。

➤ 維持治療在晚期肺癌扮演何種角色？

根據「晚期非小細胞肺癌之化學治療與標靶治療.pdf」，對於無法手術切除的晚期肺癌，化學治療的目標在於延長存活期、增進生活品質與減少治療的副作用。由於約有六成的肺癌在初診斷時即屬於晚期，因此維持治療在晚期肺癌中扮演著重要的角色。

維持治療（maintenance therapy）的概念如下：

在病人經過 4-6 個療程的化學治療後，如果病情達到緩解（complete response, CR）或穩定（stable disease, SD），則進行維持治療。

維持治療是以單一化療藥物、標靶藥物或免疫製劑持續治療，目的是讓病人

有機會接受更多線的治療。

藉由維持治療，可以延長無惡化存活期（Progression-Free Survival, PFS），甚至整體存活期（Overall Survival, OS）。

傳統上，在初線化療達到緩解或穩定後，通常會採取觀察（"watch and wait"），但多數病人在 2-3 個月後會惡化，錯失治療良機，因此維持治療可彌補此缺憾。

該文件也提供了維持治療的具體做法：

若病人在第一線化療時有併用 bevacizumab 或 pembrolizumab，則仍可持續單方使用 bevacizumab 或 pembrolizumab 作為維持治療，直至病情惡化。

若病人第一線化療藥物使用 pemetrexed, gemcitabine 或 docetaxel，則維持治療仍可持續單獨使用這些化學藥物。

PARAMOUNT 試驗顯示，以 pemetrexed 作為維持治療時，可顯著延長 PFS、OS 與 1 年存活率。

SATURN 試驗顯示，對於非選擇性病人在第一線化療後使用 erlotinib 做維持治療，PFS 與 OS 都有所延長。然而，後續的 IUNO 試驗無法證實 erlotinib 維持治療對非屬常見 EGFR 突變患者的療效，因此美國 FDA 修正了 erlotinib 的適應症，對於野生型（wild type）EGFR 病人不建議使用 erlotinib 做化療後的維持治療。

由此可見，維持治療在晚期肺癌的治療策略中，旨在鞏固化療的療效，並透過持續的治療來延緩疾病的惡化，進而達到延長病患生命和提升生活品質的目標。

- 根據此資料，肺癌的 TNM 分類系統在臨床診斷與治療決策上扮演什麼角色？

根據「肺癌分期.pdf」的資料，肺癌的 TNM 分類系統在臨床診斷與治療決策上扮演著至關重要的角色。

診斷與分期：TNM 分類系統的主要目的是定義肺癌病灶的範圍與擴散程度。它根據以下三個方面進行評估：

原發腫瘤 (T)：描述原發腫瘤的大小和在肺內的侵犯程度。資料中詳細列出了 Tx、T0、Tis、T1a/b、T2a/b、T3 和 T4 的具體定義，依照腫瘤的大小和是否侵犯到周圍結構（如主支氣管、臟層胸膜、胸壁、橫膈膜等）進行劃分。

淋巴結轉移 (N)：評估癌細胞是否已擴散到區域淋巴結，以及擴散到哪些位置的淋巴結（如同側支氣管或肺門淋巴結、同側縱隔和/隆突下淋巴結、對側縱隔和/或對側肺門淋巴結等）。N 分期包括 Nx、N0、N1、N2 和 N3。

遠處轉移 (M)：判斷癌細胞是否已擴散到肺部以外的其他器官，如肝、腦、骨頭或骨髓。M 分期分為 Mx、M0 和 M1，其中 M1 還進一步細分為 M1a（胸膜播散或對側肺葉出現衛星結節）和 M1b（肺/胸膜外其他器官轉移）。

決定治療方式：根據腫瘤的 TNM 分期結果，醫生可以判斷肺癌的期別（從 0 期到 IV 期）。肺癌的治療方式是依據腫瘤期別 (tumor stage) 等因素做決定。

例如，資料中提到早期的非小細胞肺癌（第 I~III A 期）以手術切除為主，術後視病理分期輔以輔助性化療或放療。

晚期非小細胞肺癌（第 III B~IV 期）則以緩和醫療為主，目標在於延長生命、維持生活品質與減少治療的副作用。

資料中還舉了一個病例說明，原本根據較早期的分期標準（第六版）被認為

是第 IIIB 期的肺癌，因為出現了惡性肋膜積水，根據最新的第七版分期則被歸為第四期肺癌，這直接影響了疾病的嚴重程度判斷和後續的治療策略。

小細胞肺癌的分期與治療：「肺癌分期.pdf」也提到，雖然小細胞肺癌也可以像非小細胞肺癌一樣分期，但臨床上更常使用局限期和廣泛期這兩個更簡單的系統來指導治療。局限期指癌細胞僅限於一側肺和同側胸部的淋巴結，而廣泛期則表示癌細胞已擴散到對側肺、對側胸部的淋巴結、遠處器官或有惡性肺水。這種分期直接影響治療的選擇。

總之，肺癌的 TNM 分類系統是一個標準化的方法，用於描述腫瘤的解剖學範圍，它在肺癌的診斷、預後評估以及制定和選擇最適合病患的治療方案方面起著核心作用。不同的分期代表著不同的疾病擴散程度和預後，因此醫生會根據病患的具體分期來決定是否適合手術、化療、放療、標靶治療或其他治療方式。

3. 成果分析：(限1000字內)

- 本次作業中採用的資料來源廣泛而具可信度，包括學術期刊、臨床試驗、系統性回顧、以及具醫學專業背景的 YouTube 影片等，有效提升整體資訊的準確性。透過引用近年文獻，如 ESPEN 指引、營養期刊，對肺腺癌的分類、治療策略（含化療、標靶治療與 Omega-3 的輔助角色）進行系統性分析，內容與目前醫學共識一致。
- 資料整合後，針對晚期非小細胞肺癌（NSCLC）的治療與分期制度，提供臨床具參考價值的資訊，特別是對 TNM 分期制度的演變與維持治療（Maintenance Therapy）的闡述，有助於理解治療策略與預後間的連結。Omega-3 脂肪酸的補充作為輔助治療的實證整理，亦能提供醫療決策者與病患更多實用性建議。
- 本成果運用 NotebookLM 進行多格式資料整合（Google 文件、影片、期刊、網頁等），並透過 AI 提問與互動功能，有效彙整繁複的醫學資訊。利用 Prompt 設計深入探討分類、分期、治療策略等關鍵問題，不僅提升分析效率，也展現創新應用 AI 輔助學習的潛力。
- 對於肺癌的分類（SCLC vs NSCLC）與其臨床意涵，作業不僅止於表面定義，更進一步結合病理特徵、病理演進與治療選擇進行綜合分析。對 TNM 分期制度的歷史脈絡與關鍵差異的解析，展示對癌症診療系統之整體掌握；Omega-3 在腫瘤營養與發炎控制的多重機轉，顯示良好的理論分析。
- 整體表現評估

