

Welcome!

Demystifying Artificial Intelligence:

What is AI and why does it matter to Medical Affairs?

Presenters



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CCO and Cofounder
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Educational Objectives

This session will provide a learning opportunity for our audience by:

- Defining key terminology and capabilities of artificial intelligence
- How Medical Affairs can direct AI in its application
- Examining ways AI can enhance Medical Affairs workflows
- Best practices for building a partnership between AI and Medical Affairs

Poll #1:

Why are you interested in learning more about AI?

- A. I want to better understand how AI can support my workflows in medical affairs.
- B. I want to engage in deeper discussions with my vendors to partner on crafting solutions.
- C. I want to be able to separate the reality from the claims and build trust in AI.
- D. I want to make faster, data-backed decisions with the support of AI and advanced analytics.

Medical Affairs and Artificial Intelligence

Why is Medical Affairs growing more interested in learning about AI?

- Digital transformation of Medical Affairs
- Extracting evidence from rapidly growing, complex sources
- Impact of COVID-19 on workload and new data needs
- Making the shift from multichannel to omnichannel

Poll #2:

What is your biggest roadblock when it comes to getting started with AI?

- A. I am uncertain what problems AI can help with.
- B. I am uncertain which approaches to use, (ie. NLP vs. ML)
- C. I don't know how to quantify or verify the efficacy of the AI.
- D. I worry about model accuracy, maintenance, and bias.

Medical Affairs and Artificial Intelligence

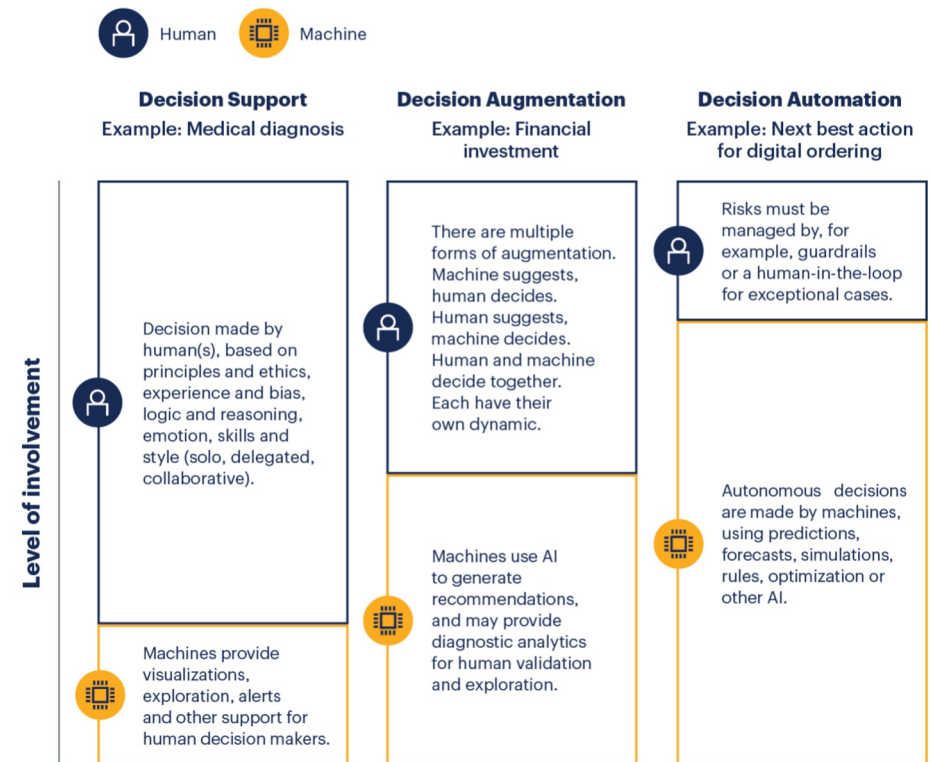
Degrees of AI in Deployment:

