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Interstitial Lung Disease Associated with Immune Checkpoint Inhibitors in Gastrointestinal Cancer Treatment: A Pharmacovigilance Analysis of the FDA Adverse Event Reporting System (FAERS) Database and EudraVigilance Database

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Research Article

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Abstract

Background

Immune checkpoint inhibitors (ICIs) have revolutionized gastrointestinal (GI) cancer therapy, yet immune-related interstitial lung disease (ILD) remains a rare but fatal complication. While well-characterized in lung cancer, the specific clinical profile and risk patterns of ICI-ILD in GI malignancies remain insufficiently explored. This study evaluates real-world safety signals and manifestations of ICI-induced ILD in the GI cancer population.

Methods

A retrospective pharmacovigilance analysis was conducted using the FAERS database (2015–2025). Disproportionality metrics (ROR, PRR, and EBGM) were employed to quantify pulmonary safety signals.

Results

A total of 588 ICI-ILD cases were identified, primarily involving gastric (32.7%) and esophageal (22.8%) cancers, with nivolumab (58.3%) as the most frequently implicated agent. Gender-stratified analysis revealed that while males constituted the majority of cases, females exhibited higher relative risk signals (ROR) for specific agents, such as avelumab. Temporally, ipilimumab demonstrated a highly concentrated early-onset risk window within the first 30 days, whereas PD-1/PD-L1 inhibitors showed a more prolonged risk distribution. Within the serious adverse event population, ROR signals exhibited marked intra-class variation. Furthermore, clinical manifestations and signal intensities demonstrated distinct regional specificities across different geographic areas.

Conclusion

ICI-related ILD in GI oncology demonstrates distinct age, gender, and agent-specific risk profiles. Given the high fatality rate and heterogeneous TTO, risk-stratified monitoring is essential. These findings offer critical evidence to optimize immunotherapy safety in gastrointestinal oncology.

1. Introduction

In recent years, the clinical application of immune checkpoint inhibitors (ICIs) has revolutionized the therapeutic landscape of malignancies. By blocking signaling pathways such as cytotoxic T-lymphocyte-associated protein 4 (CTLA-4), programmed cell death protein 1 (PD-1), and its ligand (PD-L1), ICIs can reactivate the host immune system to recognize and eliminate tumor cells[1]. In the field of digestivesystem tumors, ICIs have demonstrated significant survival benefits in the treatment of various malignancies, including gastric cancer, esophageal cancer, hepatocellular carcinoma, and colorectal cancer, becoming a vital therapeutic pillar alongside surgery, radiotherapy, and chemotherapy[2].

However, the immune activation induced by these agents is accompanied by immune-related advese events (irAEs), which are garnering increasing clinical attention. These adverse events can affect organ systems throughout the body. Among them, immune-related interstitial lung disease (ILD) or pneumonitis, while relatively low in incidence, is often characterized by insidious onset, rapid progression, and high mortality[3]. Previous studies indicate that ILD is one of the leading causes of death associated with ICI therapy[4]. Therefore, early idenification, risk assessment, and effective management of ICI-induced ILD are crucial for ensuring patient safety.

Current research on ICI-associated ILD has predominantly focused on patients with non-small cell lung cancer (NSCLC) or melanoma, with a paucity of studies specifically targeting digestive system tumors. Notably, patients with digestive system tumors present unique pathophysiological characteristics. The emerging theory of the "gut-lung axis" suggests that dysbiosis of the gut microbiota may modulate pulmonary inflammatory responses through immunoregulatory mechanisms[5]. This implies that patients with digestive tumors may face distinct risk profiles and clinical outcomes regarding ILD when treated with ICIs compared to other tumor types. Furthermore, data from existing clinical trials are often limited by sample size and strict inclusion criteria, making it difficult to fully capture the drug safety profile in complex, real-world populations.

The FDA Adverse Event Reporting System (FAERS), a large-scale, public spontaneous reporting database, aggregates adverse drug reaction reports globally, providing a valuable resource for mining rare or severe drug safety signals in large populations[5]. In light of this, the present study utilizes the FAERS database to systematically analyze the real-world occurrence of ILD induced by ICIs in the treatment of digestive system tumors. We aim to explore the clinical characteristics, time-to-onset patterns, demographic disparities, and risk signal strengths among different drugs, thereby providing evidence-based guidance for clinicians to develop individualized monitoring strategies and risk management protocols.