本成果展現出高度的資料整合能力與分析深度，成功結合 AI 工具與醫學知識應用，從宏觀的分類分期到微觀的分子補充策略，皆有具體且深入的論述。操作流程規劃明確，Prompt 設計具針對性，整體表現優異。

除了整體準確性與資料整合能力外，本次成果亦展現出優秀的問題導向學習模式。在與 NotebookLM 互動的過程中，我學會如何以臨床思維為出發點，設計具體的提問邏輯，逐步建立從疾病分類、診斷標準、治療選項到輔助療法的完整知識架構。特別是在探討 Omega-3 脂肪酸的作用機轉時，透過 AI 協助將多篇期刊研究結果進行統整比較，讓我得以從營養學、免疫學與腫瘤微環境等角度，對其臨床應用潛力提出更具深度的觀察與見解。

此外，本次作業的執行也強化了我在跨領域學習與資訊整理方面的能力。透過將醫學、營養學與 AI 工具操作三者結合，我不僅提升了文獻閱讀與摘要撰寫的效率，更在知識應用層次展現跨界整合的能力。這樣的訓練模式對於日後面對複雜病例分析、醫療決策制定與跨專業溝通皆具備實質助益。

充分體現了 AI 輔助學習的價值，不僅提升知識掌握與實證應用能力，更促進了我對醫療資訊的反思與整合能力。未來若能延伸應用至多案例分析與臨床決策模擬，將有望進一步培養批判性思維與精準醫療素養。

4. 應用情境：

Lung Adenocarcinoma

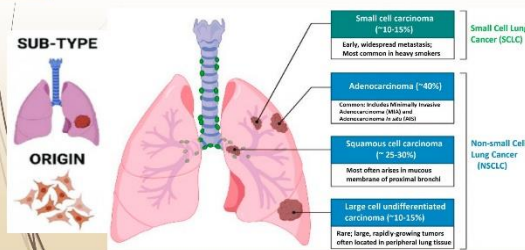
2022 Top 10 causes of death

排位	所有死亡原因	死亡人數(人)		死亡人數 (每千人人口)		標準化死亡人數 (每千人人口)	
		111年	死亡人數 佔比	110年 總人口	111年 總人口	總比	111年 死亡人數 佔比
1	所有死亡原因	20,438	13.2	893.8	13.9	441.9	9.5
1		53,927	0.5	1	222.7	1.2	1
2	心臟病(屬通性或非通性)	23,668	83	2	101.5	9.0	2
3	COVID-19 流行性感冒及肺炎	14,667	1,536.9	19	268.1	5,574.3	28.6
4	肺炎	14,320	5.7	3	63.4	2.6	263
5	腦血管疾病	12,416	5.1	4	51.2	2.6	5.5
6	糖尿病	12,289	7.3	5	52.7	8.0	6
7	癌症	8,720	10.6	6	37.4	11.3	8
8	腎臟疾病	6,953	2.6	7	29.8	3.3	7
9	慢性下呼吸道疾病	6,894	4.1	8	27.8	4.8	10
10	肺炎、流行性感冒及傷寒	5,183	6.3	9	24.9	6.9	11

Top 10 causes of cancer



Histological classification of lung cancer



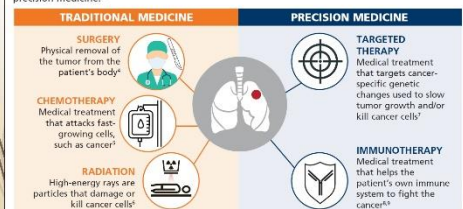
Diagnosis of lung cancer

	English Method	Advantages	Disadvantages
140	Learning materials represent 2-Dimensional images of the scene	Material is not a simulated 3D scene Learners would not be learning depth cues	
	Engagement is more natural and stronger High capability for adding multimedia	Information is limited to 2D only Provided the video can be used for 3D scene simulation	
	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
150	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
151	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
152	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
153	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
154	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
155	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
156	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
157	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
158	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
159	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
160	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
161	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
162	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
163	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
164	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
165	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
166	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
167	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
168	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
169	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
170	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
171	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
172	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
173	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
174	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
175	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
176	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
177	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
178	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
179	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
180	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
181	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
182	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
183	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
184	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
185	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
186	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
187	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
188	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
189	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
190	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
191	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
192	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
193	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
194	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
195	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
196	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
197	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
198	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
199	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
200	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
201	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
202	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
203	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
204	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
205	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
206	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
207	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
208	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
209	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
210	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
211	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
212	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
213	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
214	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
215	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
216	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
217	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
218	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
219	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
220	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
221	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
222	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
223	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
224	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
225	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
226	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
227	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
228	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
229	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
230	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
231	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
232	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
233	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
234	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
235	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
236	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
237	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
238	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
239	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
240	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
241	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
242	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
243	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
244	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
245	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
246	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
247	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
248	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
249	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
250	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
251	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
252	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
253	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
254	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
255	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
256	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
257	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
258	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
259	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
260	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
261	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
262	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
263	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
264	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
265	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
266	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
267	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
268	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
269	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
270	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
271	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
272	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
273	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
274	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
275	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
276	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
277	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
278	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
279	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
280	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
281	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
282	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
283	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
284	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
285	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
286	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
287	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
288	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
289	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
290	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
291	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
292	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
293	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
294	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
295	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
296	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
297	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
298	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
299	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
300	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
301	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
302	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
303	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
304	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
305	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
306	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
307	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
308	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
309	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
310	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
311	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
312	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
313	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
314	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
315	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
316	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
317	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
318	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
319	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
320	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
321	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
322	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
323	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
324	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
325	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
326	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
327	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
328	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
329	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
330	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can be used for 3D scene simulation	
331	Information is not limited to 2D scenes High spatial resolution and high frame rate resolution	Requires two screens to be used together Provided the video can	

