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Monitoring Adverse-Drug Side Effects in Medical Imaging while Informing the FDA with FHIR

Team: Scan & Tell

Members: Nabil Othman, Delaney McElvain, Paige Spencer, Niko Rios

Opportunities in Imaging Informatics:

Imaging results must reach provider promptly

Drug side effects tracked in **real time**

Constantly evolving literature

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Our Goals:

Timely notification of adverse drug side effects on imaging

Report drug-related imaging findings to FDA in real time

Use Case: Irene Siim

Name: Irene Siim

Age: 65

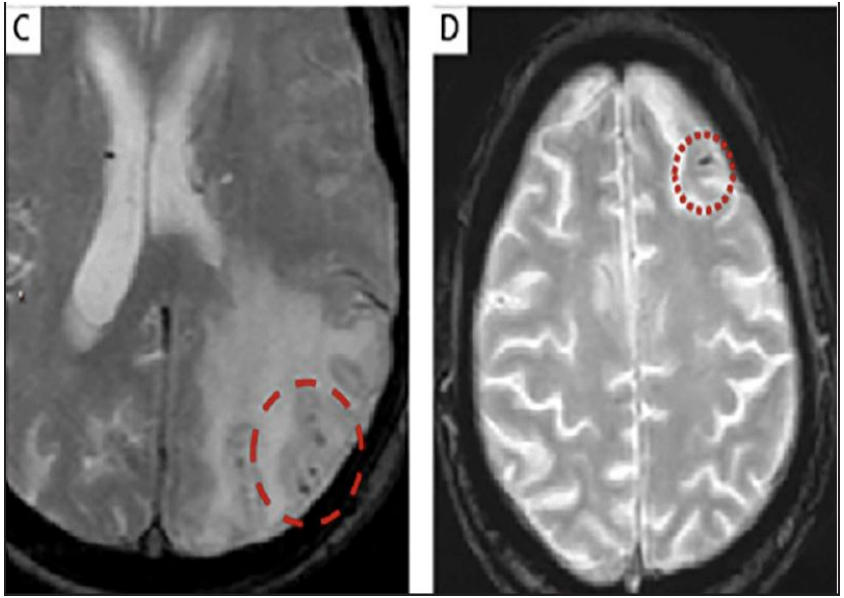
History of Present Illness: Worsening Depression

Past Medical History: Alzheimer's Disease (AD)

Current Medication: Lecanemab

Current Workup: Brain MRI Scan

Patient: Irene Siim



Radiology Report

Patient Name: Irene Siim

Exam Date: 6-27-2024

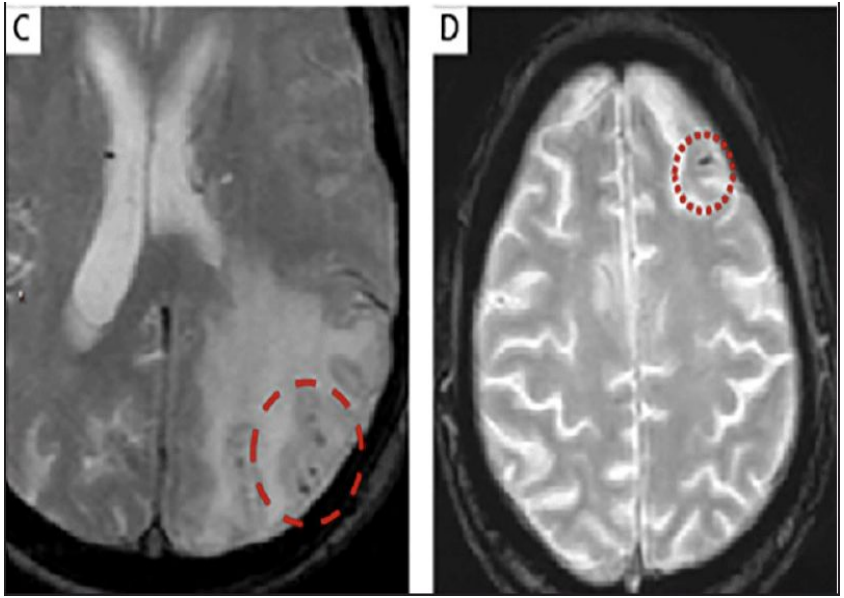
Exam Type: Brain MRI w & w/o contrast (T1 weighted)

Clinical History: Patient presented with increasing depression and history of Alzheimer's Disease; taking Lecanemab.