2. Methods

2.1. Data source and Data cleaning

The FAERS database, containing various reports of spontaneous adverse events and side effects submitted by consumers, healthcare professionals, and manufacturers, has worldwide coverage and large-scale information, making it suitable for the early detection of safety signals and timely characterization of the safety profile [6]. This study aimed to evaluate the risk of interstitial lung disease associated with immune checkpoint inhibitors in gastrointestinal

cancer treatment. Reports of ILD and related pulmonary events associated with immune checkpoint inhibitors submitted between the first quarter of 2004 and the fourth quarter of 2023 were extracted from the FAERS database and subsequently preprocessed using SAS 9.4 software. After cleaning and standardization, the data were mapped to the Medical Dictionary for Regulatory Activities (MedDRA) to identify adverse drug reactions [7]. Significant ADRs were calculated and mapped to preferred terms and system organ class, which represent the different levels of MedDRA [8]. The specific information extracted for this study included age, sex, and country. Serious clinical outcomes were classified as disability, death, hospitalization, and life-threatening events.

2.2. Statistical analysis

Multiple algorithms, including ROR, PRR and EBGM, were used to assess whether immune checkpoint inhibitors were significantly associated with ILD and related pulmonary events. In the formula, the value a represents the total number of ILD and related pulmonary events for immune checkpoint inhibitors, b represents the total number of cases for this specific ILD-related AE for all other drugs, c represents the total number of other AEs for immune checkpoint inhibitors, and d represents the total number of other AEs for all other drugs [9]. The specific formulae are as follows.

ROR

$$\mathrm{ROR} = \frac{\mathrm{ad}}{\mathrm{bc}}$$

$$95\%\mathrm{CI} = \mathrm{e}^{\ln(\mathrm{ROR}) \pm 1.96\sqrt{\frac{1}{\mathrm{a}}+\frac{1}{\mathrm{b}}+\frac{1}{\mathrm{c}}+\frac{1}{\mathrm{d}}}}$$

If the lower limit of 95% CI > 1 and a ≥ 3, the ROR should be considered a signal.

3. Results

3.1. Baseline Characteristics

This study was based on the FAERS database, ultimately including 588 cases of ILD in patients with gastrointestinal malignancies receiving ICI therapy (Table 1). Analysis revealed that nivolumab and pembrolizumab were the predominant ICIs involved, accounting for 343 cases (58.3%) and 146 cases (24.8%), respectively. The median patient age was 70.5 years. Using 18, 45, and 65 years as cutoff values, patients were stratified into four age groups, with the majority aged ≥ 65 years (N = 383, 65.14%). Male patients represented a significant proportion (421 cases, 71.6%). Case reports were primarily sourced from Japan (338 cases, 57.5%), the United States (84 cases, 14.3%), and China (62 cases, 10.5%). Intravenous administration was the predominant route of drug delivery (465 cases, 79.1%). All cases involved malignant gastrointestinal neoplasms, with gastric cancer (192 cases, 32.7%), esophageal cancer (134 cases, 22.8%), and esophageal squamous cell carcinoma (44 cases, 7.5%) ranking among the leading diagnoses. The median time to ILD onset was 58 days after treatment initiation, with 18.0% of cases (106 cases) manifesting symptoms during the initial treatment period (within 30 days). Notably, 99.8% of reported cases were classified as serious adverse events, with primary clinical outcomes including hospitalization (367 cases, 62.4%), fatal outcomes (195 cases, 33.2%), and life-threatening conditions (103 cases, 17.5%).

3.2. Gender Distribution

Among adverse event reports of ICI-related interstitial lung disease in the treatment of gastrointestinal malignancies, male patients dominated the reporting statistics (421 cases), substantially exceeding both female (110 cases) and gender-unspecified groups (57 cases)(Fig. 1a, Table 2). Nivolumab and pembrolizumab were the two ICIs with the highest reported frequencies of ILD. The former accounted for 263 cases in males, surpassing other agents, with 54 reported cases in females; the latter reported 107 cases in males and 31 cases in females. Although male reports substantially exceeded female reports in absolute numbers, the reporting odds ratio (ROR) analysis revealed that female patients demonstrated elevated relative risk for ICI-related ILD across most agents. Pulmonary inflammation emerged as the most frequently reported specific adverse event across virtually all medications. Notably, avelumab demonstrated an ROR of 80.79 for pulmonary inflammation in females, substantially exceeding the overall population ROR of 28.42. Atezolizumab-associated pulmonary inflammation in females exhibited an ROR of 12.23, nearly double that observed in males (5.11).