Treatment of lung cancer

FIGURE. Complementing Traditional Medicine with Precision Medicine

Surgery, chemotherapy, and radiation have been the backbone of cancer treatment for decades, but recent advances are allowing doctors to further individualize their patients' treatment with precision medicine.^{2,3}



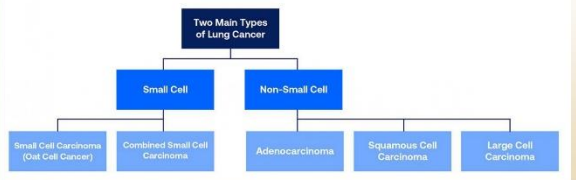
Outline

- A. Introduction of Lung Adenocarcinoma
- B. Nutrition Consultation
- C. Paper Review
- D. Conclusion

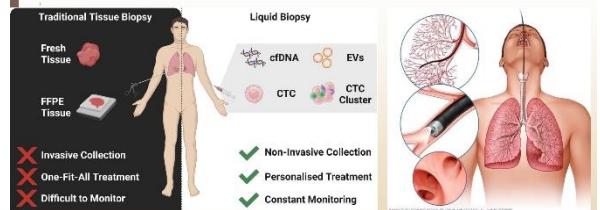
2022 Top 10 causes of death



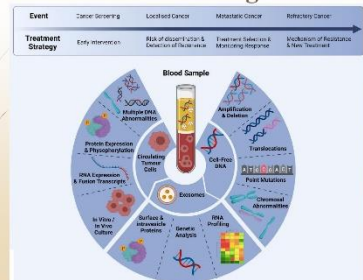
Classification of lung cancer



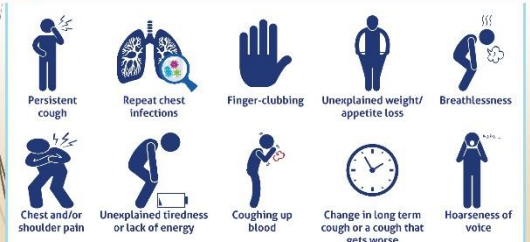
Diagnosis of lung cancer



Biomarkers of lung cancer

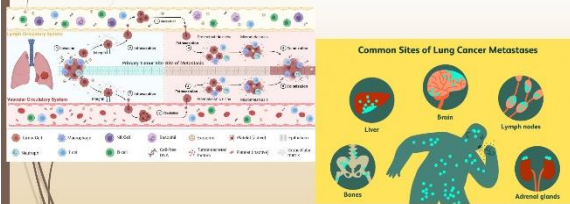


Signs and symptoms



12

Metastasis of lung cancer



14

Major risk factors



Nutrition care process - 1st

Chief complaint & Past history

18

Chief complaint:

- Headache and neck stiffness for 3 months

Medical history:

- Denied past history

Family history:

- Liver cancer, Oral cancer, Colon cancer

Imp:

- LL lung adenocarcinoma, stage IV, with multiple brain metastases and leptomeningeal seeding

20

Nutrition Assessment

Biochemical Data (BD)

Date	ALB	IP			
23-11-24	4.6	3.7			
Date	BUN	CREA	NA	K	eGFR(M)
23-12-01	12	0.79	133	3.4	104
Date	WBC	HGB			
23-12-01	5550	13.9			

22

Nutrition Assessment

Food/Nutrition-Related History (FH)

Diet order:

- Regular Diet

Diet during hospitalization (食慾差時)

- 因吞嚥困難、疼痛食慾下降
- 倍達1瓶+鹹粥0.5-1碗+(小)蘋果0.5-1顆+亞培安素沛力1瓶

Intake analysis during hospitalization:

- 600-700kcal/d, Protein 20-25g/d

13

Stages of lung cancer

TNM 8th - Primary tumor characteristics	
T ₀	Tumor in sputum/bronchial washings but not be assessed in imaging or bronchoscopy
T ₁	No evidence of tumor
T ₂	Carcinoma in situ
T ₁	≤ 3 cm surrounded by lung/visceral pleura, not involving main bronchus
T ₂	Minimally invasive carcinoma
T _{2a}	≤ 1 cm
T _{2b}	≤ 1 to ≤ 2 cm
T _{2c}	> 2 to ≤ 3 cm
T ₂	≤ 3 to ≤ 5 cm or involvement of main bronchus without carina, regardless of distance from carina or involves ipsilateral pleura or pleurovisceral or post obstructive pneumonia extending to hilum
T ₃	> 5 to ≤ 7 cm in greatest dimension or tumor of any size that involves chest wall, pericardium, pleural space or satellite nodules in the same lobe
T ₄	> 7 cm in greatest dimension or any tumor with invasion of mediastinum, diaphragm, heart, great vessels, recurrent laryngeal nerve, esophagus, trachea, esophagus, spine or separate tumor in different lobe of ipsilateral lung

N ₁	Ipsilateral peribronchovascular and/or hilar nodes and intrapulmonary nodes
N ₂	Ipsilateral mediastinal and/or subcarinal nodes
N ₃	Contralateral mediastinal or hilar; ipsilateral/contralateral scalene/supraclavicular
M ₁	Distant metastasis
M _{1a}	Tumor in contralateral lung or pleural/pericardial nodules/malignant effusion
M _{1b}	Single extrathoracic metastasis, including single non-regional lymph node
M _{1c}	Multiple extrathoracic metastases in one or more organs

15

Clinical Nutrition	
Strength of recommendation	STRONG
Level of evidence	Moderate
Questions for research	effect on clinical outcome of increased supply (1-2 g/kg/day) and composition of protein/amino acids

Client history (CH)

17

- 楊先生
- 50 yrs
- Male
- Cigarette: Nil
- Alcohol: 1-2 times/month, wine 600-800 ml/times
- Education: College
- Language: Chinese
- Marital status: Married
- Occupation: Business

19

Nutrition Assessment

Anthropometric Measurement (AD)