- Decision Automation
- Decision Augmentation
- Decision Support

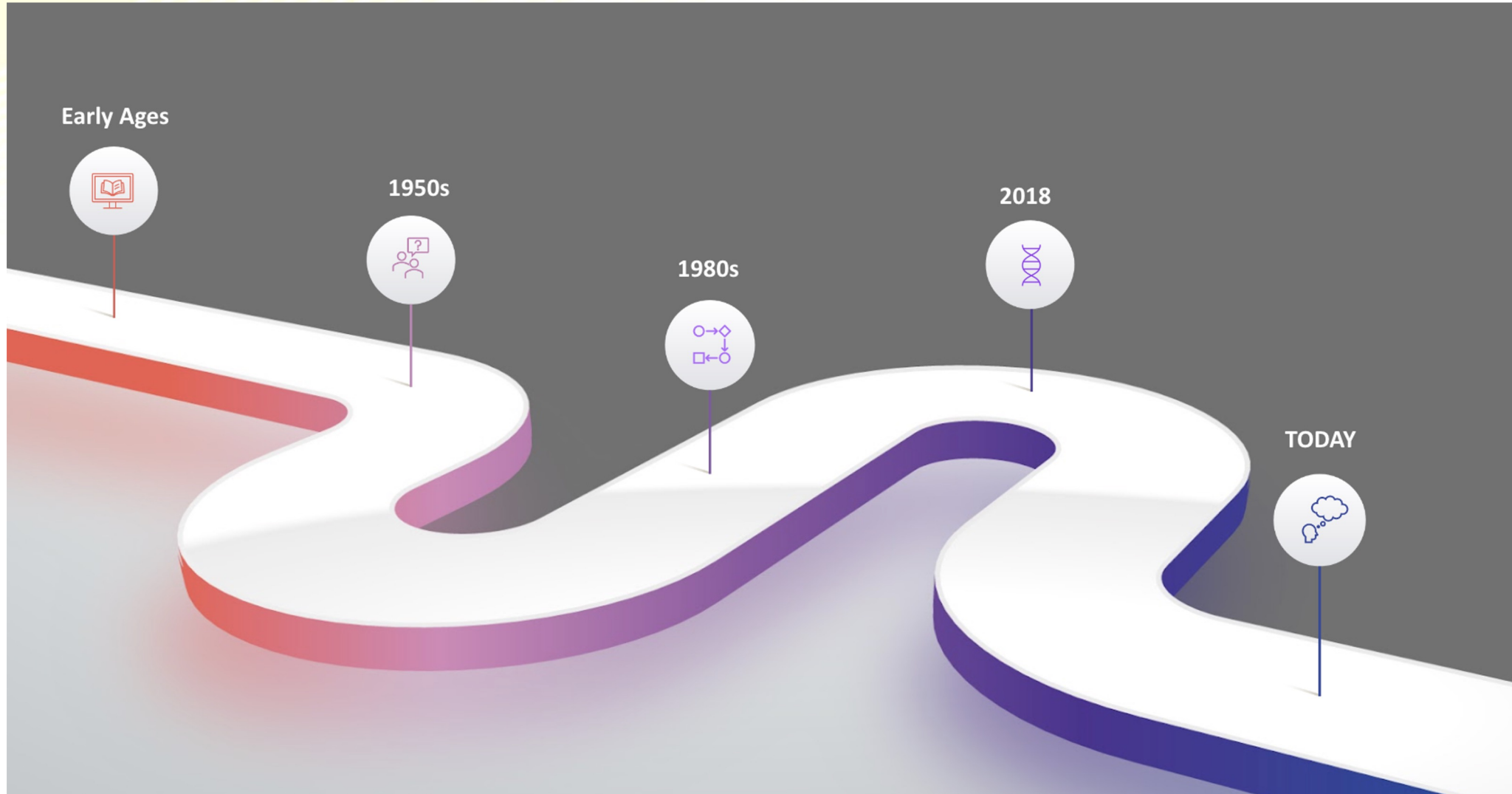
The value of learning more about AI:

- Engage in deeper internal discussions
- Identify new Medical Affairs use cases and opportunities
- Patient outcomes - tracing back to why we're here

Consider the degree of augmentation required from advanced analytics and AI



When did artificial intelligence get its start? How has it evolved?



