2024

台灣肺癌藥物治療共識

共同編撰 | 台灣胸腔暨重症加護醫學會
台灣臨床腫瘤醫學會
中華民國癌症醫學會
台灣免疫腫瘤學會
台灣肺癌學會
台灣胸腔外科醫學會

編撰委員

何肇基教授／吳尚俊醫師 編修

分組	組長	組員					
		台灣胸腔暨重症加護醫學會	台灣肺癌學會	台灣臨床腫瘤醫學會	中華民國癌症醫學會	台灣免疫腫瘤學會	台灣胸腔外科醫學會
小細胞肺癌	何肇基	蔡鎮良 蕭世欣	江起陸 賴建豪	施慧瑄 朱逸羣	官鋒澤 徐偉勛	吳銘芳 張境夫	–
鱗狀細胞癌	賴俊良	張時杰 楊宗穎	蘇健 羅永鴻	楊志仁 徐稟智	吳教恩 廖斌志	謝燿宇	–
非鱗狀細胞癌有驅動基因	夏德椿	蘇健 郭志熙	黃俊耀 廖唯昱	徐培菘 何明霖	張家崙 李純慧	王智亮 張家崙	–
非鱗狀細胞癌無驅動基因	張文震	林建中 涂智彥	郭志熙 趙恒勝	林旻希 潘奕宏	謝燿宇 徐偉勛	吳教恩	–
輔助治療與新輔助治療	許瀚水	陳焜結 魏裕峰	柯皓文	徐培菘 趙恒勝	黃得瑞	黃振洋	趙盈凱 黃才旺

Levels of evidence

I. Evidence from at least one large randomized, controlled trial of good methodological quality (low potential for bias) or meta-analyses of well-conducted randomized trials without heterogeneity

II. Small randomized trials or large randomized trials with a suspicion of bias (low methodological quality) or meta-analyses of such trials or of trials with demonstrated heterogeneity

III. Prospective cohort studies

IV. Retrospective cohort studies of case–control studies

V. Studies without control group, case reports, experts' opinions

Outline

Advanced non-squamous cell carcinoma with actionable oncogenic drivers

[#]Not Taiwan FDA approved.

EGFR mutation

▶ First-line treatment

■ Sensitizing *EGFR* mutation

- Osimertinib is preferred (**Category I**) [1].
- Osimertinib and pemetrexed with (cisplatin or carboplatin), gefitinib, erlotinib, afatinib, or dacomitinib are also recommended (**Category I**) [2-6].
- Erlotinib with bevacizumab or erlotinib with ramucirumab represents a front-line treatment option (**Category II**) [7, 8].

■ *EGFR* S768I, L861Q, and/or G719X mutations

- Afatinib is preferred (**Category II**) [3].
- Gefitinib, erlotinib, dacomitinib, or osimertinib are also recommended (**Category II**) [4-6, 9].

▶ Second-line treatment

- Progression on afatinib, erlotinib, dacomitinib, or gefitinib should be tested for the presence of the *EGFR* exon 20 T790M mutation (tissue biopsy and/or liquid biopsy).
- Osimertinib is the standard therapy for $EGFR^{T790M}$ positive after first-line EGFR-TKI (**Category I**) [10].
- Amivantamab-vmjw with carboplatin and pemetrexed is preferred after progression on osimertinib (**Category I**) [11].
- Systemic therapy including platinum-based doublet chemotherapy is the standard therapy for patients whose tumor is tested $EGFR^{T790M}$ negative.
- Combination of atezolizumab and bevacizumab with carboplatin and paclitaxel might be considered (**Category IV**) [12].

EGFR exon 20 insertion

▶ First-line treatment

- Amivantamab-vmjw with carboplatin and pemetrexed is preferred (**Category I**) [13].

- *EGFR*-A763_Y764insFQEA is sensitive to first-, second-, and third-generation EGFR TKIs [14].
- Systemic therapy including platinum-based doublet chemotherapy is also recommended.

▶ Second-line treatment

- Amivantamab-vmjw is preferred after progression on systemic therapy including platinum-based doublet chemotherapy (**Category II**) [15].

ALK rearrangement

▶ First-line treatment

- Alectinib, brigatinib or lorlatinib are preferred (**Category I**) [16-18].
- Ceritinib is recommended (**Category I**) [19].
- Crizotinib is also recommended (**Category I**) [20].

▶ Second-line treatment

- Ceritinib, alectinib, brigatinib or lorlatinib are preferred after progression on crizotinib or intolerant to crizotinib (**Category I**) [19, 21-23].
- Lorlatinib is recommended in patients who progress after a second-generation ALK TKIs (**Category II**) [23].
- Systemic therapy including platinum-based doublet chemotherapy should be considered if the next-generation ALK inhibitors are not available.
- Combination of atezolizumab and bevacizumab with carboplatin and paclitaxel might be considered (**Category IV**) [12].

ROS1 rearrangement

▶ First-line treatment

- Entrectinib, crizotinib or repotrectinib[#] are preferred (**Category II**) [24-26].
- Ceritinib is also recommended (**Category III**) [27].

▶ Second-line treatment

- Repotrectinib[#] (if not previously given) or lorlatinib are preferred (**Category III**) [28, 29].
- Entrectinib is recommended in patients who progress after crizotinib or ceritinib (**Category III**) [24].
- Systemic therapy including platinum-based doublet chemotherapy if the next-generation ROS-1 inhibitors are not available.

BRAF^{V600E} mutation

▶ First-line treatment

- Dabrafenib/trametinib or encorafenib/binimetinib[#] are preferred (**Category II**) [30, 31].

