Advances in the Management of Thoracic Malignancies:

Precision Medicine & Immunotherapy

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Questions

• What are current precision medicine targets in lung cancer?
• What is the abscopal effect?
• What are the kinetics of immune-related adverse events (irAEs)?
• What is the treatment of irAEs?
Outline

• Lung cancer
• What is Precision Medicine?
• PM in Lung CA
• Immunotherapy / Immuno-oncology
• Immune Related Adverse Events (irAEs)
• Remaining Issues
Outline

• Lung cancer
• What is Precision Medicine?
• PM in Lung CA
• Immunotherapy / Immuno-oncology
• Immune Related Adverse Events (irAEs)
• Remaining Issues
Mutation found in 54% (280/516) of tumors completely tested (CI 50-59%)
Outline

- Lung cancer
- **What is Precision Medicine?**
- PM in Lung CA
- Immunotherapy / Immuno-oncology
- Immune Related Adverse Events (irAEs)
- Remaining Issues
What is Precision Medicine?

- If PM is **defined broadly** enough it can be equated with medicine in general and **loses any real meaning**.
- Also, PM applied at a systems or population level can be called “population health”.
- PM = **molecularly-driven therapy** choices (including immunotherapy based on biomarkers) applied to individuals.
- People have always tried to personalize therapy including evaluating the patient as a whole (holistic) and in context with age, co-morbidities, and family, we are now increasingly using molecular information to help define treatment.
Outline

• Lung cancer
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• **PM in Lung CA**
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  • Immune Related Adverse Events (irAEs)
• Remaining Issues
2004 EGFRi (1)

- 11/18/04 FDA approved erlotinib (Tarceva) for locally advanced or metastatic NSCLC after failure of at least one prior chemo Tx

- (2013 1L met NSCLC FDA approval)

- N=731 DB-RCT erlotinib vs placebo

- mOS
  - 6.7 mon erlotinib
  - 4.7 months placebo
  - HR 0.73, p = <0.001

https://www.cancer.gov/about-cancer/treatment/drugs/fda-erlotinib-hydrochloride
2004 EGFRi (2)

- mPFS
  - 9.9 weeks - erlotinib
  - 7.9 weeks - placebo
  - adjusted HR for progression was 0.59, $p < 0.001$

- **ORR 8.9 percent**
- median response duration was 34.3 weeks, ranging from 9.7 to 57.6+ weeks.
  - Two responses (0.9 percent, 95 percent CI: 0.1 to 3.4) were reported in the placebo group.
- This was in UNSELECTED pts by EGFR status
- An exploratory analysis of Epidermal Growth Factor Receptor (EGFR) protein expression status on treatment survival effect was performed; however, **EGFR status was known for only 33 percent of patients**. The EGFR expression was determined using the DAKO EGFR pharmDx™ kit. About half of the patients with known EGFR status were positive and half were negative.
- In the **EGFR positive** subgroup:
  - OS (mon)
    - erlotinib 10.7
    - Placebo 3.8
    - HR **0.65**, $P = 0.033$

- No apparent erlotinib OS effect was observed in the EGFR negative subgroup

- **So, need to choose your targeted therapy based on biomarkers**
### NCCN Guidelines Version 3.2014
#### Non-Small Cell Lung Cancer

**Targeted Agents for Patients with Genetic Alterations**

<table>
<thead>
<tr>
<th>Genetic Alteration (ie, Driver event)</th>
<th>Available Targeted Agents with Activity Against Driver Event in Lung Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGFR mutations</td>
<td>erlotinib, gefitinib, afatinib</td>
</tr>
<tr>
<td>ALK rearrangements</td>
<td>crizotinib</td>
</tr>
<tr>
<td>HER2 mutations</td>
<td>trastuzumab, afatinib</td>
</tr>
<tr>
<td>BRAF mutations</td>
<td>vemurafenib, dabrafenib</td>
</tr>
<tr>
<td>MET amplification</td>
<td>crizotinib</td>
</tr>
<tr>
<td>ROS1 rearrangements</td>
<td>crizotinib</td>
</tr>
<tr>
<td>RET rearrangements</td>
<td>cabozantinib</td>
</tr>
</tbody>
</table>


*Note: All recommendations are category 2A unless otherwise indicated. Clinical Trials: NCCN believes that the best management of any cancer patient is in a clinical trial. Participation in clinical trials is especially encouraged.*

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Effective lung cancer treatment requires Precision Medicine