3.3. Age Distribution

Analysis of ICI-related ILD in patients with gastrointestinal malignancies within the FAERS database revealed substantial variation in case distribution across age strata(Fig. 1b, Table 3). The ≥ 65-year age group demonstrated the highest case frequency, reaching 383 cases (65.14% of total), significantly exceeding other age groups. The 45-64-year age group followed (133 cases, 22.6%), followed by the age-unspecified group (60 cases, 9.6%), while the < 18-year age group represented the lowest frequency with only 1 case (0.16%). ROR signal strength varied across age groups for different ICIs, with elderly patients (≥ 65 years) demonstrating more pronounced association signals overall. The most prominent examples included pembrolizumab's association with autoimmune pulmonary disease (ROR = 137.33) and nivolumab's association with bronchiolitis (ROR = 123.24). Furthermore, the ≥ 65-year group demonstrated the broadest spectrum of associated adverse events, including immune-mediated lung disease, radiation pneumonitis, consolidation, and pulmonary toxicity. The 45-64-year group exhibited generally lower signal strength compared to elderly patients, though specific drug-event combinations demonstrated substantial associations, exemplified by nivolumab's relationship with immune-mediated lung disease in this stratum (ROR = 38.21), with signals predominantly concentrated in immune-mediated lung disease and pulmonary inflammation. The 18-44-year age group demonstrated relatively limited data records with weaker ROR values.

3.4. Temporal Analysis of Adverse Event Onset

The temporal distribution of ICI-related ILD varied across different agents, with an overall median time-to-onset (TTO) of 58 days. The period of highest concentrated risk was 0–30 days following drug initiation, with the strongest signals across nearly all medications emerging during this interval(Fig. 1c, Table 4). Notably, ipilimumab demonstrated the most prominent associations with radiation pneumonitis and immune-mediated lung disease within this window, with ROR values of 204.49 and 110.32 respectively, representing the most prominent risk signals identified in this analysis. In contrast to ipilimumab's risk concentration within 0–30 days post-initiation, nivolumab demonstrated a prolonged risk window spanning all time intervals from 0–30 days through > 360 days, representing the sole agent demonstrating definitive signals at extended follow-up (> 360 days; pulmonary inflammation, ROR = 13.54). Nivolumab's most prominent signal involved immune-mediated lung disease (with signals across all time intervals), alongside a distinctive association with bronchiolitis (ROR = 32.88) across the entire population. Pembrolizumab demonstrated relatively balanced risk distribution across early, intermediate, and late phases, with the strongest association involving autoimmune pulmonary disease (ROR = 51.85). Other ICIs demonstrated substantially lower overall ROR values.

3.5. Geographic Distribution

Geographic distribution analysis revealed nivolumab as the agent with the highest reported case frequency, with predominant utilization reports from Asian regions (261 cases), substantially exceeding other geographic areas(Fig. 1e, Table 5). Pembrolizumab similarly demonstrated the highest concentration of reported cases in Asia (88 cases). In contrast, reports of other ICIs remained relatively limited. The study further observed national variation in ICI-ILD reporting patterns. Specifically, among nivolumab-related ILD reports, Germany reported elevated-intensity immune-mediated lung disease signals (ROR = 71.12), with notably elevated bronchiolitis signals from Japan (ROR = 47.78) and substantial pulmonary inflammation signals from Australia (ROR = 57.25). Pembrolizumab-associated ILD signals were most prominent in the United States, encompassing immune-mediated lung disease (ROR = 41.89) and consolidation (ROR = 22.66) among multiple manifestations. Overall population analysis revealed the strongest pembrolizumab-autoimmune pulmonary disease association signal (ROR = 51.85). Ipilimumab-related ILD signals concentrated predominantly in the United States, with the strongest immune-mediated lung disease association (ROR = 157.43) representing the highest ROR value in this analysis. Additionally, atezolizumab-associated pulmonary inflammation signals were detected in China (ROR = 16.2), while ILD reports for domestically-developed PD-1 inhibitors tislelizumab and toripalimab originated exclusively from China.