Second-line treatment

- Systemic therapy including platinum-based doublet chemotherapy is recommended.

RET rearrangement

First-line treatment

- Selpercatinib or pralsetinib are preferred (**Category II**) [32, 33].

Second-line treatment

- Systemic therapy including platinum-based doublet chemotherapy is recommended.

NTRK1/2/3 gene fusion

First-line treatment

- Larotrectinib, entrectinib or repotrectinib[#] are preferred (**Category II**) [34-36].

Second-line treatment

- Repotrectinib[#] (if not previously given) is recommended (**Category II**) [36].
- Systemic therapy including platinum-based doublet chemotherapy is also recommended.

*MET*ex14 skipping mutation

First-line treatment

- Capmatinib or tepotinib are preferred (**Category II**) [37, 38].
- Crizotinib is also recommended (**Category II**) [39].

Second-line treatment

- Systemic therapy including platinum-based doublet chemotherapy is recommended.

KRAS^{G12C} mutation

First-line treatment

- Systemic therapy including platinum-based doublet chemotherapy and/or immunotherapy is recommended depending on PD-L1 expression.

Second-line treatment

- Sotorasib or adagrasib[#] are recommended (**Category II**) [40, 41].

ERBB2 (*HER2*) mutation

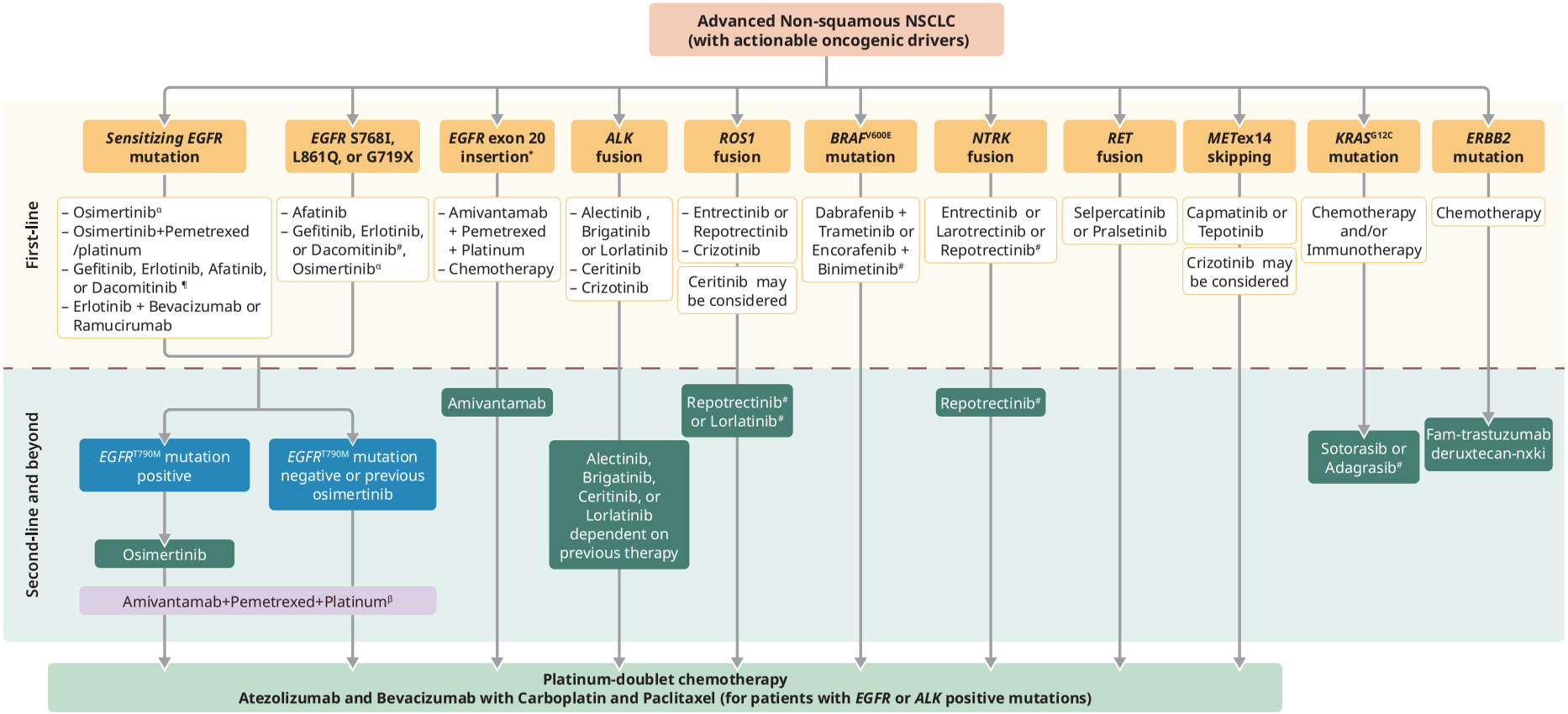
▶ First-line treatment

- Systemic therapy including platinum-based doublet chemotherapy is recommended.

▶ Second-line treatment

- Fam-trastuzumab deruxtecan-nxki is recommended (**Category II**) [42] .

Advanced Non-squamous NSCLC with Actionable Oncogenic Drivers



[¶]Dacomitinib: No brain metastasis data; [α]Osimertinib: favor patients with brain metastasis or leptomeningeal carcinomatosis; *_EGFR_-A763_Y764insFQEA: Sensitive to first-, second-, and third-generation EGFR TKIs.
PS: Drug sequence by time to market; [β]only for after progression on osimertinib; [#]Not Taiwan FDA approved.

