Brigham and Women's Hospital
Founding Member, Mass General Brigham

Dana-Farber Cancer Institute

HARVARD MEDICAL SCHOOL TEACHING HOSPITAL

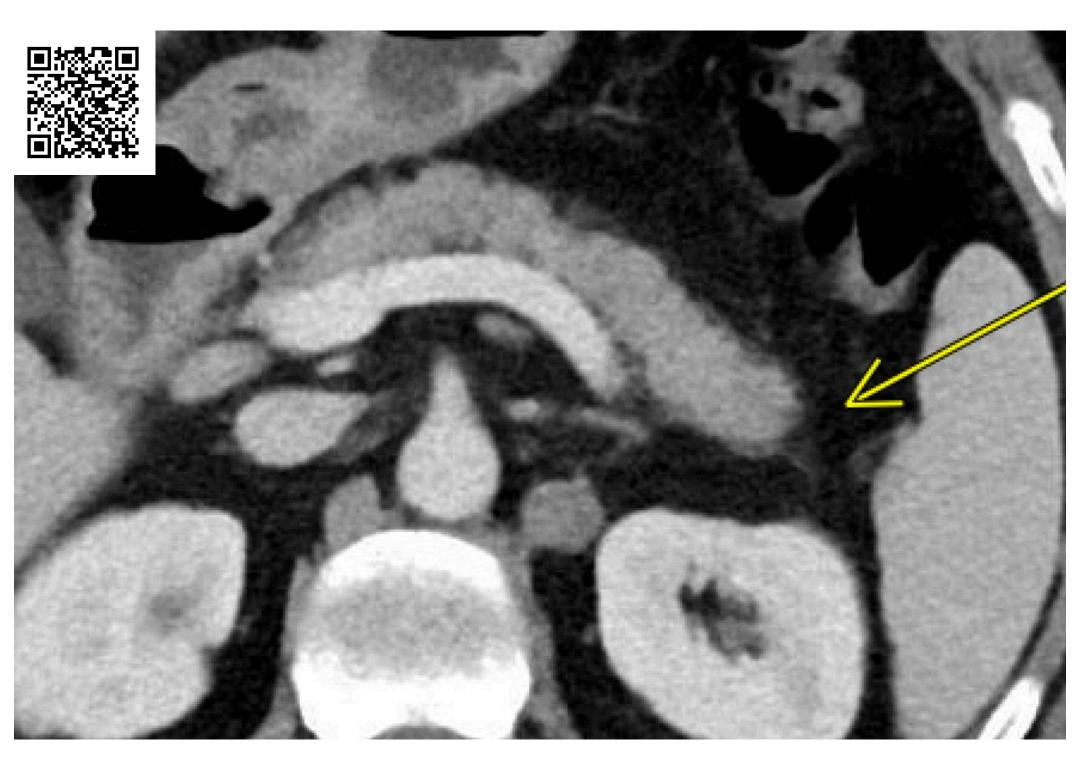# Distinct Imaging Patterns of Immune Checkpoint Inhibitor-Induced Acute Pancreatitis (ICI-AP)

Jordan Kondo, Abhishek Keraliya, Matthew Townsend, Anita Giobbie-Hurder, Marta Braschi-Amirfarzan, Shilpa Grover