Findings:

1. **Micro-hemorrhages**
   a. Multiple punctate foci of susceptibility artifact, suggestive of micro-hemorrhages. Predominantly located in subcortical white-matter
2. **Superficial Siderosis**
   a. Foci of susceptibility artifact and low signal intensity on weighted sequences, suggestive of chronic hemosiderin deposition
3. **Edema**
   a. Perilesional edema surrounding the micro-hemorrhagic foci across subcortical white matter.

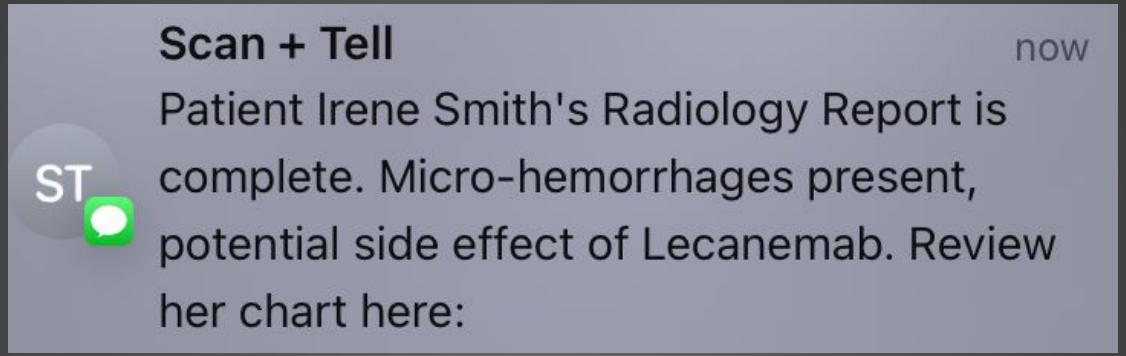
Patient: Irene Siim



Clinical Findings	Lecanemab Side Effects
Microhemorrhage	Microhemorrhage
Edema	Edema
Siderosis	