Advanced non-squamous cell carcinoma without actionable oncogenic drivers

[#]Not Taiwan FDA approved.

Immunotherapy should be considered for all non-squamous NSCLC patients without actionable oncogene drivers. In the patients unfit for PD-1 or PD-L1 inhibitors,[†] chemotherapy should be considered.

[†]**Unfit to the treatment of PD-1 or PD-L1 inhibitor** [43, 44]

- Active or previously documented autoimmune disease and/or current use of immunosuppressive agents.
- Presence of an oncogene (eg, *EGFR* [exon 19 deletions, p.L858R point mutation in exon 21], *ALK*, *ROS1* or *RET* rearrangements), which would predict lack of benefit [45, 46].
- If progression on PD-1/PD-L1 inhibitor, switching to another using a PD-1/PD-L1 inhibitor is not recommended.

First-line treatment

■ PD-L1 ≥ 50%

- Pembrolizumab, atezolizumab, or combination pembrolizumab with pemetrexed and platinum, is preferred (**Category I**) [47-49].
- Atezolizumab in combination with bevacizumab, paclitaxel and carboplatin, combination atezolizumab with carboplatin and nab-paclitaxel, combination nivolumab and Ipilimumab with pemetrexed and platinum, or nivolumab in combination with bevacizumab, paclitaxel and carboplatin is also recommended (**Category I**) [50-53]. The other option is tremelimumab-actl and durvalumab with carboplatin and albumin-bound paclitaxel or tremelimumab-actl and durvalumab with (carboplatin or cisplatin) and gemcitabine (**Category II**) [54].[#]
- Combination nivolumab and ipilimumab represents a front-line treatment option (**Category I**) [55].

■ PD-L1 ≥ 1%–49%

- Pembrolizumab with pemetrexed and platinum is preferred (**Category I**) [49].
- Atezolizumab in combination with bevacizumab, paclitaxel and carboplatin, combination atezolizumab with carboplatin and nab-paclitaxel, combination nivolumab and ipilimumab with pemetrexed and platinum, or nivolumab in combination with bevacizumab, paclitaxel and carboplatin is also recommended (**Category I**) [50-53].
- Combination nivolumab and ipilimumab represents a front-line treatment option

(**Category I**) [55]. The other option is pembrolizumab, especially for patients who are not suitable for chemotherapy (**Category I**) [56]. The other option is tremelimumab-actl and durvalumab with carboplatin and albumin-bound paclitaxel or tremelimumab-actl and durvalumab with (carboplatin or cisplatin) and gemcitabine (**category II**) [54].[#]

■ PD-L1 < 1%

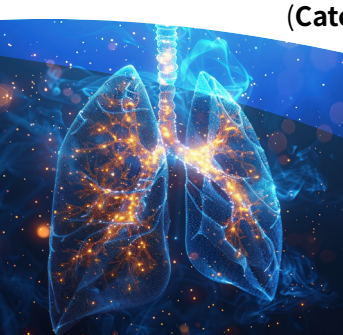
- Pembrolizumab with pemetrexed and platinum is preferred (**Category I**) [49].
- Atezolizumab in combination with bevacizumab, paclitaxel and carboplatin, combination atezolizumab with carboplatin and nab-paclitaxel, or combination nivolumab and ipilimumab with pemetrexed and platinum are also recommended (**Category I**) [50-52].
- The other option is tremelimumab-actl and durvalumab with carboplatin and albumin-bound paclitaxel or tremelimumab-actl and durvalumab with (carboplatin or cisplatin) and gemcitabine (**Category II**) [54].[#]
- Combination nivolumab and ipilimumab[#] is also effective in the post-hoc analysis (**Category II**) [55].

■ Contraindications to immunotherapy or immunotherapy are not available

- Maximum six cycles of platinum-based doublet chemotherapy is suggested (**Category I**) [57].
- Pemetrexed is preferred to gemcitabine or docetaxel for patients with non-squamous tumors (**Category I**) [58, 59].
- Less toxic maintenance monotherapy should be considered, and pemetrexed is preferred (**Category I**) [60].
- Combination bevacizumab with paclitaxel and carboplatin, or combination bevacizumab with pemetrexed and platinum may be offered in the absence of contraindications (**Category I**) [61-63].

