

# Twitter Thread by Philip Vollet

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Why are graphs the future of biomedical research and what is the value of NLP here?

A small case study about:

How to speed up drug discovery with knowledge graphs and discover potential cures for diseases

The screenshot shows the GRAKN.AI interface. At the top, there is a query editor with the following code:

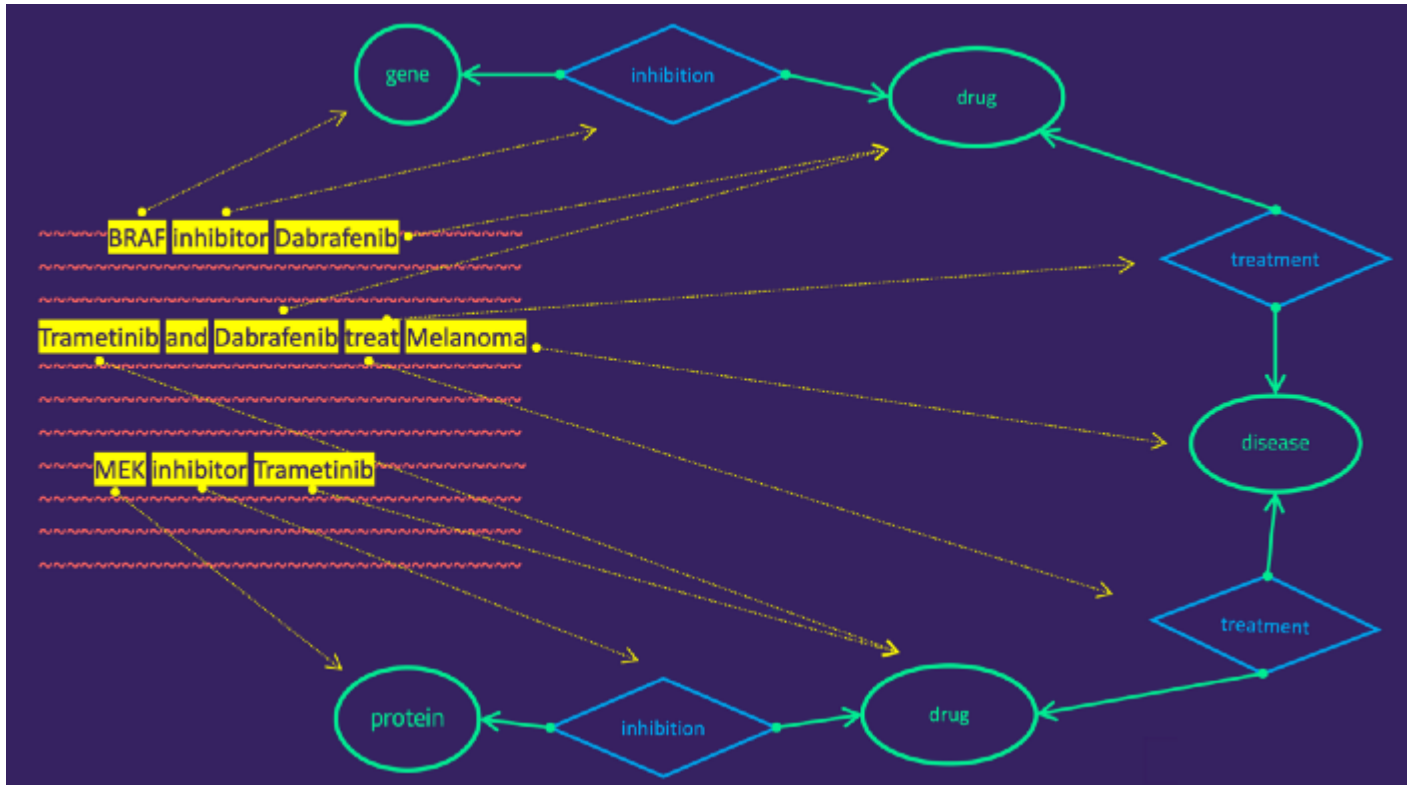
```
match
  $di isa disease, has name "melanoma";
  $dr isa drug;
  $r ($di, $dr);
get; offset 0; limit 1;
```

Below the query editor, a knowledge graph is visualized. It consists of two nodes: a green node on the left representing a disease and a red node on the right representing a drug. The disease node has the following attributes: name: melanoma, disease-id: C0025202. The drug node has the following attributes: name: trametinib, drug-id: D808911. A blue line connects the two nodes, with the label "treated-condition" on the left side and "therapeutic" on the right side. The interface also shows a "text\_mining" button and a settings gear icon in the top right corner. At the bottom left, there is a "Tab 1" indicator and a "+" button. At the bottom right, there is a status bar that reads "entities: 2, attributes: 0, relations: 1".

In this case text mining is used to contextualize knowledge about:

- Genes
- Compounds
- Diseases
- Adverse drug effects

- Receptor bindings



Which text types are processed here? Medical literature, patient notes, electronic health records, clinical reports etc.

But how to start?

First you need to identify the different entities such as compounds, diseases, adverse drug effects and receptor bindings.

This is achieved through Natural Language Processing (NLP) and there are suitable pre-trained models for processing biomedical, scientific or clinical text like scispaCy

[@spacy\\_io](https://twitter.com/spacy_io) models for processing biomedical, scientific or clinical text  
<https://t.co/1EPFZCFwoc>

Another library which is specialized in biomedical text is Spark NLP

[@JohnSnowLabs](https://twitter.com/JohnSnowLabs)  
<https://t.co/EYM8llyuUp>

The next challenge is to extract the different relations! Diseases are related to genes which are related to receptors and compounds can bind to these receptors.

Sounds simple at first but there are several problems that need to be solved

Problems to solve

1. Difficult to ingest and integrate complex networks of text mined outputs
2. Difficult to contextualize knowledge extracted from text with existing knowledge
3. Difficult to investigate insights in a scalable and efficient way

Fortunately, Grakn solves all our problems!

[@GraknLabs](#)

How it works is explained here: <https://t.co/BCGDuWrVqA>

To understand how NLP and graphs are used to link medical knowledge I recommend this talk on text mining and drug discovery at Novartis

Not quite up to date but aged very well

Connecting the Dots in Early Drug Discovery at Novartis

<https://t.co/QNJt6q5IsU>