“I think we are in a precision medicine field, and lung cancer is a model of this and patients should not be treated until [an oncologist] has this information,” Edward S. Kim, MD, chair of solid tumor oncology and investigational therapeutics at Levine Cancer Institute, told HemOnc Today. “It is part of the diagnostic workup.”
AHC Lung Panel

- < 2016 ad hoc orders
  - ~30% EGFR testing w/o systemic panels

Changed to testing on all lung CA path:

- 2016 EGFR, ALK, ROS1
- 2017 + PD-L1
- 2017 + BRAF (PCR) with BRAFi approval
- 12/13/17 NGS: ALK, ROS1, Ret, NTRK1, Met & EGFR, BRAF (PCR), PD-L1, HER2 IHC
2018
(additional PM pathways in development)

Non Small Cell Lung Medical Oncology Pathway

Stage IV, Non Squamous Cell With Driving Mutation

Initial Therapy
1. L0S351: Alectinib 600 mg Twice Daily Until Progression or Unacceptable Toxicity
   - If Alectinib First Line:
     1. L0S364: Brigatinib 90/180 mg Daily Until Progression or Unacceptable Toxicity
   - If Cretinib First Line:
     1. L0S351: Alectinib 600 mg Twice Daily Until Progression or Unacceptable Toxicity

Third Line (if progression after two subsequent second generation ALK-inhibitors)

Efficacy of third-line targeted therapy following progression after two subsequent second generation ALK-inhibitors is unknown at this time. The committee recommends considering re-biopsy with mutational analysis, which may be informative and assist with determining the next most appropriate course of therapy.
- If additional targeted therapy with an ALK-Inhibitor TKI is elected, then the agent may be selected off-pathway.
- If switching to chemotherapy is elected, then navigate back to the line-of-therapy screen to select "Initial Chemotherapy/Immunotherapy."

Initial Therapy
1. L0S257: Erlotinib 150 mg PO Daily Until Progression or Unacceptable Toxicity

Second Line
T790M Positive
1. L0S349: Osimertinib 80 mg PO Once Daily Until Progression or Unacceptable Toxicity

T790M Negative/Unknown
There is no defined pathway for second line EGFR T790M negative/unknown patients. Treatment in this setting is at the discretion of the clinician. Consider accrual to clinical trial. For chemotherapy/Immunotherapy recommendations, see first line chemotherapy/Immunotherapy branches on next page.

ROS1 Rearrangement Positive
Initial Therapy
1. L0S274: Cretinib 250 mg Twice Daily Until Progression or Unacceptable Toxicity

BRAF V600E Mutation Positive
Initial Therapy
1. L0S358: Dabrafenib 150 mg BID + Trametinib 2 mg Once Daily Until Progression or Unacceptable Toxicity

Currently, the pathway does not have treatment recommendations for Other Mutations/Biomarkers and these sections are used solely for placement of clinical trials.

1. May consider re-biopsy and mutational analysis, which could be informative for therapy guidance of a subsequent ALK-inhibitor.

2. Erlotinib, gefitinib, and afatinib are FDA-approved for the treatment of metastatic NSCLC patients with EGFR positive mutations at exon 19 or 21 and the limited head-to-head data as of 5/23/16 do not show one to be more efficacious than the other in this setting. Erlotinib is the current recommendation based on consistently lower rates of toxicities including diarrhea, rash/ acne, and stomatitis/mucositis than afatinib and less hepatic transaminase abnormalities than gefitinib (Rosell et al. 2012; Sequist et al. 2013; Wu et al. 2014; Urama et al. 2016). If gefitinib or afatinib is indicated, the regimen should be selected Off Pathway.
2018 - Improving on EGFRi PM


Also,
Afatinib
1/16/18
FDA approval
EGFR G719X, L861Q, & S768I

Osimertinib
PM in Lung CA
(a sampling)

- EGFR
- ALK
- ROS1
- BRAF
- HER2
- MET
- RET
ALK

1L crizotinib vs Plat+pem
Solomon et al. NEJM 2014

1L ceritinib vs Plat+pem
Soria et al. Lancet 2017
ALK - 1L Alectinib vs Crizotinib

Peters – NEJM 2017

Comparing ALKi
Crizotinib in Advanced ROS1+ NSCLC*

*Response-evaluable population excluding patients with early death/indeterminate response (n=19).
†Tumor ROS1 FISH-positive, but negative for ROS1 fusion gene expression. ‡Crizotinib held for >6 wks prior to first scans which showed PD. +, Treatment ongoing. For ongoing patients, duration of response/SD is the time from first documentation of tumor response/first dose to last available on treatment scan. For discontinued patients, duration is to the time of PD or death. Duration is in wks. Data in the database as of August 20, 2012.