Second-line treatment

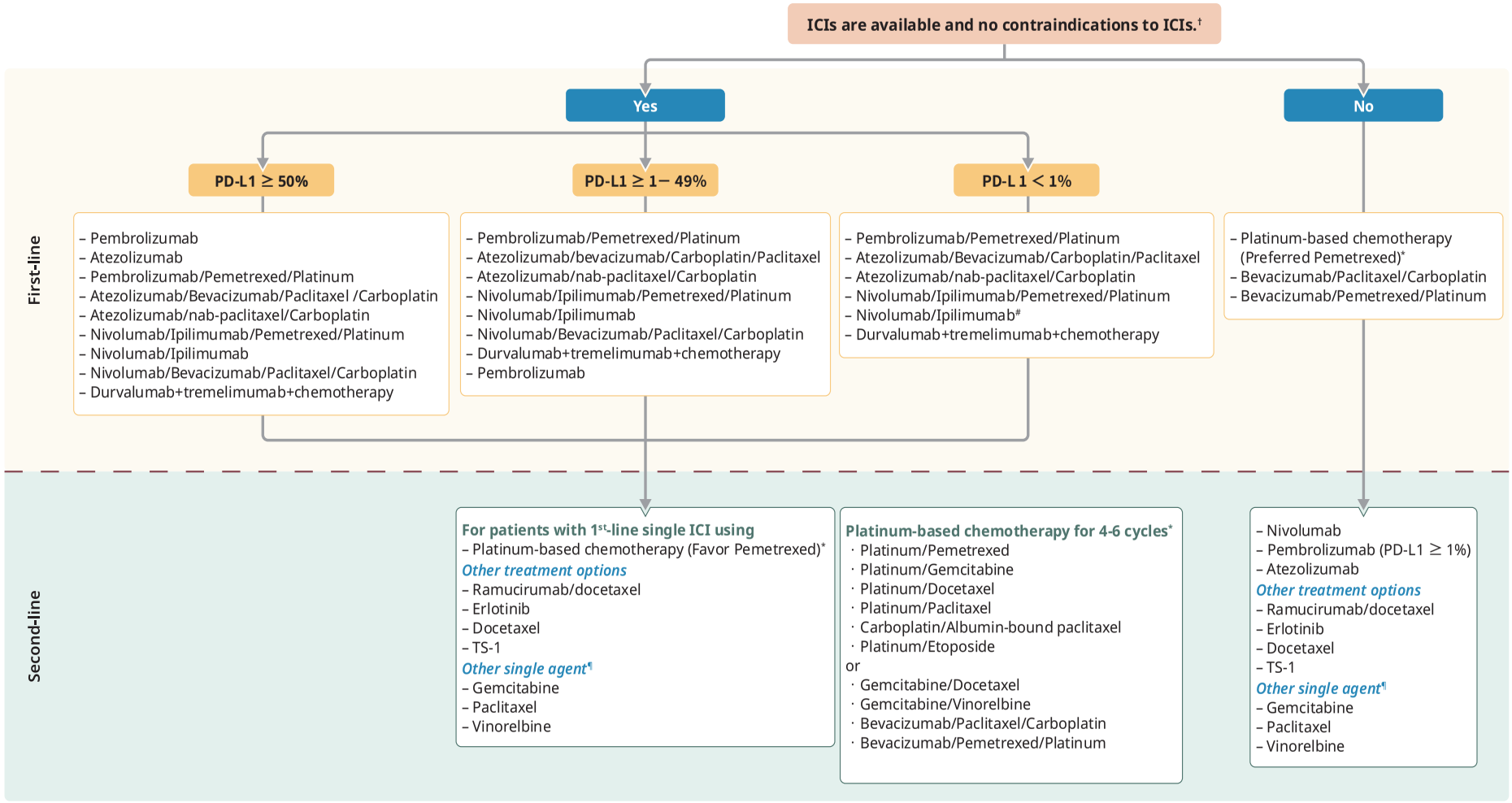
- For patients with progression after first-line immunotherapy (pembrolizumab, atezolizumab, combination of nivolumab and ipilimumab, or cemiplimab-rwlc[#]), platinum-based doublet chemotherapy is recommended as the second-line treatment option.
- PD-1 and PD-L1 inhibitors (nivolumab and atezolizumab) are the treatment of choice for PD-L1 inhibitor-naive NSCLC in second-line setting, irrespective of PD-L1 expression (**Category I**) [64, 65]. Pembrolizumab is indicated for second-line treatment of lung cancer



with PD-L1 ≥ 1% (**Category I**) [66].

- In patients not suitable for immunotherapy, second-line chemotherapy is recommended.
- Docetaxel with/without Ramucirumab, or TS-1 is a treatment option in NSCLC patients progressing after first-line chemotherapy (**Category I**) [67-69].
- Erlotinib represents a potential second- or third-line treatment option in particular for patients not suitable for immunotherapy or second-line chemotherapy in unknown *EGFR* status or *EGFR*-WT tumors (**Category II**) [70].
- Although the supporting evidence base is limited, the other single agents, including gemcitabine, paclitaxel, or vinorelbine, can be considered as treatment options (**Category II**) [71-75].

Advanced Non-squamous NSCLC without Actionable Oncogenic Drivers



*Maximum six cycles of platinum-based doublets followed by less toxic maintenance monotherapy should be considered (*N Engl J Med 2002; 346:92-98; Lancet. 2009;374:1432-40.*); #Not Taiwan FDA approved.
†Contraindications for treatment with PD-1/PD-L1 inhibitors may include active or previously documented autoimmune disease and/or current use of immunosuppressive agents, or presence of an oncogene (ie, *EGFR* exon 19 deletion or L858R, *ALK*, *ROS1* or *RET* rearrangements), which would predict lack of benefit (NCCN guideline) ICI: Immune checkpoint inhibitors; ¶The supporting evidence base is limited.

Advanced squamous cell carcinoma without actionable oncogenic drivers

[#]Not Taiwan FDA approved.

Immunotherapy should be considered for all squamous NSCLC patients without actionable oncogene drivers. In the patients unfit for PD-1 or PD-L1 inhibitors,[†] chemotherapy should be considered. Molecular testing for the identification of driver mutations should be considered for patients with lung squamous cell carcinoma, especially for never-/light-smokers. Targeted therapies are recommended if actionable mutations are detected.

[†]**Unfit to the treatment of PD-1 or PD-L1 inhibitor** [43, 44]

- Active or previously documented autoimmune disease and/or current use of immunosuppressive agents.
- Presence of some oncogenes (eg, *EGFR*, *ALK*, *ROS1* or *RET* rearrangements), which would predict lack of benefit [45, 46].
- If progression on PD-1/PD-L1 inhibitor, switching to another using a PD-1/PD-L1 inhibitor is not recommended.

