高雄榮民總醫院
肺癌放射治療政策及執行程序 （2023 年第一版）

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注意事項
一、本治療指引主要做為臨床醫師與其他醫療保健人員參考之用。 二、假如您是一位癌症患者，直接引用此治療準則並不恰當，請與你的醫師討論決定您最恰當的治療

本版與上版的差異:

1. 非小細胞肺癌的 N2 手術後的放射治療適應症
2. 參考文獻（小細胞肺癌放射治療劑量）

前言

肺癌的治療指引以肺癌多專科團隊訂定的治療準則為依據。以下僅就非小細胞肺癌與小細胞肺癌治療時放射治療的適應症、治療技術、治療劑量、以及正常組織的劑量限制來說明肺癌放射治療政策及執行程序。

非小細胞肺癌之放射治療政策(strategy)及執行程序

1. 放射治療適應症

1.1 可手術的 I-II 期: 若是手術切除的邊緣有腫瘤細胞時，可施行手術後的放射治療。

1.2 I-II 期，但身體狀況不適合手術或經外科評估後拒絕手術者，可以施行放射治療。

1.2.1 T1-2N0:立體定位消融放射治療 (SABR, stereotactic ablative radiotherapy)

1.2.2 T3N0:同步化學放射治療、低分次放射治療(hypofrationated radiotherapy)、立體定位消融放射治療

1.2.3 T1-2N1:同步化學放射治療。

1.3 可手術的 IIIA 期:

1.3.1 手術前同步化學放射治療，並評估手術的可行性。

1.3.2 配合化學治療與手術，手術後若是手術切除的邊緣有腫瘤細胞可給予放射治療。手術切除的邊緣無腫瘤細胞且 N2 時，給予化學治療，另高風險 N2 時(淋巴結外膜侵犯、多處淋巴結侵犯、淋巴結摘除或取樣不足時)可考慮放射治療。

1.4 不可手術的 IIIA 期: 同步化學放射治療。

1.5 IIIB 期: 同步化學放射治療。

1.6 IV 期: 身體狀況較佳者(ECOG 0-2)可以配合化學治療並給予緩和性放射治療。

2. 固定模具製作及定位：

2.1 病人仰臥，雙手高舉，雙臂置於頭後，使用真空吸壓及 wingboard 或其它固定模具來固定病患的姿勢。

2.2 有需要時可配合腹部壓縮(abdominal compression)以減少橫膈膜的移動。另外也可評估深呼吸閉氣放射治療(deep inspiration breath hold radiotherapy)。

2.3 可以考慮使用 4D-CT 做治療計畫。

2.4 強度調控放射治療(intensity modulated radiotherapy)、弧形強度調控放射治療(volumetric modulated arc radiotherapy)或影像導引放射治療(image-guided radiotherapy)來治療病人。

3. 靶體積定義(Target Volume Definition)

3.1 GTV(gross tumor volume): 包括原發腫瘤、短軸≧1 cm 的淋巴結、PET(正子攝影)有明顯異常處、或是經由縱隔腔內視鏡證實有腫瘤處。

3.2 CTV(clinical target volume): GTV 加上 0.5-1 cm 的範圍。

3.3 ITV (internal target volume):由 4D-CT 取得肺腫瘤因呼吸而移動的
範圍。

3.4 PTV(planning target volume): 考慮呼吸時移動等因素，將 CTV 再加上 0.5-1 cm 的範圍。

3.5 以 IFI(involved field irradiation)替代 ENI (elective nodal irradiation)，不考慮大範圍選擇性淋巴結的放射治療(comprehensive elective nodal radiotherapy)。

3.6 手術後放射治療的 CTV 包括支氣管殘端(bronchial stump)與高風險淋巴結區域。

4. 放射治療計畫規劃(Radiation Therapy Planning)及放射治療劑量:

4.1 同步化學放射治療的劑量為: 每次以 1.8-2.2 Gy 治療，給予 60-70 Gy，不超過 74 Gy。

4.2 立體定位消融放射治療的劑量為: 建議生物有效劑量(biologically effective dose)≥100，依腫瘤大小與部位分為三次、四次、五次與八次治療，以上每次治療劑量分別為 18 Gy、12 Gy、10-11Gy 與 7.5 Gy，總劑量分別為 54 Gy、48 Gy、50-55 Gy 與 60 Gy。