Overall response rate = 50%
n=20 evaluable patients; 1 CR and 9 PRs
Disease control rate = 70% at 8 weeks

Best overall response
- PD
- SD
- PR
- CR

Best change from baseline (%)

100 80 60 40 20 0 20 40 60 80 100

7 43+ 24 44 33+ 8+ 15+ 28+ 10+ 36+ 12 45+ 18 44 16+ 7+ 44+ 53+ 80+

Ou et al., ESMO 2012

Courtesy: Alice Shaw
ROS1

- Imaging
- Swimmers plot

Shaw et al. 2014 NEJM
BRAF

- Activating $BRAF^{V600E}$ (Val600Glu) mutations ~1-2% of lung AdCA
- 6/22/17 FDA approved combination
  - dabrafenib (Tafinlar) - BRAFi
  - trametinib (Mekinist) - MEKi
- Oncomine Dx Target Test – NGS for:
  - BRAF, ROS1, and EGFR gene mutations
- AHC = PCR
- ORR, 1L = 64%

Lung cancer patients with HER2 mutations treated with chemotherapy and HER2-targeted drugs: results from the European EUHER2 cohort.


- HER2 mutations 1-2% of lung adenocarcinomas.
- Retrospective cohort study in European centers, n=38 centers, n=101 pts.
- HER2 exon-20 insertion, treated with chemotherapy and/or HER2-targeted drugs.
- Concomitant EGFR mutations, ALK translocations, and ROS translocations were observed in 5, 1, and 1 patients, respectively.
- The median number of treatment lines was 3 (range: 1-11).
- The median overall survival was 24 months.
- Overall response rate (ORR) and the median progression-free survival (PFS) with conventional chemotherapy (excluding targeted therapies) were 43.5% and 6 months in first-line (n = 93), and 10% and 4.3 months in second-line (n = 52) therapies.
- Sixty-five patients received HER2-targeted therapies: trastuzumab = 57, neratinib = 14, afatinib = 9, lapatinib = 5, T-DM1 = 1.
- ORR was 50.9% and PFS was 4.8 months with trastuzumab or T-DM1.
**MET**

- *MET* alterations leading to exon 14 skipping occur in ~4% of lung carcinomas
- MET activation and sensitivity to MET inhibitors in vitro.
- **Crizotinib**, initially developed as a MET inhibitor, is approved for *ALK*-positive NSCLC
- **PROFILE 1001**
  - N=18 pts
  - **ORR 67%** (10/15 evaluable)

Efficacy & safety crizotinib in MET exon 14-altered NSCLC. Drilon et al. #ASCO16 Abs.108
http://ow.ly/Lu4m303LkfO
RET

- Vandetanib
- n=19
- 2/7/2013 – 3/19/2015
- 53% ORR 9/17
- 47% ORR 9/19 ITT
- 90% DCR

Yoh et al. 2017 Lancet Resp Med - LURET
NTRK

- (neurotrophic) tropomyosin receptor kinase (Trk)
  - Protein: 3 TrkA, TrkB & TrkC receptors
  - Genes: NTRK1, NTRK2 and NTRK3
- entrectinib & LOXO-101 under clinical evaluation
- LOXO-101 phase I solid tumors ORR of 83% (5/6)
- 3% NSCLC NTRK alterations