AI is a long-standing academic discipline with its own KOLs

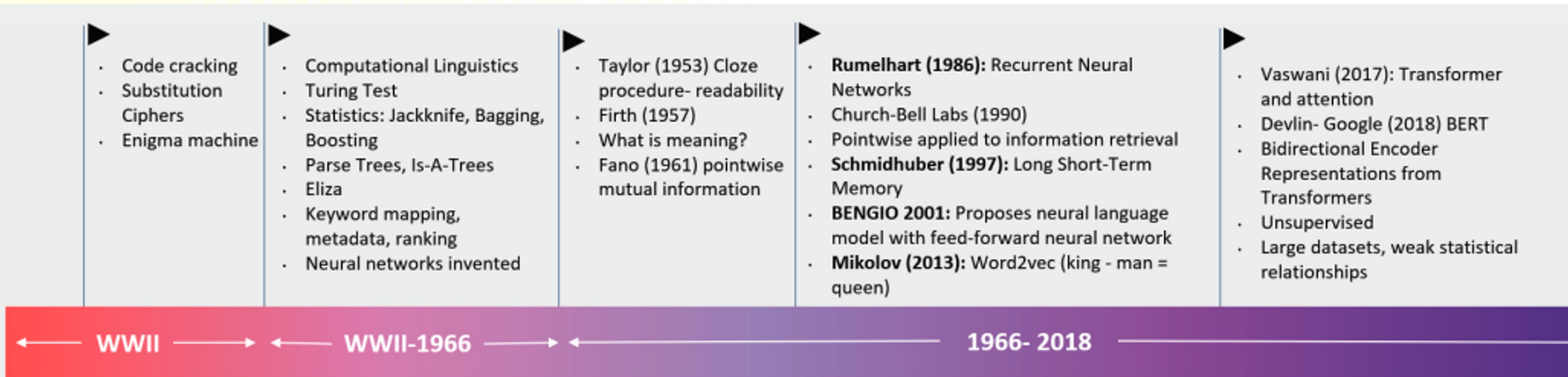
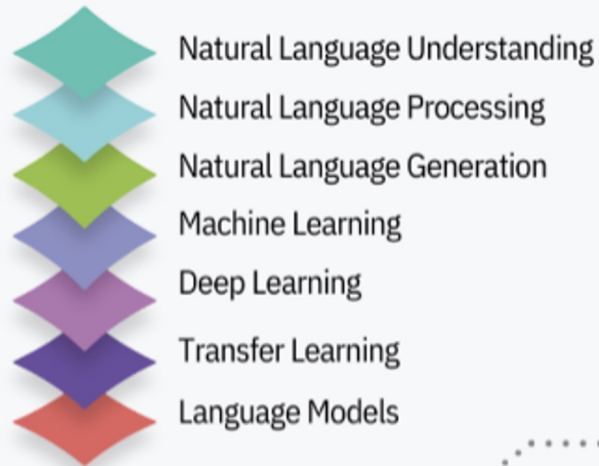


