IASLC 2011/WHO 2015 CLASSIFICATION OF LUNG ADENOCARCINOMAS

DEMOGRAPHIC PATTERNS, TRENDS, AND IMPLICATIONS FOR CANCER SURVEILLANCE
Outline

- Relevance of lung adenocarcinoma for cancer control
- Review lung adenocarcinoma classification
- Incidence patterns by IASLC/WHO class and demographic group
- Incidence trends by demographic group
- Cause-specific survival patterns by stage, IASLC/WHO class and demographic group
- Challenges of using cancer registry data to classify tumors by WHO 2015 classification
Lung Carcinoma Incidence Rate: by Histology Group; 2000-2013
Background

- Widely divergent clinical spectrum within lung adenocarcinoma subtype

- 12-month survival varies from nearly 100% for pre-invasive tumors to 30% for certain histologic subtypes

- Survival differs strongly by population demographics in the SEER-Medicare linked cohort

- Subtype classification is highly recommended to advance research and improve patient outcomes
Adenocarcinoma Classification

- Epithelial tumor with glandular differentiation
  - mucin production
  - pneumocite marker expression
  - multiple morphological patterns with molecular correlations

- Numerous attempts to standardize the classification:

- Histopathology is the backbone of adenocarcinoma classification
  - Molecular studies and imaging contribute to classification
IASLC (2011) and WHO (2015) Classification

- **Preinvasive lesion**
  - atypical adenomatous hyperplasia; adenocarcinoma in situ

- **Minimally invasive adenocarcinoma**

- **Invasive adenocarcinoma**
  - *No predominant pattern*, coded as NOS (most tumors)
  - *Predominant pattern*:
    - lepidic, acinar, solid, papillary, micropapillary

- **Adenocarcinoma variant**
  - mucinous, colloid, clear cell, signet ring, enteric, fetal

- **Other Adenocarcinoma (not a WHO 2015 category):**
  lung tumors with histology codes not included in IASLC/WHO classification but listed in the ICD-O-3 under Adenocarcinomas Histology Group
Distribution of Lung Adenocarcinoma Incident Cases by Histologic Subtype, 2000-2013

- Adenocarcinoma, NOS: 81%
- Adenocarcinoma, Predominant: 7%
- Adenocarcinoma, Variant: 6%
- Adenocarcinoma, Min-Invasive: 3%
- Adenocarcinoma, Other: 3%
Lung Adenocarcinoma Incidence Rate by Age Category, 2000-2013
Lung Adenocarcinoma Incidence Rate by Sex, Age-adjusted, 2000-2013
Lung Adenocarcinoma Histologic Subtype Association with Sex

WHO 2015 classification, positive histology, dx. year 2000-2013

95% Confidence Interval of Age-Adjusted Female Incidence Rate Ratio
Reference Category: Male
Lung Adenocarcinoma Incidence Rate, by Race/Ethnicity, 2000-2013

Year of Diagnosis

Age-adjusted Incidence Rate per 100,000

- Adenocarcinoma Non-Hispanic White
- Adenocarcinoma Non-Hispanic Black
- Adenocarcinoma Hispanic
- Adenocarcinoma Asian/Pacific Islander
Lung Adenocarcinoma Histologic Subtype Association with Race/Ethnicity Group

WHO 2015 classification, positive histology, dx. year 2000-2013

95% Confidence Interval of Age-Adjusted Incidence Rate Ratio
Reference Category: Non-Hispanic White

- Other Adenocarcinoma
- Adenocarcinoma, Minimally Invasive
- Adenocarcinoma, Variant
- Adenocarcinoma, Predominant Pattern
- Adenocarcinoma, No Predominant Pattern

Non-Hispanic Black  Hispanic  Asian/Pacific Islander
Lung Adenocarcinoma Cause-specific Survival by Sex and Stage at Diagnosis

Female

Male

Cause-specific 12-month survival

- Localized
- Regional
- Distant
Lung Adenocarcinoma Cause-specific Survival by Race/Ethnicity Group

- Non-Hispanic White
- Non-Hispanic Black
- Hispanic
- Asian/Pacific Islander

Cause-specific age-adjusted 12-month survival

Localized 
Regional 
Distant
Cause-specific Survival by Lung Adenocarcinoma Histologic Subtype

- Other Adenocarcinoma
- Adenocarcinoma, Minimally Invasive
- Adenocarcinoma, Variant
- Adenocarcinoma, Predominant Pattern
- Adenocarcinoma, No Predominant Pattern