3.6. Fatal versus Non-Fatal Cases and Serious Adverse Event Analysis

Substantial variation existed in absolute frequencies of fatal versus non-fatal cases across different ICIs(Fig. 1f). Nivolumab demonstrated the highest number of fatal ILD cases (221 cases). Among the total 588 reported cases, serious adverse event reports reached 587 cases, with only 1 non-serious report. Nivolumab dominated in serious ILD report frequency with 343 cases (58.4% of total), followed by pembrolizumab (145 cases, 24.7%) and ipilimumab (46 cases, 7.8%). Further signal strength analysis via ROR revealed that pembrolizumab demonstrated the strongest association signal with autoimmune pulmonary disease in serious reports, with ROR reaching 52.77, while immune-mediated lung disease and consolidation also displayed strong signals. Ipilimumab demonstrated exceptionally strong associations with immune-mediated lung disease and radiation pneumonitis, with serious report ROR values of 42.30 and 38.03, respectively. Nivolumab, in addition to generating the highest absolute number of reports, demonstrated definitive strong signal associations with immune-mediated lung disease and bronchiolitis, with ROR values of 33.7 and 31.2, respectively, in the serious adverse event population.

3.7. Supplementary Validation Using the EudraVigilance Database

Analysis of the EudraVigilance database in this study reveals that patients with digestive system tumors who developed interstitial lung disease following ICI treatment exhibit distinct characteristic distributions and risk associations. From a demographic perspective, the affected population is predominantly male (74.19%–79.20%) and elderly individuals over 65 years of age (58.06%–81.60%), with the number of reported cases increasing year by year since 2021. In terms of risk association strength, disproportionality analysis confirms statistically significant links between interstitial lung disease and the use of Nivolumab, Pembrolizumab, Ipilimumab, and Tislelizumab. Regarding immune-mediated lung disease, Nivolumab and Ipilimumab demonstrate particularly strong risk signals, with ROR values as high as 34.43 and 33.50, respectively. In the category of interstitial lung disease, Nivolumab also shows the strongest signal among ICIs (ROR = 3.27)(Table 6).

4. Discussion

The emergence of immune checkpoint inhibitors (ICIs) has significantly improved the survival outcomes of patients with various malignancies; however, it has simultaneously brought challenges related to immune-related adverse events (irAEs). Based on the Food and Drug Administration Adverse Event Reporting System (FAERS) database, this study systematically analyzed interstitial lung disease (ILD) adverse reactions induced by ICIs in the treatment of gastrointestinal malignancies. Through disproportionality analysis, we identified 21 categories of gastrointestinal adverse events associated with ICIs and conducted in-depth analyses of their incidence, safety signals, and clinical characteristics. To the best of our knowledge, this is the first large-scale retrospective analysis systematically evaluating the disease-specific distribution of ICI-related ILD in gastrointestinal cancer patients based on FAERS data. This study not only fills the gap in research on ICI-related adverse reactions specific to ILD in gastrointestinal malignancies, but also provides important empirical evidence for clinical monitoring and patient management.

The mechanism of interstitial lung disease (ILD) induced by immune checkpoint inhibitors (ICIs) in the treatment of gastrointestinal malignancies is complex and multifaceted, involving immune cell activation, inflammatory mediator release, and individual-specific responses. In general, the core mechanism of ICI-ILD lies in the fact that ICIs block the CTLA-4 or PD-1/PD-L1 signaling pathway, relieving T cell suppression and enhancing anti-tumor immunity; however, this may simultaneously lead to autoreactive T cells attacking lung tissue and triggering immune-mediated lung injury[6]. Studies have demonstrated that the infiltration and activation of cytotoxic CD8 + T cells and helper CD4 + T cells in lung tissue represent the central step in ILD

development. These cells promote inflammation by secreting pro-inflammatory factors such as interferon-γ (IFN-γ) and tumor necrosis factor-α (TNF-α), recruiting macrophages and neutrophils, thereby further amplifying the inflammatory response[7]. Moreover, the tumor microenvironment of gastrointestinal malignancies may exacerbate this process through the "gut-lung axis": dysbiosis of the intestinal microbiota can lead to impaired intestinal barrier function, promoting bacterial translocation and the entry of pathogen-associated molecular patterns (PAMPs) such as lipopolysaccharide (LPS) into the circulation, activating systemic immune responses[8]. These immune activation signals can disseminate to the lungs via circulating immune cells or inflammatory factors, enhancing pulmonary tissue sensitivity to ICI-induced immune attack.