First-line treatment

■ PD-L1 ≥ 50%

- Pembrolizumab, atezolizumab, or combination pembrolizumab with paclitaxel or albumin bound paclitaxel and carboplatin are preferred (**Category I**) [47, 48, 76].
- Combination nivolumab and Ipilimumab with paclitaxel and carboplatin is also recommended (**Category I**) [52]. The other option is tremelimumab-actl and durvalumab with carboplatin and albumin-bound paclitaxel or tremelimumab-actl and durvalumab with (carboplatin or cisplatin) and gemcitabine (**Category II**) [54].[#]
- Combination nivolumab and Ipilimumab represent a front-line treatment option (**Category I**) [55].

■ PD-L1 ≥ 1%–49%

- Pembrolizumab with paclitaxel or albumin bound paclitaxel and carboplatin is preferred (**Category I**) [76].
- Combination nivolumab and Ipilimumab with paclitaxel and carboplatin is also recommended (**Category I**) [52]. The other option is tremelimumab-actl and durvalumab with carboplatin and albumin-bound paclitaxel or tremelimumab-actl and durvalumab with (carboplatin or cisplatin) and gemcitabine (**Category II**) [54].[#]
- Combination nivolumab and ipilimumab represent a front-line treatment option (**Category**

I) [55]. The other option is pembrolizumab, especially for patients who are not suitable for chemotherapy (**Category I**) [56].

■ PD-L1 < 1%

- Pembrolizumab with paclitaxel or albumin bound paclitaxel and carboplatin is preferred (**Category I**) [76].
- Combination nivolumab and Ipilimumab with paclitaxel and carboplatin is also recommended (**Category I**) [52].
- The other option is tremelimumab-actl and durvalumab with carboplatin and albumin-bound paclitaxel or tremelimumab-actl and durvalumab with (carboplatin or cisplatin) and gemcitabine (**Category II**) [54].#
- Combination nivolumab and ipilimumab is also effective in the post-hoc analysis although it is not approved by TFDA (**Category II**) [55].#

■ Contraindications to immunotherapy or immunotherapy are not available

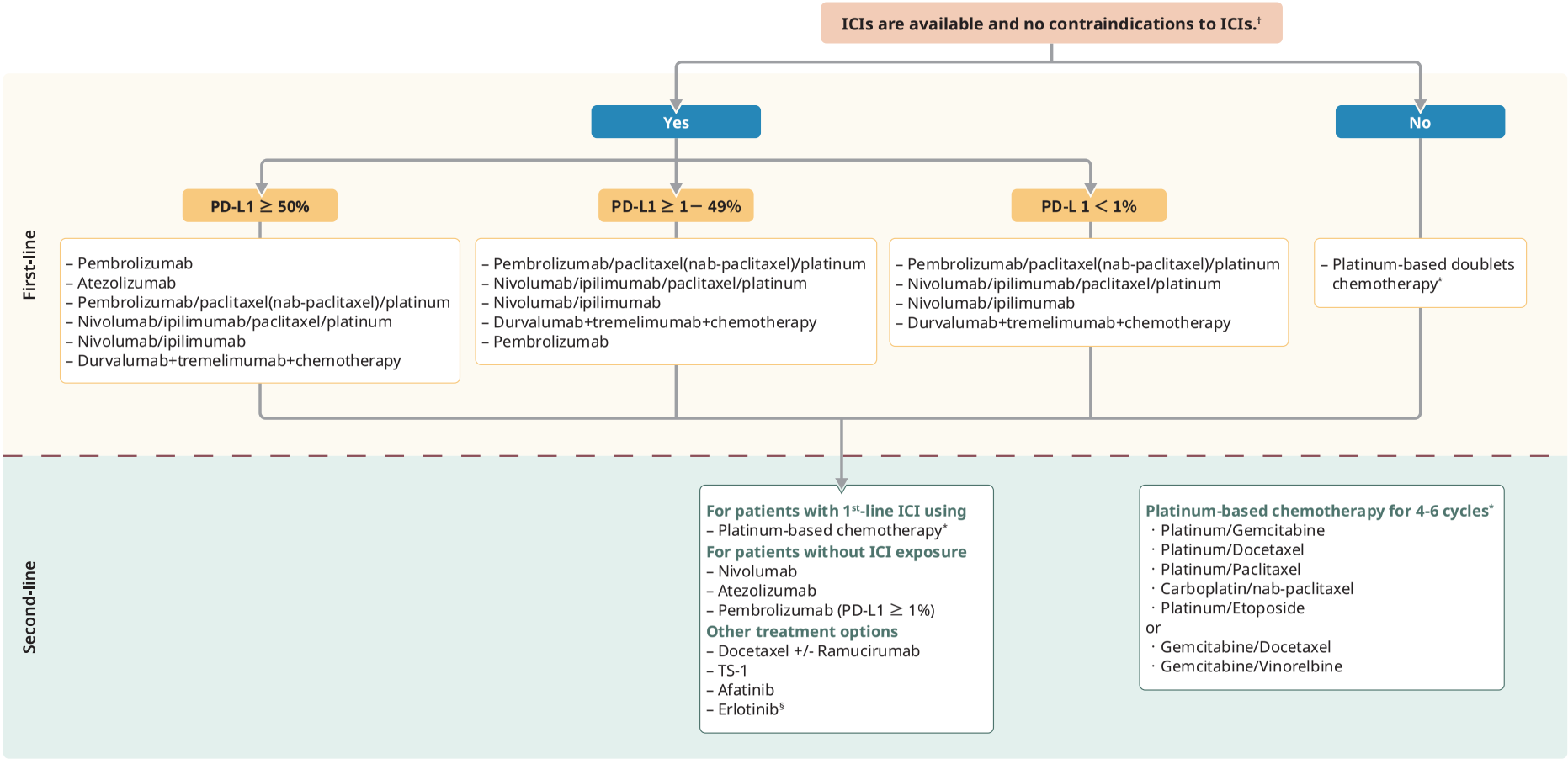
- Maximum six cycles of platinum-based doublet chemotherapy is suggested (**Category I**) [57].*

  * Pemetrexed is not recommended for the treatment of squamous cell carcinoma [58].