Ricciuti et al. 2017 Med Oncol
Hong et al. AACR 2016
https://www.mycancergenome.org/content/disease/lung-cancer/ntrk1/315/
<table>
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<th>Target</th>
<th>Drug</th>
<th>Line</th>
<th>ORR</th>
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<tbody>
<tr>
<td>EGFR</td>
<td>erlotinib</td>
<td>?</td>
<td>8.9%</td>
<td>unselected – PI 2004</td>
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<td>erlotinib</td>
<td>1L</td>
<td>65%</td>
<td>Rosell et al. Lancet Oncol - EURTAC</td>
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<td>ALK</td>
<td>crizotinib</td>
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<td>74%</td>
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<td>72.5%</td>
<td>Soria et al. Lancet 2017 – ASCEND 4</td>
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<td>alectinib</td>
<td>1L</td>
<td>82.9%</td>
<td>Peters et al. 2017 NEJM</td>
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<td>ROS1</td>
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<td>&gt;1</td>
<td>72%</td>
<td>Shaw et al. 2014 NEJM</td>
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<tr>
<td>BRAF</td>
<td>dabra/tram</td>
<td>1L</td>
<td>64%</td>
<td>Planchard et al. 2017 JCO</td>
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<td>HER2</td>
<td>traz, TDM1</td>
<td>~3</td>
<td>50.9%</td>
<td>Mazières et al. 2016 Ann Oncol</td>
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<td>MET</td>
<td>meta analysis</td>
<td>??</td>
<td>67%</td>
<td>Drilon et al. 2016 ASCO - PROFILE001</td>
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<tr>
<td>RET</td>
<td>vandetanib</td>
<td>&gt;1</td>
<td>53%</td>
<td>Yoh et al. 2017 Lancet R. M. - LURET</td>
</tr>
</tbody>
</table>
During the early development of EGFR inhibitors, 4 large Phase III RCTs combined erlotinib and gefitinib with first-line chemotherapy in unselected patients with NSCLC.

All these combination trials failed to show a survival benefit and were associated with increased toxicities.

Intercalated erlotinib and showed an OS benefit of 3.1 months (18.3 versus 15.2 months) in the FAST-ACT2 study in an unselected population, but subgroup analysis demonstrated that the benefit was only in the EGFR-mutated population.

The combination of pemetrexed and gefitinib has demonstrated a PFS benefit of 4.9 months (15.8 versus 10.9 months) in a phase II study of EGFR-mutated NSCLC (119).

Combining chemotherapy upon progression on EGFR TKI therapy also did not demonstrate a benefit in the phase III IMPRESS trial (120).

Combination of bevacizumab with erlotinib in an EGFR-mutated population demonstrated a PFS benefit of 6.3 months (16 versus 9.7 months), with OS data pending (121).

The rational combination of cetuximab and afatinib appear to combine with favorable response rates, albeit with higher toxicity (23).
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• Immune Related Adverse Events (irAEs)
• Remaining Issues
NCCN v2.2018 Ad

IO >1L – Nivo, pembro, Atezo

ADENOCARCINOMA, LARGE CELL, NSCLC NOS

INITIAL CYTOTOXIC THERAPY

PS 0-2

Systemic therapy

Tumor response evaluation

Response or stable disease

4–6 cycles (total)

Tumor response evaluation

PS 0-2

Progression

PS 3-4

Systemic immune checkpoint inhibitors (preferred)

Nivolumab (category 1)

or pembrolizumab (category 1)

or atezolizumab (category 1)

Progression

Other systemic therapy:

Docetaxel or pemetrexed or gemcitabine or ramucirumab + docetaxel

Best supportive care

See NCCN Guidelines for Palliative Care

Continuation maintenance

Bevacizumab (category 1)

Pemetrexed (category 1)

Bevacizumab + pemetrexed

Gemcitabine (category 2B)

Switch maintenance

Pemetrexed

Close observation

Progression, see Subsequent therapy, above
NCCN v2.2018 Sq IO >1L – Nivo, pembro, Atezo

SUBSEQUENT THERAPY

- Systemic immune checkpoint inhibitors (preferred)
  - Nivolumab (category 1)
  - Pembrolizumab (category 1)
  - Atezolizumab (category 1)

- Other systemic therapy:
  - Docetaxel or gemcitabine or ramucirumab + docetaxel

Best supportive care
See NCCN Guidelines for Palliative Care

PS 0-2 → Systemic therapy
  → Tumor response evaluation

PS 3-4 → Best supportive care
See NCCN Guidelines for Palliative Care

Response or stable disease → 4-6 cycles (total) → Tumor response evaluation

Continuation maintenance
- Gemcitabine
- Switch maintenance
- Docetaxel
- Close observation

Progression → See Subsequent therapy, above

Progression → Progression
Immunotherapy
Assumes PM tx prior if EGFR or ALK alteration

- **Pembrolizumab**
  - 1L w/ Carbo/pemetrexed (AdCA) – PDL1 + or – combo
    ORR 55% vs 29% Carbo/pemet alone
  - 1L monoTx - tumor proportion score (TPS) ≥50%
  - >1L monoTx - PD-L1 TPS ≥1%