- BMI= 170 cm
- IBW= 63.6 kg
- CBW= 57 kg
- BMI= 19.7
- UBW = 59-60 kg (3 months ago)

Nutrition-Focused Physical Findings (PE)

- None

21

Nutrition Assessment

Food/Nutrition-Related History (FH)

Diet at home (食慾佳時)

- 三餐多外食
- B: (中)素食麵1碗/(小)燻肉飯1碗
- L: 白飯1.3-1.5碗+(油/炸/煎/烤)豬肉/雞肉2-3兩+炒菜0.3-0.5碗/(大)廣東粥1碗
- D: 白飯1-1.5碗+(煎/烤)豬肉/(蒸/煎)魚肉2-3兩+炒菜0.3-0.5碗/(小)蘋果1個

Intake analysis at home:

- 1700-1800 kcal/d, Protein 70-75 g/d

23

Nutrition Assessment

Nutrition requirement

Estimated Energy Requirement:

- 57 kg x 30 kcal/kg = 1700-1800 kcal/d

Estimated Protein Requirement:

- 57 kg x 1.5 g/kg = 85.5 g/d

Nutritional status: Moderate malnourished (PG-SGA score: 8)

Nutrition Assessment

Medication

學名	商品名	劑量	單位	途徑	頻次	說明
Digoxin/lactate *tab 5mg/PTP VPP	Bisacodyl EPC * tab 5 mg/PTP VPP	2	TAB	PO	HS	暫時緩解便秘
Alprazolam (Xanax) ** tab 0.5 mg	Xanax ** tab 0.5 mg	1	TAB	PO	HS	此藥具有降低緊張感之功效
Osimertinib FC # tab 80 mg	Tagrisso FC # tab 80 mg	X2	TAB	PO	QOD	適用於肺腺癌患者服用基因子受體 (EGFR) 突變之肺腺癌或轉移性 NSCLC 病人的第一線治療。適用於治療具有 EGFR T790M 基因突變之局部晚期或轉移性 NSCLC 患者 EGFR TKI 治療期間或之後出現副作用的人。常見副作用有疲勞、腹瀉、皮膚乾燥、指甲變色、口腔炎、食慾減退、貧血、血小數低下、嗜中性白血球低下。

Nutrition Assessment

Nutrition Diagnosis

Problem	Inadequate Oral Intake (NI-2.1)
Etiology	Decreased ability to consume sufficient energy
Sign/Symptom	Change in appetite

Goal

- Energy intake: 1700-1800 kcal/day
- Protein intake: 85-90 g/day
- Maintain body weight

Monitoring & Evaluation

- Body weight
- Dietary intake

Nutrition Assessment

- Nutrition follow up due to inadequate intake.
- 患者要求置入鼻胃管，置入兩截式鼻胃管
- Well tolerance with enteral feeding diet.

Anthropometric Measurement (AD)

- BH= 170 cm
- CBW= 57.8 kg
- BMI= 20.0

Nutrition Assessment

Food/Nutrition-Related History (FH)

Diet order:

- 一般灌食-均衡配方 (Regular Feeding-Nutrient Complete Formula) 纖維：低渣，濃度：1.0 kcal/ml(1S)，熱量：1750kcal

Diet during hospitalization:

- 一般灌食(均衡配方) 1750kcal+核桃/腰果10顆+倍速1瓶/稀飯0.8-1碗

Estimated during hospitalization:

- 2000-2100kcal/d, Protein 75-80 g/d

Nutrition Assessment

Medication

學名	商品名	劑量	單位	途徑	頻次	說明
Scopolamine FC tab 20 mg	Thorough FC tab 20 mg	2	TAB	PO	HS	緩解便秘
Moxipride curate 1°C tab 5 mg	Moxipride 1°C tab 5 mg	1	TAB	PO	TTD	預防胃腸蠕動異常引起之不適症狀，包括心窩灼熱、噁心、噯氣
Baclofen * tab 10 mg "TW"	Baclofen * tab 10 mg "TW"	0.5	TAB	PO	TTD	脊髓和大腦的成癮引起的肌肉痙攣，伴有嚴重的運動神經元的痙攣，而產生肌肉的痙攣作用
Megestrol sup 40 mg/ml 120 ml	Megestrol sup 40 mg/ml 120 ml	10	CC	PO	QD	預防或治療因服用某些藥物而導致的體重減輕，而體重或肌肉量下降的體重明顯減輕
Lorazepam "U.L." ** tab 0.5 mg/PTP	Anxiolam ** tab 0.5 mg/PTP	1	TAB	PO	HS	緩解焦慮症狀
Tramadol SR(Muonexin) ** tab 100mg	Muonexin SR 2** tab 100 mg	1	TAB	PO	HS	中級神經系統鎮痛劑
Alprazolam (Xanax) ** tab 0.5 mg	Xanax ** tab 0.5 mg	1	TAB	PO	HS	此藥具有降低緊張感之功效

Nutrition Assessment

Medication

學名	商品名	劑量	單位	途徑	頻次	說明
Scopolamine FC tab 20 mg	Thorough FC tab 20 mg	2	TAB	PO	HS	緩解便秘
Moxipride curate 1°C tab 5 mg	Moxipride 1°C tab 5 mg	1	TAB	PO	TTD	預防胃腸蠕動異常引起之不適症狀，包括心窩灼熱、噁心、噯氣
Baclofen * tab 10 mg "TW"	Baclofen * tab 10 mg "TW"	0.5	TAB	PO	TTD	脊髓和大腦的成癮引起的肌肉痙攣，伴有嚴重的運動神經元的痙攣，而產生肌肉的痙攣作用
Megestrol sup 40 mg/ml 120 ml	Megestrol sup 40 mg/ml 120 ml	10	CC	PO	QD	預防或治療因服用某些藥物而導致的體重減輕，而體重或肌肉量下降的體重明顯減輕
Lorazepam "U.L." ** tab 0.5 mg/PTP	Anxiolam ** tab 0.5 mg/PTP	1	TAB	PO	HS	緩解焦慮症狀
Tramadol SR(Muonexin) ** tab 100mg	Muonexin SR 2** tab 100 mg	1	TAB	PO	HS	中級神經系統鎮痛劑
Tramadol FC ** tab	Tramadol FC ** tab	1	TAB	PO	HS	使用時應注意避免服用中藥及多種藥物

Nutrition Intervention

Content related nutrition education

Nutrition Prescription: Calorie 1700-1800 kcal/day, Protein 85-90 g/day.