Second-line treatment

- For patients with progression after first-line immunotherapy (pembrolizumab, atezolizumab, combination of nivolumab and ipilimumab), platinum-based chemotherapy is recommended as the second-line treatment option.
- PD-L1 and PD-1 inhibitors (nivolumab and atezolizumab) are the treatment of choice for PD-L1 inhibitor-naive NSCLC in second-line setting, irrespective of PD-L1 expression (**Category I**) [64, 65, 77]. Pembrolizumab is indicated for second-line treatment of lung cancer with PD-L1 ≥ 1% (**Category I**) [66].
- In patients not suitable for immunotherapy, second-line chemotherapy is recommended.
- Docetaxel+/-Ramucirumab, or TS-1 is a treatment option in NSCLC patients progressing after first-line chemotherapy (**Category I**) [67-69].
- Afatinib is approved for the second-line treatment lung squamous cell carcinoma irrespective of the *EGFR* mutation status (**Category I**) [78]. Erlotinib is only reimbursed as the third-line treatment of squamous cell carcinoma (**Category II**) [70].

Advanced Squamous Cell Carcinoma



*Maximum six cycles of platinum-based doublets chemotherapy is suggested (*N Engl J Med 2002; 346:92-98*)
†Contraindications for treatment with PD-1/PD-L1 inhibitors may include active or previously documented autoimmune disease and/or current use of immunosuppressive agents, or presence of some oncogenes, which would predict lack of benefit (NCCN guideline).
§ Erlotinib is reimbursed as the third-line treatment by Taiwan NHI.

Small cell lung cancer

[#]Not Taiwan FDA approved.

Limited-stage SCLC

1. Management of limited-stage SCLC should be discussed in a multidisciplinary committee.
2. Clinical stage I-IIA (T1-2, N0, M0) should consider pathological mediastinal staging, then Lobectomy and mediastinal lymph node dissection or sampling should be considered in pathologic mediastinal staging negative.
3. Limited stage IIB-IIIC (T3-4, N0, M0; T1-4, N1-3, M0) with good performance status (ECOG 0-2), systemic therapy with concurrent radiotherapy should be considered (**Category I**). Poor performance status (ECOG 3-4), systemic therapy with/without radiotherapy (concurrent or sequential) should be considered.

■ Primary or adjuvant therapy for limited-stage SCLC

▶ Preferred regimens

- Cisplatin and etoposide are preferred (**Category I**) [79].
- Carboplatin and etoposide are also recommended (**Category I**) [79].
- Adjuvant therapy with durvalumab after concurrent or sequential chemoradiotherapy for 24 month is preferred (**Category I**) [80].

Extensive-stage SCLC

■ Primary therapy for extensive-stage SCLC

▶ Preferred regimens

- Carboplatin and etoposide and atezolizumab every 21 days x 4 cycles followed by maintenance atezolizumab every 21 days should be considered (**Category I**) [81].
- Carboplatin or Cisplatin and etoposide and durvalumab every 21 days x 4 cycles followed by maintenance durvalumab every 28 days should be considered (**Category I**) [82].

▶ Other recommended regimens

- Carboplatin and etoposide for 4–6 cycles [83].
- Cisplatin and etoposide for 4–6 cycles [84-86].