Cause-specific 12-month survival

- Distant
- Regional
- Localized
Challenges for Cancer Surveillance

- Incidence of preinvasive adenocarcinoma
  - Atypical Adenomatous Hyperplasia: ICD-O 8250/0
    - New code, benign behavior, non-reportable
  - Adenocarcinoma in situ:
    - Recommended: 8140/2; 8410/2; 8253/2

- Minimally invasive adenocarcinoma (8250/2; 8257/3)
  - Less than 5mm invasion
    - Size of invasive component not collected, not required by CAP protocol
  - Solitary nodule
    - CS Site-Specific Factor 1 Separate Tumor Nodules - Ipsilateral Lung not collected
Challenges for Cancer Surveillance (cont.)

- New text description of an existing code, approved by IARC/WHO for ICD-O:
  - 8250/3 - Leipidic adenocarcinoma (formerly BAC)
  - 8551/3 - Acinar cell cystadenocarcinoma
  - 8253 - Invasive mucinous adenocarcinoma (formerly BAC)
  - 8254 - Mixed invasive adenocarcinoma (mucinous and non-mucinous) (formerly BAC)

- Coding predominant pattern preferred over the use of a “mixed subtypes” code
  - Path reports often do not include the predominant pattern
  - Registrars might need training to identify predominant pattern in path report text
Conclusion

- Incidence rate and survival of lung adenocarcinoma patients have changed since year 2000:
  - Incidence increased among females, among Asians/Pacific Islanders and among patients 65 to 84 years of age
  - Survival advantage for females and Asian Pacific Islanders
  - Predominant pattern reported for small proportion of cases
  - Survival is better when a predominant pattern was identified
  - Good survival for minimally invasive tumors

- Cancer surveillance community needs a focused effort to implement changes required by IASLC 2011/WHO 2015
Thank You!
Lung Adenocarcinoma Stage Distribution: Adenocarcinoma vs. All Other Carcinoma

Adenocarcinoma
- Localized: 52,670
- Regional: 4,748
- Distant: 8,881
- Unstaged: 4,343

Other Carcinoma
- Localized: 53,018
- Regional: 5,301
- Distant: 8,104
- Unstaged: 9,561
Lung Adenocarcinoma Stage Distribution: Male vs. Female
Lung Adenocarcinoma Classification (based on ICD-O-3 histology)

- Lung adenocarcinoma (NOS)
- Adenocarcinoma with predominant pattern (WHO 2004; WHO 2015)
- Variants of adenocarcinoma (WHO 2004; WHO 2015)
- Minimally invasive adenocarcinoma (WHO 2015 only)
- Other lung adenocarcinomas (histology not included in WHO classification but recognized by ICD-O-3)
Lung Adenocarcinoma with Lepidic Predominant Pattern
Lepidic growth
Lung Adenocarcinoma with Acinar Predominant Pattern
Adenocarcinoma with Papillary Predominant Pattern
Lung Adenocarcinoma with Solid Predominant Pattern
Lung Adenocarcinoma, No Predominant Pattern
Lung Adenocarcinoma with Micropapillary Predominant Pattern
Background

- The World Health Organization Classification of Tumours of the Lung, **2004**
  - IAP; IASLC
  - IARC Working Group, March 2003

- The World Health Organization Classification of Tumours of the Lung, **2015**
  - IASLC, 2011
  - IARC Working Group meeting, April 2014
Lung Carcinomas: Histology Groups (needs update)

- **Other lung carcinomas** (based on ICD-O-3 histology)
- **Other lung tumors** (non-carcinoma; based on ICD-O-3 histology)
Lung Cancer Incidence Rate, 2000-2013: Carcinomas, Non-Carcinomas
Lung Adenocarcinoma Incidence Rate, by Age Category, 2000-2013
Lung cancer incidence: carcinoma vs. non-carcinoma histology, by sex
Lung Adenocarcinoma
12-Month Cause-Specific Survival by Age Category and Stage
Lung Adenocarcinoma Stage Distribution: by Age Category
Lung Adenocarcinoma Stage Distribution: by Sex
Lung Adenocarcinoma Stage Distribution: by Race/Ethnicity Group
Methods

- SEER 18 Regs Research Data, Nov 2015 Sub
- Diagnosis year: 2000-2013
- Age 20 – 84 years
- Tumors with positive histology only
- Primary site: lung and bronchus
- SEER historic stage A
- Active follow-up; SEER survival data elements