1. Instruct high protein diet 1700-1800 kcal/day, protein 85-90 g/day.
 - Food groups and food exchange list teaching.
 - Bean/Fish/Egg/Meat: 4-5 ex/day.
 - Grain: 6 ex/day.
 - Oral nutritional supplement introduction.
 - 增加1瓶適宜專用配方 (300 kcal/can)
 - 指導認識口服營養品營養標示
2. Quit drinking.
3. 如果無法由口進食達到熱量需要量，建議放置鼻胃管。

Nutrition care process – 2nd

Nutrition Assessment

Biochemical Data (BD)

Date	IP	BUN	CREA	NA	K
23-12-8	4.2	14	0.87	132	3.6
Date	BUN	CREA	NA	K	eGFR(M)
23-12-11	10	0.77	137	3.5	107
Date	WBC	HGB			
23-12-11	5330	12.3			

Nutrition Assessment

Medication

學名	商品名	劑量	單位	途徑	頻次	說明
Benzylsulfonate * spray 3 mg/ml 15ml	Diffusa forte * spray 3 mg/ml 15ml	X1	BOT	ORO	ASOR	舒解口腔及喉嚨不適
Tramadol curate oral * gel 0.1% 6 g	Nuncort oral * gel 0.1% 6 g	X1	FUB	MT	HRD	治療胃痛、胃酸過多、吞、津液分泌不足、口臭及急慢性便秘
Diphemylmethane * tab 5mg/PTP VPP	Bisacodyl 13°C * tab 5 mg/PTP VPP	2	TAB	PO	HS	暫時緩解便秘
Osimertinib FC # tab 80 mg	Tagrisso FC # tab 80 mg	X1	TAB	PO	QOD	適用於肺腺癌患者服用基因子受體 (EGFR) 突變之肺腺癌或轉移性 NSCLC 病人的第一線治療。適用於治療具有 EGFR T790M 基因突變之局部晚期或轉移性 NSCLC 患者 EGFR TKI 治療期間或之後出現副作用的人。常見副作用有疲勞、腹瀉、皮膚乾燥、指甲變色、口腔炎、食慾減退、貧血、血小數低下、嗜中性白血球低下。

Nutrition Assessment

Nutrition Diagnosis

Problem	Acute Disease or Injury Related Malnutrition (undernutrition) (NC-4.1.3)
Etiology	Physiological causes increasing nutrient needs due to acute illness
Sign/Symptom	Patient generated subjective global assessment (PG-SGA) score

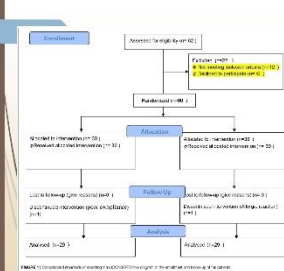
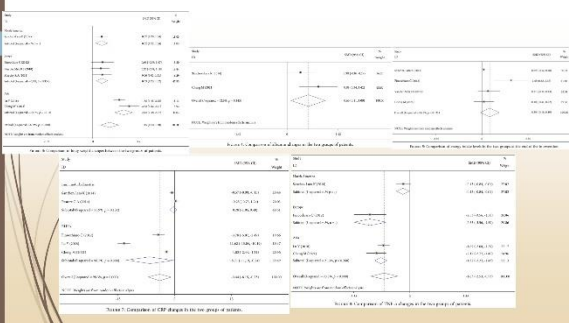
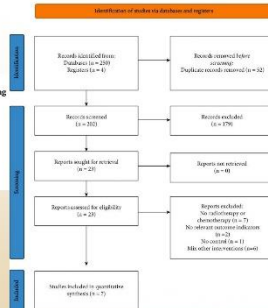
Nutrition Intervention

Content related nutrition education

Nutrition Prescription: Calorie 1700-1800 kcal/day, Protein 85-90 g/day.

1. Change diet to 一般渣食-均衡配方 (Regular Feeding-Nutrient Complete Formula) 纖維: 低渣, 濃度: 1.0 kcal/ml (1S), 熱量: 1250kcal.
2. 維持癌症專用配方 (300 kcal/can) * 2 can/day
3. Evaluation and monitoring dietary intake and body weight.

Review Article
Efficacy of ω -3 Polyunsaturated Fatty Acids in Patients with Lung Cancer Undergoing Radiotherapy and Chemotherapy: A Meta-Analysis



**Omega-3 Fatty Acids
Supplementation Improve Nutritional
Status and Inflammatory Response
in Patients With Lung Cancer: A
Randomized Clinical Trial**

W. H. Chung^{1,2}, S. C. Yang^{3,4}, C. H. Yang^{5,6}, and S. C. Wu^{1,2}

Interventions

Omega-3 fatty acid supplementation gel capsules [eicosapentaenoic acid (EPA) 1.6 g/day and docosahexaenoic acid (DHA) 0.8 g/day, derived from fish oil in gel capsules] or placebo gel capsules (sunflower oil) with a similar appearance (supplied by Sinadaro, China) were provided to the patients for 12 weeks of intervention. The dose was selected according to the previous study (26). Compliance of the patients was evaluated by a form marked on each day of taking capsules by the patient him/herself. The forms were checked in each visit by the investigator. Patients with more than three lost doses per month were excluded from the analysis.

TABLE 3 | Laboratory indices of nutritional status with lung cancer in omega-3 fatty acid supplementation and placebo groups.

Characteristics		Omega-3 (<i>n</i> = 29)	Placebo (<i>n</i> = 29)	<i>P</i> -value
Hemoglobin (g/L)	Before	9.92 ± 1.48	9.53 ± 2.27	0.469
	After	10.25 ± 1.75	9.60 ± 1.97	0.160
Albumin (g/L)	Before	4.18 ± 1.06	4.31 ± 1.09	0.644
	After	4.74 ± 0.80	4.21 ± 0.77	0.013
Triglyceride (mg/dL)	Before	114.45 ± 20.74	118.96 ± 22.04	0.436
	After	130.90 ± 25.17	119.07 ± 14.44	0.032
Cholesterol (mg/dL)	Before	164.52 ± 48.46	150.62 ± 57.38	0.701
	After	163.28 ± 45.57	152.97 ± 45.19	0.978

TABLE 4 | Inflammatory markers of patients with lung cancer in omega-3 fatty acid supplementation and placebo groups.