The distribution of ICI-related ILD demonstrates significant tumor type specificity. In all cases included in this study, the underlying diseases were gastrointestinal malignancies, with gastric cancer (32.7%), esophageal cancer (22.8%), and esophageal squamous cell carcinoma (7.5%) ranking among the top three. Gastric cancer, as the most frequently reported tumor type associated with ICI-related ILD, may have its high-risk characteristics closely related to the immunobiological features of gastric cancer. Research has demonstrated that gastric cancer, particularly microsatellite instability (MSI) and Epstein-Barr virus (EBV)-positive gastric cancer subtypes, typically exhibits high tumor mutation burden and neoantigen load, generating more tumor-associated neoantigens and thus eliciting stronger T cell immune responses[9]. Esophageal cancer patients similarly face elevated risk of ICI-related ILD. Esophageal squamous cell carcinoma, as the predominant pathological type in Asian regions (particularly East Asia), typically demonstrates a tumor immune microenvironment characterized by high PD-L1 expression and T cell infiltration, suggesting a state of intense immune suppression. When ICIs block the PD-1/PD-L1 pathway, the rapid "reboot" of the immune system may result in excessive immune activation and pulmonary inflammation[10]. Furthermore, esophageal cancer patients frequently suffer from esophageal dysfunction and malnutrition, factors that may compromise immune reserves and pulmonary antioxidant defense capacity, increasing susceptibility to ILD. In this study, esophageal cancer and esophageal squamous cell carcinoma combined accounted for 30.3%, reflecting the prominent position of these two tumor types among ICI-related pulmonary toxicity patients.

This investigation systematically analyzed the relevant factors associated with ILD induced by ICI application in the treatment of gastrointestinal malignancies. Regarding age distribution, patients aged ≥ 65 years occupied the dominant position (383 cases, 65.14%), possibly related to immune senescence, decreased pulmonary function, and increased comorbidity burden in this age group. Previous studies have demonstrated that age is an important risk factor for ICI-related adverse events, with elderly patients showing potential for more severe pulmonary inflammation following immune checkpoint inhibition[11]. Regarding gender differences, although males comprised a significantly larger proportion of reported cases (421 cases, 71.6% vs. females 110 cases, 18.7%), analysis of reporting odds ratio (ROR) values showed that female patients demonstrated higher relative risk in the majority of ICI-related ILD cases. This phenomenon may be related to differences in hormone levels, gender-biased immune responses in females, and the expression specificity of X-linked immunoregulatory genes[12]. Analysis of time to onset revealed specific temporal distribution characteristics of ICI-related ILD. However, significant differences exist in the risk windows among different ICIs. This study found that the ILD risk of anti-CTLA-4 agents (such as ipilimumab) was highly concentrated in the early phase of 0–30 days post-medication. This rapid toxicity response may be related to the mechanism of strong and widespread T cell activation induced by anti-CTLA-4 agents. CTLA-4 is a negative regulator of early T cell activation; its blockade can rapidly relieve T cell suppression, triggering early and acute immune response dysregulation[13]. In contrast, anti-PD-1/PD-L1 agents (nivolumab and pembrolizumab) demonstrated relatively balanced temporal risk distribution. This extended risk window may reflect the central role of the PD-1/PD-L1 pathway in maintaining chronic immune homeostasis. Its blockade not only induces acute effector T cell activation, but may also trigger long-term disruption of immune tolerance and aberrant activation of memory T cells, resulting in ILD with longer latency and more persistent immune drive[7]. This heterogeneity in temporal distribution suggests that different mechanism-based ICIs (anti-CTLA-4 versus anti-PD-1/PD-L1) may differ in their immunological mechanisms of ILD induction, necessitating temporally-stratified dynamic monitoring strategies. Reporting patterns for ICI-ILD vary significantly across different geographic regions, with Japan, the United States, and China being the primary reporting sources. These geographic variations may reflect regional differences in the utilization preferences of different ICIs or differences in medical standards and reporting norms, all of which may influence ILD risk. Notably, the Nivolumab-related "bronchiolitis" signal from Japan demonstrated the strongest intensity (ROR = 47.78), suggesting the need to further explore the impact of racial/geographic-specific factors on ICI-induced pulmonary toxicity.