Key
Side effects present on Image

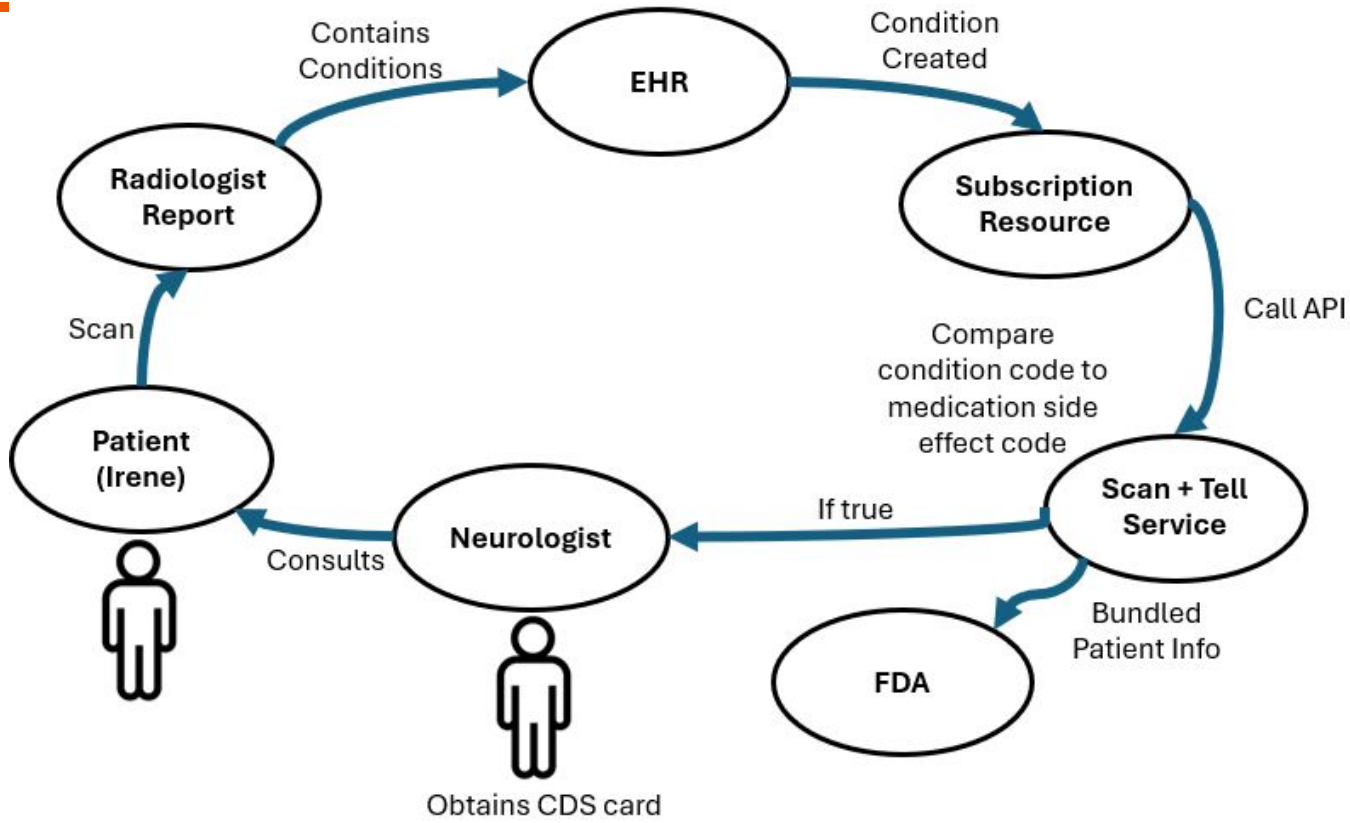
Notifying the Provider:



Patient Irene Siim's Brain MRI has reported presence of micro-hemorrhages, which are a side effect of her Alzheimer's treatment Lecanemab. Consider reviewing her chart.

Here is a link to relevant primary research literature: *Updated safety results from phase 3 lecanemab study in early Alzheimer's disease.*
https://link.springer.com/article/10.1186/s13195-024-01441-8

Alert and Reporting Cycle:



Demo of the Code:

```
%pip install fhir.resources

import requests
import json

apikey = "095852d6-543c-4e06-98f0-11ffe7ffc105"
headers = {
      'Content-Type' : "application/json",
      'Accept': "application/json",
      'apikey': "095852d6-543c-4e06-98f0-11ffe7ffc105"
      }

#define JSON query URLs
medEffect_query_url = "https://hackathon.siim.org/fhir-r4/MedicinalProductUndesirableEffect?_id=149"
report_query_url = "https://hackathon.siim.org/fhir-r4/DiagnosticReport?result=Observation/154"
medication_query_url = "https://hackathon.siim.org/fhir-r4/Medication?_id=148"
medicationStatement_query_url = "https://hackathon.siim.org/fhir-r4/MedicationStatement?subject=Patient/siimirene"
patientInfo_query_url = "https://hackathon.siim.org/fhir-r4/Patient?family=SIIM&given=Irene"

siderosis_observation_query_url = "https://hackathon.siim.org/fhir-r4/Observation?code=G96.8"
hem_observation_query_url = "https://hackathon.siim.org/fhir-r4/Observation?code=I61.8"
dep_observation_query_url = "https://hackathon.siim.org/fhir-r4/Observation?code=F32.A"
neur_observation_query_url = "https://hackathon.siim.org/fhir-r4/Observation?code=G60.3"
```

Scan + Tell Colab

Benefits

1) Alerts physicians of imaging findings promptly

2) Reports data to FDA for further analysis in **real time**

3) Tracks drug side effects found in imaging in **real time**

Future Directions

Track new side effects as they are reported in literature

+

Present potential drug side effects to radiologists at time of dictation

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Thank you for your time!

Questions?

Contact us here!