Characteristics		Omega-3 (Mean $\pm$ SD) (n = 29)	Placebo (Mean $\pm$ SD) (n = 29)	P-value
CRP* (mg/L)	Before	2.69 $\pm$ 1.34	2.79 $\pm$ 1.24	0.769
	After	1.42 $\pm$ 0.63	3.00 $\pm$ 1.05	0.001
Tnfa* (pg/mL)	Before	3.74 $\pm$ 1.69	3.87 $\pm$ 1.78	0.775
	After	1.92 $\pm$ 0.65	4.24 $\pm$ 1.19	0.001
IL-6† (pg/mL)	Before	4.27 $\pm$ 0.88	4.23 $\pm$ 0.93	0.852
	After	4.15 $\pm$ 1.46	4.20 $\pm$ 1.48	0.901

*C-reactive protein.
†Tumor necrosis factor alpha.

Conclusion

- Omega-3 PUFAs may improve the nutritional status and inflammatory reaction in patients undergoing radiotherapy and chemotherapy with lung cancer.
- Omega-3 fatty acid supplementation can improve nutritional status and suppress the systemic inflammatory response in patients with lung cancer.
- The total number of studies included in this paper was small, the quality of the literature was limited, and some outcomes had large heterogeneity.

Efficacy of ω -3 Polyunsaturated Fatty Acids in Patients with Lung Cancer Undergoing Radiotherapy and Chemotherapy: A Meta-Analysis

Year	Country	Area	Disease	Basic treatment	Intervention	Intervention duration	Dose	Control	Intervention sample	Control sample
2011	Mexico	North America	NSCLC	Cisplatin therapy	IPA	9 weeks	EPN 2.2 g/d	Standard care	66	66
2012	Italy	Europe	NSCLC	Cisplatin therapy	IPA + DHA	66 days	IPA 50 mg + DHA 500 mg/d	Docu oil	13	13
2019	Netherlands	Europe	NSCLC	Cisplatin therapy + radiotherapy	IPA + DHA	5 weeks	IPA 2.02 g + DHA 0.92 g/d	Irexolone premedication	20	20
2018	China	Asia	NSCLC	Cisplatin therapy + radiotherapy	IPA + DHA	6 weeks	IPA 500 mg + DHA 500 mg/d	Emulsion diet	77	66
2011	Canada	Europe	NSCLC	Cisplatin therapy	IPA	6 weeks	EPN 2.2 g/d	Control diet	16	24
2021	China	Asia	NSCLC + SCLC	Cisplatin therapy	IPA + DHA	12 weeks	IPA 1.6 g + DHA 6.0 g/d	Sulfoxone acid	20	20
2019	Brazil	South America	NSCLC + SCLC	Cisplatin therapy	IPA	6 weeks	EPN 2.2 g/d	Irexolone premedication	8	8

Omega-3 Fatty Acids Supplementation Improve Nutritional Status and Inflammatory Response in Patients With Lung Cancer: A Randomized Clinical Trial

TABLE 1 | Baseline demographic and clinical characteristics of patients with lung cancer in omega-3 fatty acid supplementation and placebo groups.

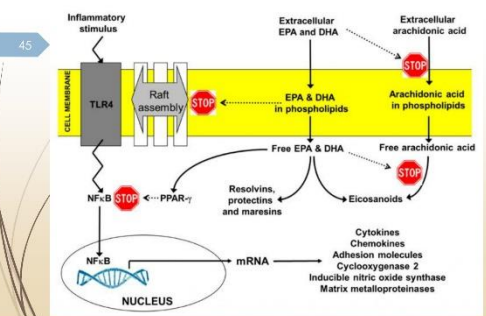
Characteristic	Omega-3 (Mean ± SD) n = 29	Placebo (Mean ± SD) n = 29	P-value**
Gender (male/female)	16/13	10/19	0.113
Age (years)	60.23 ± 8.28	64.55 ± 8.08	0.643
WBC	4.31 ± 0.89	4.41 ± 0.63	0.538
Type of lung cancer			
Small cell lung cancer	2	3	0.726
Non-small cell lung cancer	13	12	
Adenocarcinoma	10	7	
Squamous cell carcinomas	2	5	
Large cell carcinomas	1	0	
Others	2	2	
Stage of lung cancer			
Stage I NSCLC	2	3	
Stage II NSCLC	7	6	
Stage III NSCLC	12	10	
Stage IV NSCLC	2	3	
Stage I small cell lung cancer	1	1	
Stage advanced SCLC	1	2	
Small cell lung cancer			
Type of treatment			
Cisplatin	14	15	
Cisplatin and docetaxel	13	13	0.662
Doxorubicin	2	2	

*Values are not rounding.

**P-values obtained from Fisher's exact probability, or a test for the significance of trend.

TABLE 2 | Anthropometric outcomes of patients with lung cancer in omega-3 fatty acid supplementation and placebo groups.

Characteristics	Omega-3 (<i>n</i> = 25)	Placebo (<i>n</i> = 25)	P-value*
Weight (kg)	Before: 61.66 ± 10.02 After: 61.91 ± 9.17	62.46 ± 8.88 61.31 ± 8.03	0.809 0.121*
DM (kg/m^2)	Before: 20.04 ± 4.57 After: 21.64 ± 4.59	21.13 ± 4.48 20.81 ± 4.54	0.363 0.863
Upper arm circumference	Before: 24.73 ± 2.91 After: 25.08 ± 2.04	24.70 ± 2.08 24.87 ± 2.08	0.990 0.120
Skinfold thickness	Before: 12.43 ± 1.62 After: 13.54 ± 1.51	12.46 ± 1.60 12.71 ± 1.52	0.948 0.064
Calcium intake (Ca/mg)	Before: 2,067 ± 358 After: 2,130 ± 420	2,081 ± 360 2,090 ± 424	0.965 0.703