This study has several important limitations. First, the FAERS database, as a global spontaneous reporting system, only collects data from patients receiving immune checkpoint inhibitor (ICI) therapy who developed interstitial lung disease (ILD), but lacks denominator data reflecting the total number of patients receiving such treatment. Therefore, the number of ICI-related ILD cases reported in this study reflects only the absolute quantity in the adverse event reporting system, rather than the true incidence rate and relative risk in the total population receiving ICI therapy. FAERS reporting is voluntary, and not all patients who develop ILD are reported. Additionally, factors such as product time-on-market, geographic variation, and healthcare professional reporting propensity contribute to significant selection bias. Second, the database lacks critical covariates such as baseline pulmonary function status, prior history of pulmonary disease, concomitant medications, and smoking history, as well as important clinical parameters such as COVID-19 infection status and Eastern Cooperative Oncology Group (ECOG) performance status, all of which may affect ILD risk but cannot be effectively controlled[11]. When this study employed Medical Dictionary for Regulatory Activities (MedDRA) terminology to classify adverse reactions, diagnostic ambiguity may have occurred, potentially reflecting tumor progression or radiation therapy sequelae rather than ICI toxicity per se. The absence of confirmatory diagnostic data such as high-resolution computed tomography (HRCT) and lung biopsy in FAERS prevents differentiation between immunotherapy-induced specific ILD and tumor-driven clinical manifestations, leading to indication bias. Many patients had received chemotherapy or radiotherapy prior to ICI treatment, but we were unable to accurately quantify the degree of this interaction. Our interpretation of the potential biological mechanisms underlying ICI-related ILD remains limited, necessitating further prospective clinical trials and systematic real-world data studies to elucidate these associations.

Based on the findings of this study, we propose the following clinical recommendations: (1) conduct prospective, multicenter clinical studies to establish diagnostic gold standards and predictive models for ICI-ILD; (2) undertake biomarker discovery and validation to identify high-risk populations; (3) explore the immunological and genetic foundations of ICI-ILD and elucidate the specific mechanisms of the gut-lung axis; (4) evaluate the effectiveness of early intervention strategies (such as probiotics, prebiotics, or traditional Chinese medicine).

This study systematically analyzed the epidemiological characteristics, safety signals, and clinical features of ILD induced by ICIs in the treatment of gastrointestinal malignancies. The findings demonstrate that ICI-related ILD in gastrointestinal cancer patients exhibits significant age, gender, tumor type, and geographic specificity, with different ICI agents demonstrating differential temporal risk curves. Elderly patients, female patients, and patients with gastric cancer and esophageal cancer face elevated ILD risk. These findings provide important evidence-based data for individualized risk assessment, stratified monitoring, and clinical decision-making during ICI therapy, contributing to better prevention and management of associated serious pulmonary toxicity while fully harnessing the anti-tumor efficacy of ICIs.

Declarations

Ethics approval and consent of participate

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Author Contribution

Author ContributionsRuiying Chen drafted the original manuscript and prepared the figures and tables. Pengkhun Nov contributed to the preparation of the figures and data visualization. Jiqiang Li served as the corresponding author, providing supervision and critical review of the manuscript. All authors reviewed the manuscript and approved the final version for submission.

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Tables

Tables 1 to 6 are available in the Supplementary Files section.