- **Nivolumab**
  - 2L PDL1 + or - & AdCA or Sq

- **Atezolizumab**
  - 2L PDL1 + or - & AdCA or Sq

3 programmed death-1/programmed death-ligand 1 (PD-L1) inhibitors are currently approved for NSCLC. Treatment with pembrolizumab in NSCLC requires PD-L1 IHC testing. Nivolumab and atezolizumab are approved without PD-L1 testing, though US FDA-cleared complementary PD-L1 tests are available for both. PD-L1 IHC assays include:

- PD-L1 IHC 28-8 pharmDx (28-8)
- PD-L1 IHC 22C3 pharmDx (22C3)
- Ventana PD-L1 SP142 (SP142)
- Ventana PD-L1 SP263 (SP263)

Differences in antibodies and IHC platforms have raised questions about comparability among these assays and their diagnostic use.

High concordance and interobserver reproducibility were observed with the 28-8, 22C3, and SP263 clinical trial assays for PD-L1 expression on tumor cell membranes, whereas lower PD-L1 expression was detected with SP142.

Immune-cell PD-L1 expression was variable and interobserver concordance was poor.

Inter- and intratumoral heterogeneity had variable effects on PD-L1 expression.

**Conclusion**

High concordance among 28-8, 22C3, and SP263 when assessing PD-L1 expression on tumor cell membranes suggests possible interchangeability of their clinical use for NSCLC but not for assessment of PD-L1 expression on immune cells. Development of LDAs requires stringent standardization before their recommendation for routine clinical use.
IO Stage III NSCLC

- PACIFIC trial
- Stage 3 NSCLC, n=713
- Durvalumab (anti–PDL1 Ab)
- PFS longer: 16.8 mon vs 5.6 mon, HR 0.52
- ORR 28.4% vs 16.0%
- Med time to death or distant metastasis: 23.2 mon vs. 14.6 mon
- Safety was similar between the groups

Antonia et al. 2017 NEJM
Progression-free Survival in the Intention-to-Treat Population.

### SCLC – relapsed IO

#### ASCO 2017

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<tr>
<td>ORR</td>
<td>11%</td>
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<tr>
<td>DCR</td>
<td>36%</td>
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<tr>
<td>OS</td>
<td>4.1</td>
<td>7.9 mon</td>
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#### IASLC 2017 – high TMB

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<td>low</td>
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<td>med</td>
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<td>22%</td>
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<td>high</td>
<td>21%</td>
<td>46%</td>
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<table>
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<tr>
<td>low</td>
<td>22%</td>
<td>23%</td>
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<tr>
<td>med</td>
<td>26%</td>
<td>20%</td>
</tr>
<tr>
<td>high</td>
<td>35%</td>
<td>62%</td>
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</table>

TMB = tumor mutation burden

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Antonia et al. 2016 Lancet Oncol – Ph 1/2
Hellmann et al. 2017 ASCO Abstract 8503
Hellmann IASLC 2017 OA 07.03a http://ow.ly/kE2730ibURY
XRT and IO

• stereotactic body radiotherapy (SBRT) prior to pembrolizumab may help improve outcomes in patients with advanced solid tumors and multiple metastatic sites

• Well tolerated, and abscopal (out of field) responses were seen, suggesting further study is warranted for this treatment paradigm.

https://immunosym.org/daily-news/sbrt-could-augment-anti-pd-1-therapy-patients-metastatic-disease

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• Immune Related Adverse Events (irAEs)
• Remaining Issues
irAEs (1)


Managing immune checkpoint-blocking antibody side effects - Postow ASCO15 http://ow.ly/ysd9304fCS7
irAEs (2)

• Treatments w/ immunosuppressants
  – Corticosteroids
    • Systemic
    • Topical for rash
  – tumor necrosis factor-alpha antagonists
  – mycophenolate mofetil
  – other agents
“The correlation between efficacy of checkpoint-blocking antibodies and the occurrence of irAEs is controversial. Patients can benefit from checkpoint-blocking antibodies without developing irAEs. Any potential association between PD-1/PD-L1–blockade and irAEs will be hard to determine as the incidence of significant irAEs is low.”
Question: Are irAEs associated with outcome of nivolumab in NSCLC?