■ Relapse SCLC or second-line therapy

▶ Preferred regimens

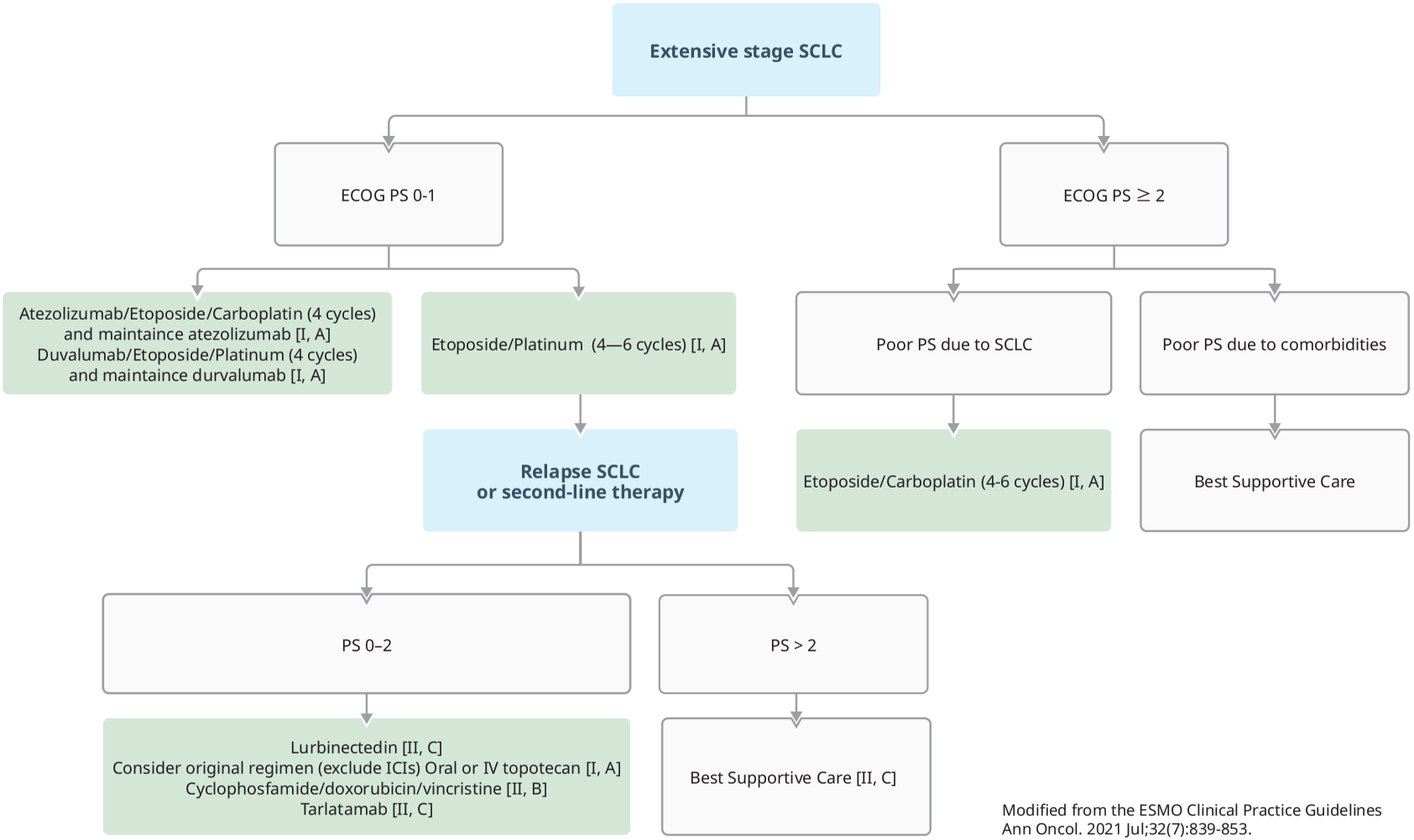
- Lurbinectedin [87].
- Topotecan PO or IV [88].
- The original regimen, excluding ICIs, is also considered [89].*
- Tarlatamab [90].#

** Rechallenging with the original regimen or similar platinum-based regimens recommended if there has been a chemotherapy-free interval (CTFI) of more than 6 months and may be considered if there has been a CTFI of at least 3 to 6 months.*

▶ Other recommended regimens

- TFDA Approved
  - ✓ Cyclophosphamide/doxorubicin/vincristine (CAV) [88].
  - ✓ Oral etoposide [91, 92].
- No TFDA Approved
  - ✓ Paclitaxel [93, 94].
  - ✓ Docetaxel [95].
  - ✓ Irinotecan [96].
  - ✓ Temozolomide [97, 98].
  - ✓ Vinorelbine [99, 100].
  - ✓ Gemcitabine [101, 102].
  - ✓ Nivolumab [103, 104].
  - ✓ Bendamustine [105].

Small Cell Lung Carcinoma



Modified from the ESMO Clinical Practice Guidelines
Ann Oncol. 2021 Jul;32(7):839-853.

Perioperative Systemic Treatment in Stage I-III NSCLC

Systemic treatment should be initiated after a surgical consultation or a discussion by a multidisciplinary team.

Pre-Surgical Recommendations (Category IIA)

- Pulmonary function tests: It is suggested if not previously completed.
- Bronchoscopy and pathologic mediastinal lymph node evaluations: It is recommended to assess for N2 disease and discuss the appropriateness of surgery within a multidisciplinary team.
- FDG-PET/CT scan and brain MRI with contrast (≥ stage IB): Suggested if not previously performed, prior to thoracic surgical oncology consultation.
- Molecular testing: Suggested for *EGFR* mutations, *ALK* rearrangements, and PD-L1 expression before systemic treatment.

Resected Stage IB to IIIA

■ *EGFR* Mutations: del-19 or L858R

- Adjuvant therapy with osimertinib for 3 years is preferred (**Category I**) [106, 107].
- Chemotherapy: Four cycles of adjuvant chemotherapy are also recommended before osimertinib (**Category I**) [106].

■ Resected Stage II and IIIA (*ALK* Rearrangements)

- Adjuvant therapy with alectinib for 2 years is preferred (**Category I**) [108].

■ Operable Stage II

▶ Adjuvant Treatment

- UFUR for 2 years: for pathological staging T2 (tumor ≥ 3cm) lung adenocarcinoma patients [109].
- Four cycles of adjuvant chemotherapy are recommended (**Category I for stage IIB**) [110].
- Adjuvant atezolizumab (for PD-L1 ≥ 1%)(1200 mg every 21 days; for 16 cycles or 1 year) and pembrolizumab (200 mg every 3 weeks for up to 18 cycles) after chemotherapy are also recommended for patients without sensitizing *EGFR* mutations and *ALK* rearrangement (**Category I**) [111, 112].

▶ Neoadjuvant Treatment

- Neoadjuvant systemic therapy with nivolumab and platinum-doublet chemotherapy every

3 weeks for 3 cycles is recommended for patients without sensitizing *EGFR* mutations and *ALK* rearrangement (**Category I**) [113].

- Neoadjuvant systemic therapy with chemotherapy may be also considered.

▶ Perioperative Treatment

- Pembrolizumab/Durvalumab and platinum-based doublet chemotherapy every 3 weeks for 4 cycles, followed by single-agent pembrolizumab/durvalumab as adjuvant treatment after surgery, is recommended for patients without sensitizing *EGFR* mutations and *ALK* rearrangement (**Category I**) [113, 114].