Figures

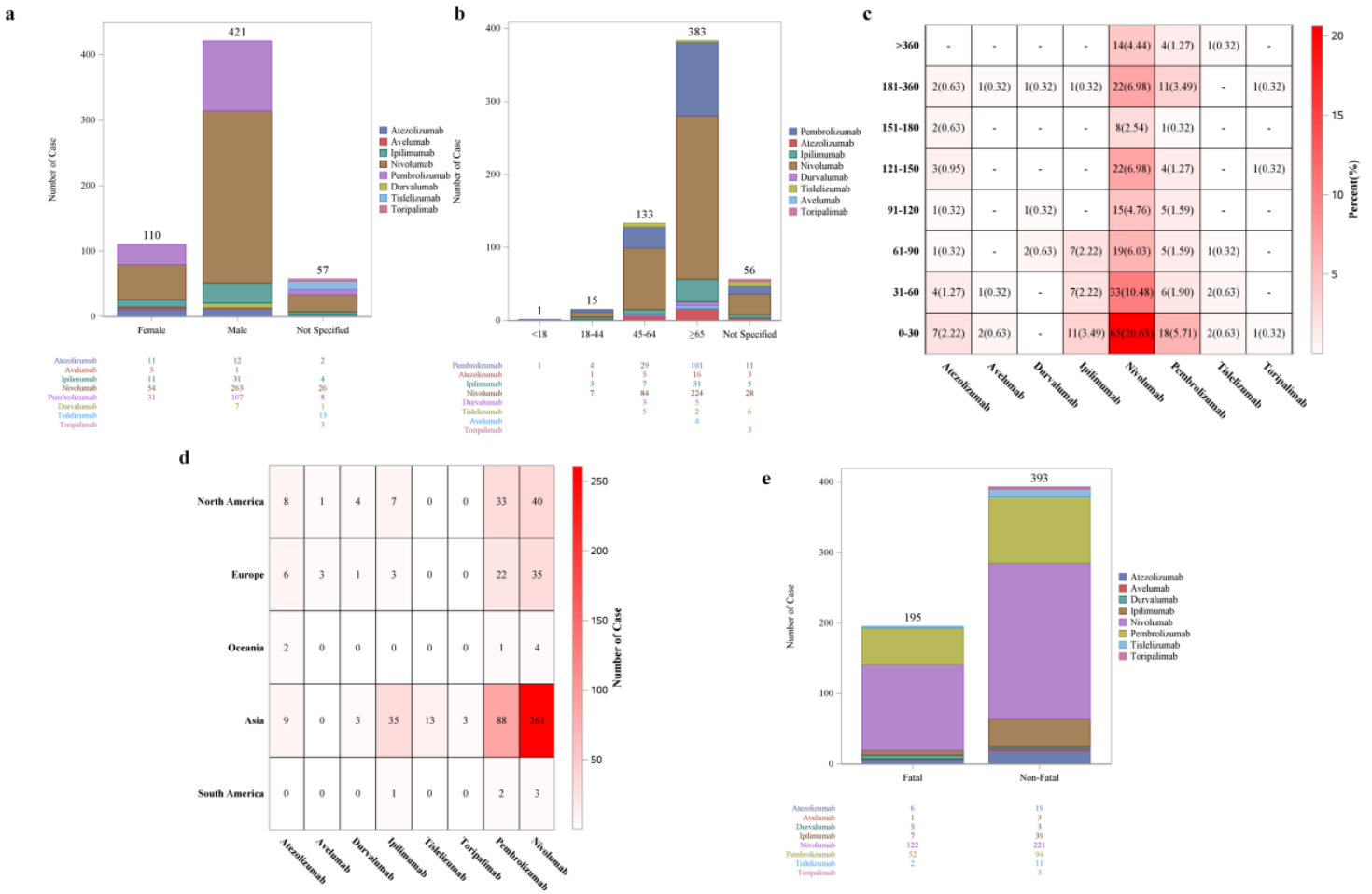


Figure 1

a. Gender distribution of AE reports

b. Age distribution of AE reports

c. Heatmap of time-to-onset distribution of AE reports

e. Geographic distribution of AE reports

f. Fatal and non-fatal cases of AE reports

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Table1.ClinicalprofilesofICIinducedILDinpatientswithdigestivesystemmalignanciescollectedfromtheFAERSdatabase20152025.xls
- Table2.ReportingOddsRatiosRORand95ConfidenceIntervalsforimmunerelatedpulmonaryadverseeventsstratifiedbydrugandgender.xls
- Table3.ReportingOddsRatiosRORand95ConfidenceIntervalsforimmunerelatedpulmonaryadverseeventsstratifiedbydrugandage.xls
- Table4.ReportingOddsRatiosRORand95ConfidenceIntervalsforimmunerelatedpulmonaryadverseeventsstratifiedbyheatmapoftimetoonsetdistribution.xls
- Table5.ReportingOddsRatiosRORand95ConfidenceIntervalsforimmunerelatedpulmonaryadverseeventsstratifiedbygeographicdistribution..xls
- Table6.ReportingOddsRatiosRORand95ConfidenceIntervalsforimmunerelatedpulmonaryadverseeventsstratifiedbygeographicdistribution.xls