Referance

- Arends J, Bachmann P, Van Erven Y, Harberschuyt V, Beetz H, Olzevski F, Caron K, Sultman T, Iscuring F, Kasan R, Schreier L, Lind B, Laviano M, Livramento A, Mühlbauer C, Muscarello M, Mezzetti I, Ravasio D, Hollander T, Strasser E, van der Kraak de Kortmeester AC. ASPEN guidelines on nutrition in cancer patients. Clin Nutr. 2017;36(1):11-48.
- Cheung M, Zhang S, Ning C, Ho Q. Omega-3 fatty acids supplementation improves Nutritional Status and Inflammatory Response in Patients With Lung Cancer: A Randomized Clinical Trial. Front Oncol. 2021 Jul 30;9:658252.
- Liao X, Zhong Q. Role of Efficiency of α-Tocopherols as Antioxidant Agents against Oxidative DNA Damage in Lung Cancer Undergoing Radiotherapy: A Meta-Analysis. Int J Clin Pract. 2021 Feb;2022:6556466.
- Troesch B, Eggendorfer M, Laviano A, Rolland Y, Smith AD, Wankle I, Weimann A, Calder PC. Expert Opinion On Benefits Of Long-chain omega-3 fatty Acids (DHA) and EPA in Aging and Clinical Nutrition. Nutrients. 2020 Jun;12:4129-55.
- Huang Z, Li Y, Liu G, Wang Y, Chen Y, Wu Y, Xu X, Sun Y, Jiang W, Yang Y, Yao K, Zhou X, Zhao N, Guo Y, Shi X, Fan J, Huo X, He Y, Zhuang H, Yu J, Tang Y, et al. The Effectiveness of Intravenous Lipid Emulsion Supplementation in Improving Postoperative Recovery After Laparoscopic Gastrectomy: A Systematic Review and Meta-analysis. Surg Endosc. 2020 Jan 22;34(2):113-23.
- van der Meijs BS, Langius JA, Staal FE, Speybroekszweg MD, von Blomberg BM, Heijboer AC, Pool MA, van Leeuwen PA. Oral nutritional supplement consumption ($\geq$) polyunsaturated fatty acids affect the nutritional status of patients with stage III non-small cell lung cancer during multimodality treatment? J Natr. 2010 Oct;18(10):1774-80.
- García-Pastor Salas I, Emilia de Saiz-Garayzar M, Velázquez-López M. Omega-3 supplements for patients in chemotherapy and/or radiotherapy: A systematic review. Clin Nutr. 2015;34(3):359-66.



Thank you!

在此次作業過程中，我實際將 NotebookLM 應用於撰寫一篇關於晚期肺腺癌個案的臨床報告，該病患為一位年約50歲的非吸菸男性，確診為第四期肺腺癌，在初步化療反應良好後，考慮進行維持治療策略。在撰寫個案分析與治療計畫時，我需整合多份文獻、國際治療準則與營養建議，以建構完整的治療與照護方針，此時 NotebookLM 成為我極大的助力。

我將個案初步分析、參考文獻（PDF 文章、期刊連結）、以及前期的治療摘要上傳至 NotebookLM 平台，利用其多格式整合能力，建立一份個人化的知識庫。透過設計 Prompt，例如「晚期非小細胞肺癌維持治療的藥物選擇與效果比較」、「Omega-3在改善肺癌病患營養與發炎指標上的機轉與數據支持」等，我能快速獲取具臨床依據的回應。這對撰寫個案中的治療建議、營養策略以及病患生活品質改善對策，提供了實證支持。

更重要的是，NotebookLM 允許我反覆驗證文獻資料的出處與內容摘要，有效減少誤解或斷章取義的風險。我也嘗試將 YouTube 影片中提到的口訣與病理分類邏輯整合進報告中，用以加強對疾病理解的深度與通俗說明的能力。在與臨床指導老師討論過程中，我也能快速引用相關資訊，加強論述說服力。

整體而言，NotebookLM 並不只是工具，而是一個能與我「共讀、共思」的數位助手，在實際醫療報告撰寫與臨床應用情境中，展現極高的實用性與學術深度整合能力。

5. 心得與建議：

透過本次應用 NotebookLM 於肺腺癌相關主題，我對 AI 輔助醫學學習與臨床資料整合的能力有了更深刻的體驗與反思。

首先，我認為 NotebookLM 最具價值的特點在於其「跨格式整合」與「語意對話式分析」能力。過去面對大量資料時，往往需要逐一開啟文件、手動比對內容，耗費大量時間。然而藉由 NotebookLM，我能將 PDF、網站、影片連結、甚至是自己寫的初稿一次性納入資料庫，並以自然語言直接詢問疑問，減少大量查找與比對的瑣碎工作，讓我更能聚焦於臨床思維與分析。

其次，NotebookLM 並非單向搜尋工具，而是一個具有「共構」特質的學習夥伴。在我撰寫個案時，某些 Prompt 的回答甚至超出了我預期的視角，例如在分析 Omega-3 脂肪酸抗發炎作用時，平台自動鏈接到 EGFR 與 Grb2 訊號通路的研究機轉，這讓我對腫瘤營養的分子層次有了新的理解與學習契機。

然而，我也發現 NotebookLM 的資料彙整仍需使用者主動判斷其正確性與學術背景。例如某些資料摘要過於簡化，若無搭配原文交叉比對，可能會遺漏重要前提或限制條件。因此我認為，使用 AI 工具的同時，仍應保持批判性閱讀與交叉驗證的習慣。

我建議未來在醫學教育中，可以將 NotebookLM 等 AI 平台納入臨床寫作訓練的一部分。透過設計專題式學習任務（如本次肺癌分析），不僅能提升學生的實證整合與表達能力，也能培養新時代醫療人員運用 AI 進行輔助決策的能力。此外，若平台能加入引用格式自動生成、文獻品質評估等功能，將更進一步提升其應用價值。

總結來說，本次使用 NotebookLM 不僅大幅提升了撰寫個案報告的效率，也強化了我從資料中萃取洞見、進行實證論證的能力。這不僅是一次技術上的進步，更是學習思維模式的革新。