■ Operable Stage III

▶ Adjuvant Treatment

- Four cycles of adjuvant chemotherapy are recommended (**Category I**) [110].
- Adjuvant atezolizumab (for PD-L1 ≥ 1%)(1200 mg every 21 days; for 16 cycles or 1 year) or pembrolizumab (200 mg every 3 weeks for up to 18 cycles) after chemotherapy is preferred for patients without sensitizing *EGFR* mutations and *ALK* rearrangement (**Category I**) [111, 112].

▶ Neoadjuvant Treatment

- Neoadjuvant systemic therapy with nivolumab and platinum-doublet chemotherapy every 3 weeks for 3 cycles is preferred for patients without sensitizing *EGFR* mutations and *ALK* rearrangement (**Category I**) [113].
- Neoadjuvant systemic therapy with chemotherapy may also be considered.

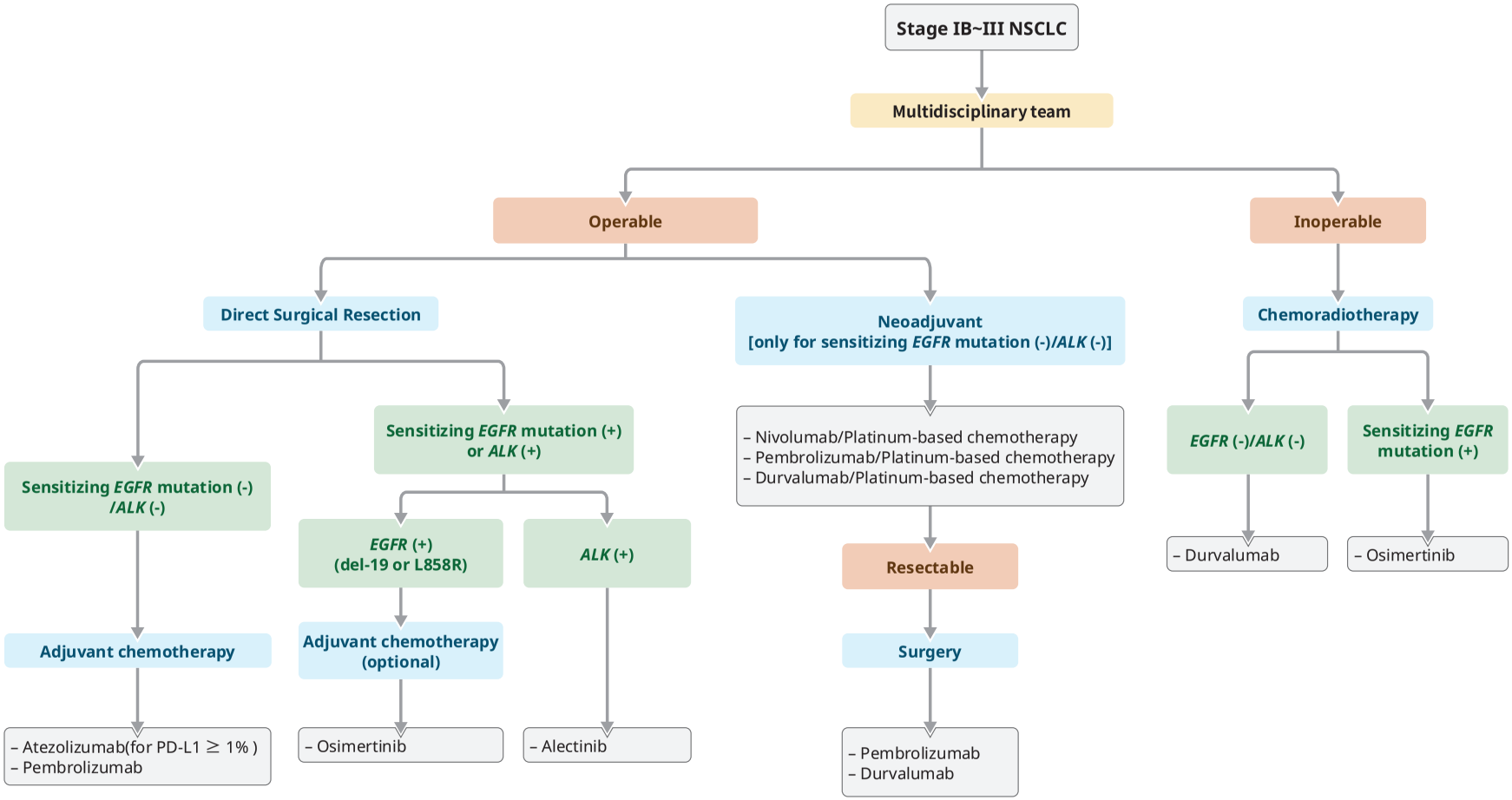
▶ Perioperative Treatment

- Pembrolizumab/Durvalumab and platinum-based doublet chemotherapy every 3 weeks for 4 cycles, followed by single-agent pembrolizumab/durvalumab as adjuvant treatment after surgery, is preferred for patients without sensitizing *EGFR* mutations and *ALK* rearrangement (**Category I**) [113, 114].

Inoperable Stage II-III

- **Consolidation Therapy**: Durvalumab after concurrent or sequential chemoradiotherapy for 1 year is preferred for patients without sensitizing *EGFR* mutations and *ALK* rearrangements (**Category I for Stage III**; **Category IIA for Stage II**) [115-117].
- **Osimertinib**: Recommended until disease progression in cases of *EGFR* exon 19 deletion or L858R mutations (**Category I for Stage III**; **Category IIA for Stage II**) [118].

Perioperative Systemic Treatment in Stage I-III NSCLC



Reference

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