Findings: Multi-institutional medical record review including 134 patients with advanced or recurrent NSCLC treated with nivolumab monotherapy, landmark and multivariable analyses showed that immune-related adverse events were significantly associated with a better treatment outcome.
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Remaining Issues

• Value
• Sequencing
• Pathology operational issues
• Combinations – PM, IO, chemo
• Biomarker testing
  – Timing – initial dx, surgery, mets?
  – # of tests, validation vs research
  – Tissue (+?amount) vs liquid biopsy
  – Cost & value
Pharmacogenomics: Precision Medicine and Drug Response

Weinshilboum & Wang
Take Home

- Lung cancer Tx is evolving to PM and IO directed
- Optimal implementation & value is evolving
- PM – high response rates, but resistance
- IO – lower response rates, but longer benefit
- New AE and irAEs to consider
- Future research on combinations needed
Q: What are current precision medicine targets in lung cancer?
A: EGFR, ALK, ROS1, PDL1, BRAF, HER2, RET, MET, and others emerging

Q: What is the abscopal effect?
A: The out of [radiation] field effect – ie localized radiation treatment of a cancer mass causes shrinking of cancers outside the localized area

Q: What are the kinetics of immune-related adverse events (irAEs)?
A: Skin -> GI (colitis) -> hypophysitis/hypothyroidism -> liver

Q: What is the treatment of irAEs?
A: Steroids first. Then other immunosuppressants.
Lung-MAP Sub-Studies for Treatment

Patients with squamous cell lung cancer

Tumor sample analyzed

Sub-Study A
- Tumor has none of the changes listed here
  - Arm A1: 50% Chemotherapy
  - Arm A2: 50% MEPl 4736

Sub-Study B
- Tumor DNA has PIK3CA gene mutation
  - Arm B1: 50% Chemotherapy
  - Arm B2: 50% Pictilisib

Sub-Study C
- Tumor DNA has CCND1, D2, CDK4 gene amplification
  - Arm C1: 50% Chemotherapy
  - Arm C2: 50% Palbociclib

Sub-Study D
- Tumor DNA has FGFR gene amplification, mutation or fusion
  - Arm D1: 50% Chemotherapy
  - Arm D2: 50% AZD 4547

Sub-Study E
- Tumor contains high levels of c-Met protein
  - Arm E1: 50% Erlotinib
  - Arm E2: 50% Rilotumumab + Erlotinib
Novel precision medicine trial designs

**Umbrella trial**
- 1 type of cancer
- Different genetic mutations (● ● ●)

- Test drug 1
- Test drug 2
- Test drug 3

**Basket trial**
- Multiple types of cancer
- 1 common genetic mutation (●)

- Test drug
There are 2,004 cancer immunotherapies crowding into the pipeline. Now what?
[12/7/17] @JohnCendpts @endpts http://ow.ly/FbVU30h5w3l
irAEs (3)


Immunotherapy Ushers in New Era of Toxicity Management [10/6/16] @ClinOncNews http://ow.ly/NLuR305qk0Y #ImmunoOnc #SuppOnc

Pearls for Managing Immune-Related Toxicities [10/10/16] by Caroline Helwick @ASCOPost http://ow.ly/njXX305qjSm #ImmunoOnc #SuppOnc

• Other driver alterations
  – DDR2
CLINICAL PRESENTATION

Metastatic Disease

• Establish histologic subtype with adequate tissue for molecular testing (consider rebiopsy if appropriate)
• Smoking cessation counseling
• Integrate palliative care (See NCCN Guidelines for Palliative Care)

HISTOLOGIC SUBTYPE

• Adenocarcinoma
  • Large cell
  • NSCLC not otherwise specified (NOS)

• Squamous cell carcinoma

TESTING

• Molecular testing
  ‣ EGFR mutation testing (category 1)
  ‣ ALK testing (category 1)
  ‣ ROS1 testing
  ‣ BRAF testing
  ‣ Testing should be conducted as part of broad molecular profiling
  ‣ PD-L1 testing

TESTING RESULTS

Sensitizing EGFR mutation positive (see NSCL-18)

ALK positive (see NSCL-21)

ROS1 positive (see NSCL-24)

BRAF V600E positive (see NSCL-25)

PD-L1 positive and EGFR, ALK, ROS1, BRAF negative or unknown (see NSCL-26)

EGFR, ALK, ROS1, BRAF negative or unknown, PD-L1<50% or unknown (see NSCL-27)

Sensitizing EGFR mutation positive (see NSCL-18)

ALK positive (see NSCL-21)

ROS1 positive (see NSCL-24)

BRAF V600E positive (see NSCL-25)

PD-L1 positive and EGFR, ALK, ROS1, BRAF negative or unknown (see NSCL-26)

EGFR, ALK, ROS1, BRAF negative or unknown, PD-L1 <50% or unknown (see NSCL-28)