來源

對話

Studio

Lung Adenocarcinoma

16 個來源

這份文件主要闡述了肺癌的分期系統，尤其著重於非小細胞肺癌的 TNM 分類。它回顧了分期系統的歷史沿革，從 1997 年的第五版到 2009 年生效的第七版的主要變革，像是根據腫瘤大小更細緻的劃分以及遠處轉移定義的更新。此外，文件也簡述了小細胞肺癌的兩期分類，即局限期和廣泛期，以提供更簡便的治療考量。總體而言，這份資料旨在說明肺癌分期的複雜性與持續發展，並解釋不同分期對於疾病判斷的意義。

儲存至記事

來源

對話

Studio

新增

搜索

獲取所有來源

49938865

Advances in Genomic Data and Biomarkers Revolutionizing Lung Cancer Diagnosis and Treatment.pdf

ESPEN guidelines on nutrition in cancer patients.pdf

Efficacy of ω-3 Polyunsaturated Fatty Acids in Patients with Lung Cancer Undergoing Radiotherapy and Chemotherapy: A Meta-Analysis.pdf

Expert Opinion on Benefits of Long-Chain Omega-3 Fatty Acids in Lung Cancer Patients.pdf

Lung Cancer Tumors

Lung cancer types | Respiratory system diseases | NCBI

MAFF confers vulnerability to cisplatin-based and immunotherapy in lung cancer cells

MIRNAs in Lung Adenocarcinoma: Role, Diagnosis, Prognosis, and Therapy

Omega-3 Fatty Acids Supplementation Improve Nutritional Status and Quality of Life in Lung Cancer Patients.pdf

Progression and metastasis of lung cancer.pdf

The Role of Circulating Biomarkers in Lung Cancer.pdf

根據此資料，肺癌的 TNM 分類系統在臨床診斷與治療決策上扮演什麼角色？

根據「肺癌分期.pdf」的資料，肺癌的 TNM 分類系統在臨床診斷與治療決策上扮演著至關重要的角色。它根據以下三個方面進行評估：

- **原發腫瘤 (T)**：描述原發腫瘤的大小和在肺內的侵犯程度。資料中詳細列出了 Tx、T0、T1a、T1ab、T2ab、T3 和 T4 的具體定義，依照腫瘤的大小和是否侵犯到周圍結構（如主支氣管、縱膈胸膜、胸壁、縱膈腺等）進行劃分。
- **淋巴結轉移 (N)**：評估癌細胞是否已擴散到區域淋巴結，以及擴散到哪些位置的淋巴結（如胸內支氣管或肺門淋巴結、同側縱膈和/或隆突下淋巴結、對側縱膈和/或對側肺門淋巴結等）。N 分期包括 Nx、NO、N1、N2 和 N3。
- **遠處轉移 (M)**：判斷癌細胞是否已擴散到肺部以外的其他器官，如肝、腦、骨頭或骨髓。M 分期分為 Mx、MO 和 M1，其中 M1 還進一步細分為 M1a（胸膜腔或對側肺葉出現衛星結節）和 M1b（肺外其他器官轉移）。

• **決定治療方式**：根據腫瘤的 TNM 分期結果，醫生可以判斷腫瘤的期別（從 0 期到 IV 期）。肺癌的治療方式是依據腫瘤期別 (tumor stage) 等因素來決定。• 例如，資料中提到早期的非小細胞肺癌（第 I-III A 期）以手術切除為主，術後視病理分期輔以化療或放療。• 晚期非小細胞肺癌（第 III B-IV 期）則以緩和和醫療為主，目標在於延長生命、維持生活品質與減少治療的副作用。• 資料中還舉了一個病例說明，原本根據較早期的分期標準（第六版）被認為是第 II B 期的肺癌，因為 TUBB3 蛋白在 NSCLC 中預後意義為何？何謂虛假惡化，營養介入扮演何種角色？

Studio

語音摘要

深入探索對話

兩位主持人 (僅限英文)

自訂

生成

記事

新增記事

研讀指南

語音文件

常見問題

時間軸

肺癌診斷、治療與營養支持新進展

好的，這是一份根據您提供的資料所整理的詳細簡報文件，主要回顧了非小細胞肺癌 (NSCLC) 的診斷與治療進展、癌症營養支持指南以及 Omega-3 脂肪酸在肺癌治療中的作用。

簡報文件：肺癌診斷、治療與營養支持新進展

日期：2023年11月10日

目的：回顧近期對於非小細胞肺癌的診斷與治療進展，探討癌症營養支持指南，並分析 Omega-3 脂肪酸在肺癌治療中的潛在益處。

資料來源：

- Advances in Genomic Data and Biomarkers Revolutionizing Lung Cancer Diagnosis and Treatment.pdf
- ESPEN guidelines on nutrition in cancer patients.pdf
- Efficacy of ω-3 Polyunsaturated Fatty Acids in Patients with Lung Cancer Undergoing Radiotherapy and Chemotherapy: A Meta-Analysis.pdf
- Expert Opinion on Benefits of Long-Chain Omega-3 Fatty Acids in Lung Cancer Patients.pdf
- Lung Cancer Tumors (Khan Academy)
- MIRNAs in Lung Adenocarcinoma: Role, Diagnosis, Prognosis, and Therapy - PMC
- Progression and metastasis of lung cancer.pdf
- The Role of Circulating Biomarkers in Lung Cancer.pdf
- 晚期非小細胞肺癌之化學治療與標靶治療.pdf
- 肺癌分期.pdf

主要內容：

第一部分：非小細胞肺癌 (NSCLC) 的診斷與治療進展

- **生物標記 (Biomarkers)**：
 - 根據生物特性可分為：
 - **基因生物標記**：包括 DNA 變異，如基因突變或重排等基因型 (SNPs)。
 - **蛋白質生物標記**：可在血液或尿液等生物樣本中測量的特定蛋白質或蛋白質組。
 - **脂質生物標記**：與體內脂質代謝、可能與心血管或代謝疾病有關。
 - **代謝生物標記**：可在生物樣本中測量的代謝產物或中間體。
- 根據臨床應用可分為：
 - **診斷性生物標記**：用於確認或排除特定疾病或篩選患者。
 - **預後性生物標記**：用於預測疾病進展或治療反應。
 - **治療性生物標記**：用於評估治療中藥物的生物活性或藥物濃度。

撰寫格式：

字體：12號字(中文：標楷體、英文：Times New Roman)

與前後段距離：0列、行高：單行間距

12