4.3 術後放射線治療:每次以 1.8-2.2 Gy 治療。

4.2.1 若為 N2，negative margin， 給予 50-54 Gy。

4.2.2 淋巴結膜外侵犯(extracapsular extension) 或 microscopic residual tumor，給予 54-60 Gy。

4.2.3 Gross residual tumor，給予 60-70 Gy。

4.4 術前放射線治療:每次以 1.8-2.2 Gy 治療，給予 45-54 Gy。

5. 非脊柱骨骼轉移病灶的緩和性放射治療:每次以 3 Gy 治療，給予 30 Gy 外，或單次給予 12-16 Gy。

6. 重要器官 (Organ at Risk)及劑量限制(Dose Constraints)

6.1 脊髓: 每日每次給予 1.8-2.2 Gy 時，限制最大劑量≦46 Gy。

6.2 肺臟: V_{20}<35%，mean<20 Gy。

6.3 食道: 限制最大劑量<給予劑量的 105%，平均劑量<34 Gy。

6.4 心臟: V_{40}<80%，V_{45}<60%，V_{60}<30%，平均劑量<35 Gy。

6.5 臂神經叢: 限制最大劑量<66 Gy

Vxx = % of the whole OAR receiving ≧xx Gy

小細胞肺癌

1.放射治療適應症

1.1 侷限期(limited stage): 配合化學治療，並給予放射治療。肺部腫瘤經放射治療後若達到部分緩解(PR, partial response)以上時，可給予預防性的全腦照射(prophylactic cranial irradiation)。

1.1.1 臨床期別 I-IIA(T1-2,N0,M0)接受肺葉手術切除後，若是病理分期 N2 則建議手術後放射治療，另外 N1 也可考慮手術後放射治療。手術後放射治療的範圍與劑量如非小細胞肺癌。

1.1.2 若是臨床期別 I-IIA(T1-2,N0,M0)的病人不適合施行手術，可評估於肺腫瘤使用立體定位消融放射治療(SABR)，隨後再做化學治療。立體定位消融放射治療施行的原則如非小細胞肺癌。

1.1.3 同步化學放射治療是標準治療，應儘早配合化學治療施行。

1.2 擴散期(extensive stage): 化學治療為主，並評估病患狀況給予緩和性放射治療。

2.固定模具製作及定位：

2.1 病人仰臥，雙手高舉，雙臂置於頭後，使用真空吸壓及 wingboard 或其它固定模具來固定病患的姿勢。

2.2 有需要時可配合腹部壓縮(abdominal compression)以減少橫膈膜的移動。另外也可評估深呼吸閉氣放射治療(deep inspiration breath hold radiotherapy)。

2.3 可以考慮使用 4D-CT 做治療計畫。

2.4 使用強度調控放射治療(intensity modulated radiotherapy)、弧形強度調控放射治療(volumetric modulated arc radiotherapy)或影像導引放射治療(image-guided radiotherapy)來治療病人。

3. 靶體積定義(Target Volume Definition)

3.1 建議參考治療前 4 週內的正子電腦斷層攝影(PET-CT)

3.2 GTV:包括原發腫瘤與轉移淋巴結(化學治療後的原發腫瘤體積與轉移的淋巴結區域)。

3.3 CTV:GTV + 0.5-1cm + 化學治療前轉移淋巴結的 nodal stations。

4. 放射治療計畫規劃(Radiation Therapy Planning)及放射治療劑量:

4.1 每次以 1.8-2.2 Gy 治療，給予總劑量 60-70 Gy。

4.2 局限期病人肺部腫瘤經治療後若有較佳的效果時，可以考慮給予預防性的全腦照射。施行預防性的全腦照射中與治療後，可考慮給予 memantine。

4.3 預防性全腦照射的建議劑量: 25 Gy/10 分次。

4.4 腦轉移時全腦照射是標準治療，但是轉移病灶較少時，仍可評估是否使用立體定位放射手術/治療(SRT/SRS)，例如病灶接近重要器官、二次腦部放射治療、或預後較佳的病人。

4.5 全腦照射的建議劑量是 30 Gy/10 分次，並考慮於療程中與治療後使用 memantine。

4.6 當病人有較佳的預後時(例如存活時間≥4 個月)，可以考慮使用強度調控放射治療技術來執行避開腦部海馬迴的全腦放射治療(hippocampal-sparing WBRT)。

5. 重要器官 (Organ at Risk)及劑量限制(Dose Constraints)

5.1 脊髓: 每日每次給予 1.8-2.2 Gy 時，限制最大劑量≦46 Gy。
5.2 肺臟: V_{20}<35%，mean<20 Gy。
5.3 食道: 限制最大劑量<給予劑量的 105%，平均劑量<34 Gy。
5.4 心臟: V_{40}<80%，V_{45}<60%，V_{60}<30%，平均劑量<35 Gy。
5.5 臂神經叢: 限制最大劑量<66 Gy

Vxx = % of the whole OAR receiving ≧xx Gy

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SABR

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