

# Kobby Panford-Quainoo

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**Research Interest:** Graph Neural Network  
Representation Learning in Healthcare

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# Motivating directions

- Answering the “what if?” questions
  - Randomized control trials are expensive in healthcare
- Leveraging medical knowledge in structured prediction
- Personalized Patient decision-making

# Answering the “What if?” questions

- Medical literature and knowledge sources for causal graphs
  - Extracting semantic relations from these sources eg. PubMed

# Answering the “What if?” questions

- Medical literature and knowledge sources for causal graphs

The screenshot shows the PubMed.gov search interface. The search term 'mitochondrial gene therapy' is entered in the search box. The results page displays two search results. The first result is titled 'The adenovirus-mediated linamarase/linamarin suicide system: A potential strategy for the treatment of hepatocellular carcinoma' by Li J, Li H, Zhu L, Song W, Li R, Wang D, Dou K. The second result is titled 'Silver ions induce oxidative stress and intracellular zinc release in human skin fibroblasts' by Cortese-Krott MM, Müller P, Pallua N, Kröncke K. A blue callout box highlights the second result, containing the text: 'Mitochondrial gene therapy augments mitochondrial physiology in a Parkinson's disease cell model. Hum Gene Ther. 2009 Aug; 20(8):897-907.' To the right of the search results, there is a 'Filter your results' section showing 'All (2396)' results, with options for 'Review (565)' and 'Free Full Text (737)'. Below this, a section titled 'Titles with your search terms' lists several related titles, including 'Progress and prospects: gene therapy for mitochondrial DNA dise: [Gene Ther. 2008]', 'Mitochondrial gene therapy augments mitochondrial physe [Hum Gene Ther. 2009]', and 'Her chromatinosis gene polymorphisms, mitochondrial haplogro: [J Infect Dis. 2008]'. A 'See more...' link is provided at the bottom of this section.

# Answering the “What if?” questions

- Medical literature and knowledge sources for causal graphs
  - Extracting semantic relations from these sources
  - *Disease a **causes** sleepwalking*



# Answering the “What if?” questions

- Medical literature and knowledge sources for causal graphs
  - Extracting semantic relations from these sources
  - “*Disease a causes sleepwalking*”



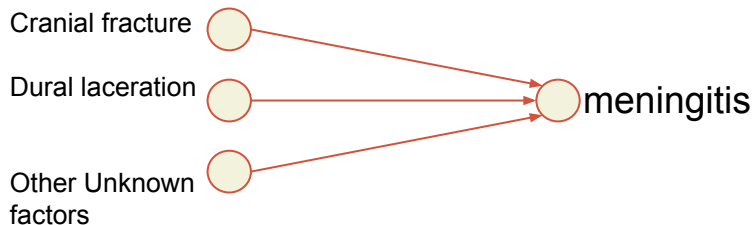
- “Can disease a cause sleepwalking?”

# Answering the “What if?” questions

- Medical literature and knowledge sources for causal graphs
  - Extracting semantic relations from these sources
  - “*Disease a causes sleepwalking*”



- “Can *disease a cause sleepwalking?*”
- “*Cranial fracture with dural laceration leads to meningitis*”



# Answering the “What if?” questions

- Medical literature and knowledge sources for causal graphs
  - Extracting semantic relations from these sources
  - “*Disease a causes sleepwalking*”

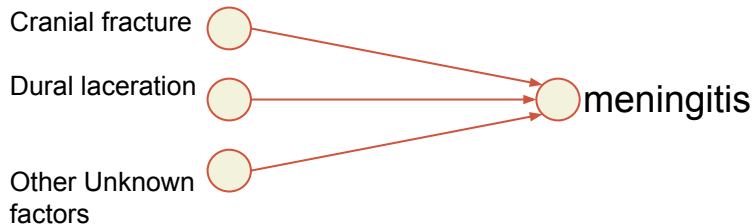


❑ “Can *disease a cause sleepwalking*?”

❑ “*Cranial fracture with dural laceration leads to meningitis*”

❑ **NLU problem**

❑ **Validity of coexisting diseases + Causal edge**





# Medical Knowledge in models

- Encode medical knowledge for structured predictions
  - Eg. ICD-9, ATC, SNOMED CT etc.

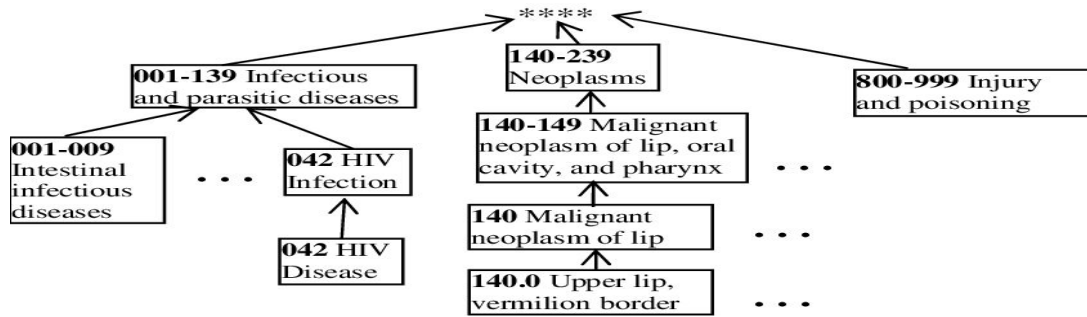


Fig by T.M Truta

- Using Graph-based approaches



Thank You