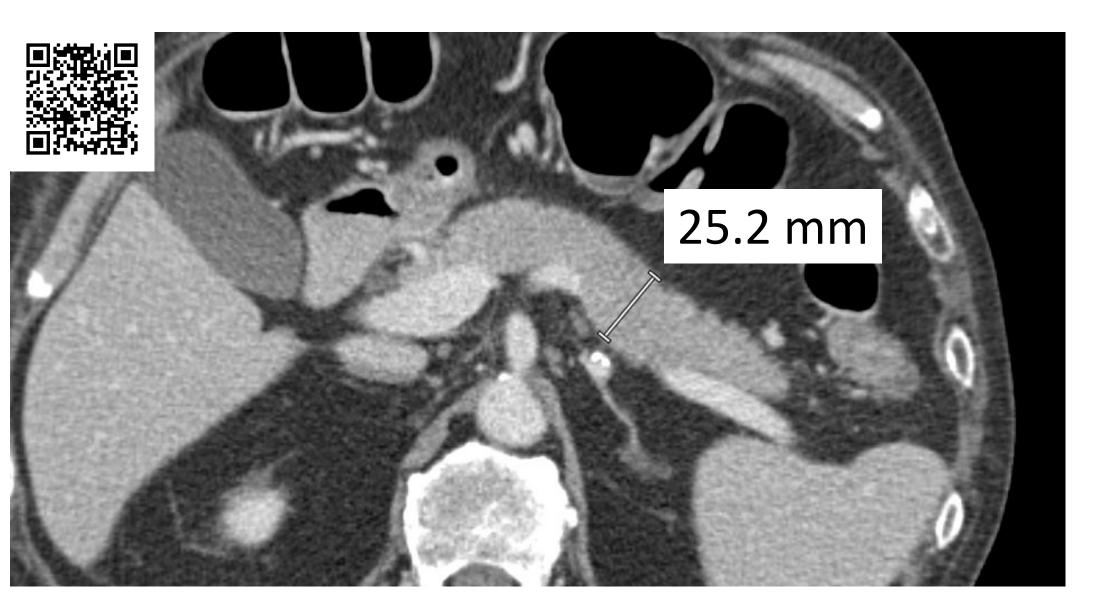## BACKGROUND

- Immune checkpoint inhibitor-induced pancreatic injury (ICI-PI) ranges in presentation from asymptomatic enzyme elevation to symptomatic acute pancreatitis.
- Diagnosing ICI-AP is important as management involves hospital admission, interruption/cessation of ICI therapy, and treatment for pancreatitis with glucocorticoids.
- ICI-AP is characterized by at least 2 of the 3 Atlanta Criteria: abdominal pain, lipase ≥3 ULN, imaging features
- Imaging features of ICI-induced acute pancreatitis (ICI-AP) remain poorly described.

## AIM

- We evaluated radiographic patterns of pancreatic inflammation in patients with ICI-AP.

## METHODS

- Study Population: Retrospective cohort of 26 patients diagnosed with ICI-AP after initiation of ICI therapy who underwent abdominal imaging between 2011 and 2019.
- Imaging Modality: CT, MRI, ^{18}F-FDG PET/CT
- Interpretation: Board-certified independent radiologist
- Outcomes:
  - Diffuse interstitial pattern
  - Focal interstitial pattern
  - Pancreatic enlargement
  - Normal
- Analysis: Univariate analyses to evaluate associations between clinical characteristics and radiographic patterns of ICI-AP.

## RESULTS

- **Three distinct imaging patterns of ICI-AP observed**



**Diffuse Interstitial Edematous, 38%**
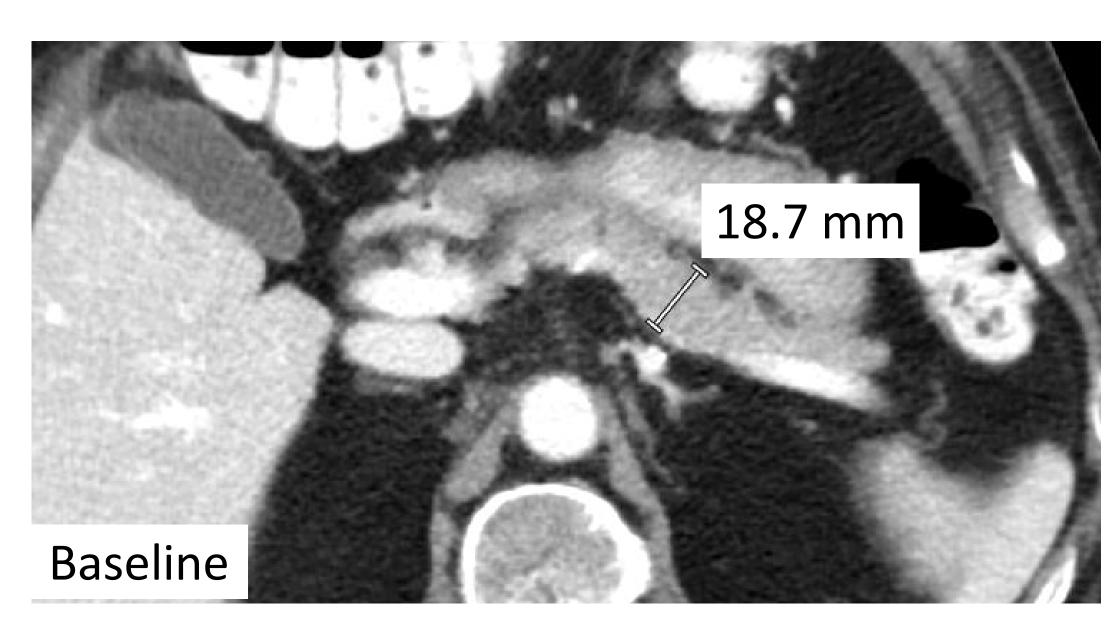


**Focal Interstitial Edematous, 26%**



25.2 mm



18.7 mm

Baseline

**Pancreatic Enlargement without Peripancreatic Inflammation, 12%**

**Table. Imaging Characteristics in Patients with Immune Checkpoint Inhibitor-Induced Acute Pancreatitis**

| Characteristics | Overall (N = 26) | Diffuse interstitial pattern (N = 10) | Focal interstitial pattern (N = 7) | Pancreatic enlargement alone (N = 3) | Normal (N = 6) | P-value |
|---|---|---|---|---|---|---|
| Age (years), mean ± SD | 62.4 ± 11.3 | 65.6 ± 11.9 | 57.4 ± 14.6 | 70.0 ± 3.6 | 59.2 ± 4.0 | **0.046** |
| Female, n (%) | 12 (46.2) | 6 (60.0) | 1 (14.3) | - | 5 (83.3) | **0.02** |
| Race (White), n (%) | 24 (92.3) | 9 (90.0) | 7 (100) | 2 (66.7) | 6 (100) | 0.27 |
| Cancer type, n (%) | | | | | | 0.40 |
| Melanoma | 11 (42.3) | 3 (30.0) | 2 (28.6) | 2 (66.7) | 4 (66.7) | |
| Non-melanoma | 15 (57.8) | 7 (70.0) | 5 (71.4) | 1 (33.3) | 2 (33.3) | |
| ICI class, n (%) | | | | | | 0.77 |
| CTLA4 | 2 (7.7) | - | 1 (14.3) | - | 1 (16.7) | |
| PD1/PDL1 | 18 (69.2) | 8 (80.0) | 5 (71.4) | 2 (66.7) | 3 (50.0) | |
| CTLA4 + PD1/PDL1 | 6 (23.1) | 2 (20.0) | 1 (14.3) | 1 (33.3) | 2 (33.3) | |
| Max lipase elevation (U/L), median (IQR) | 889 (874) | 889 (664) | 530 (863) | 519 (979) | 1123 (439) | 0.95 |
| Abdominal pain, n (%) | 22 (84.6) | 9 (90.0) | 4 (57.1) | 3 (100) | 6 (100) | 0.18 |
| Imaging modality, n (%) | | | | | | 0.21 |
| CT | 22 (84.6) | 9 (90.0) | 5 (71.4) | 2 (66.7) | 6 (100) | |
| MRI | 3 (11.5) | - | 2 (28.5) | 1 (33.3) | - | |
| ^{18}F-FDG PET/CT | 1 (3.8) | 1 (10.0) | - | - | - | |
| Pancreatitis severity by revised Atlanta criteria, n (%) | | | | | | 0.38 |
| Mild | 23 (88.5) | 9 (90.0) | 7 (100) | 3 (100) | 4 (66.7) | |
| Moderately severe | 3 (11.5) | 1 (10.0) | - | - | 2 (33.3) | |
| Days from ICI initiation to pancreatitis, mean ± SD | 161.8 ± 242.5 | 134.0 ± 148.7 | 156.1 ± 158.8 | 451.0 ± 633.4 | 70.2 ± 40.7 | 0.52 |
| Duration of lipase elevation (days), mean ± SD | 65.4 ± 81.1 | 54.2 (62.3) | 41.0 (37.0) | 32.3 (43.4) | 129.0 (130.0) | 0.66 |
| Managed with steroids, n (%) | 21 (80.1%) | 8 (80.0%) | 5 (71.4%) | 2 (66.7%) | 6 (100%) | 0.53 |
| ICI discontinued due to ICI-PI, n (%) | 19 (73.1%) | 7 (70.0%) | 5 (71.4%) | 1 (33.3%) | 6 (100%) | 0.23 |
| Response to steroids, n (%) | 10 (38.5%) | 3 (30.0%) | 4 (57.1%) | 1 (33.3%) | 2 (33.3%) | 0.76 |

Abbreviations: Cytotoxic T-lymphocyte-antigen protein-4 (CTLA-4); Immune checkpoint inhibitor (ICI); programmed cell death-1 (PD-1) / PD-1 ligand (PD-L1).

## CONCLUSION

- We propose 3 distinct imaging patterns of ICI-AP.
- The notable subset of asymptomatic patients (15%) with imaging evidence of ICI-AP supports the role of abdominal imaging with hyperlipasemia.
- Pancreatic enlargement without peripancreatic inflammation highlights the importance of comparing baseline imaging in the evaluation of patients with suspected ICI induced pancreatitis.

Jordan Kondo: jkondo@bwh.harvard.edu
Shilpa Grover, MD, MPH: sgrover@bwh.harvard.edu