Figure 5. The Evolution of AI and Language Intelligence

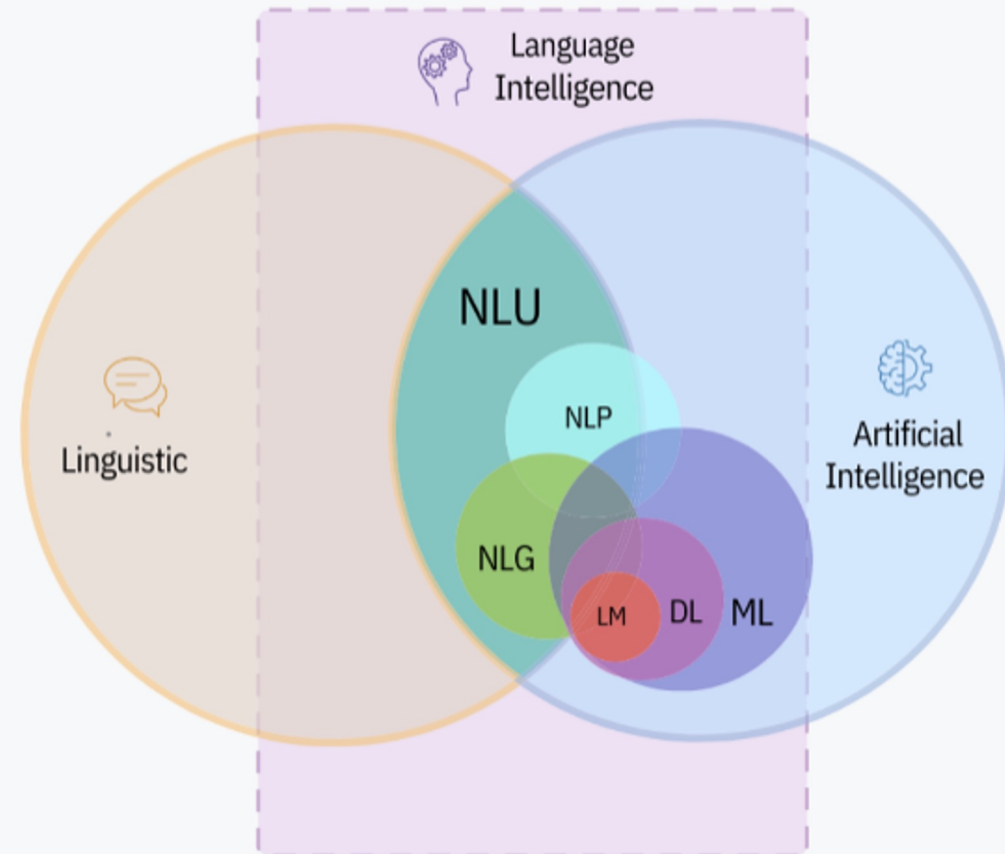
Families of Artificial Intelligence

AI consists of fields of computer science focused on data and language.

Families of AI applicable to publications:



When adapted to medical and scientific language, each delivers unique capabilities.



Capabilities of Artificial Intelligence Technologies

- Text cleaning
- Entity Recognition and text extraction
- Transformation of Unstructured text
- Keyword search capabilities

NLP

- Computer reading comprehension
- Data structures from relationship of text Specification in data extraction from documents
- Semantic analysis of entire sentences

NLU

- Auto summarization of content
- Higher level comprehension of meaning

NLG

- Classification and organization of documents from metadata
- Template generation
- Predictive modeling on structured data, against historical datasets

Machine Learning

- AI learning and analysis for classification and content clustering
- Derivation of themes or topics from unstructured text
- QC review of document for consistency, variations, and changes
- Predictive analysis on unstructured text
- Advanced Chatbots

Deep Learning

- Scalable solutions for specific content types
- Assembling and dissemination of content
- Optimization and Assessments of content for delivery
- Q&A generation
- Semantic search of content

AI Language Models

Each Application of Artificial Intelligence Solves Different Needs

- Novel data with different facets are continuously published across peer reviewed journals, clinical trials, congresses, and medical guidelines.
- Each family of AI provides a key layer to solving the knowledge extraction challenge for novel use cases.
 - NLP to annotate medical text and identify themes
 - Deep Learning to automate ingestion of unstructured text
 - NLU to drive deeper concept understanding
- Layering AI solutions can unlock new possibilities, but it is limited by the ideas and needs of medical professionals

Medical Affairs can apply AI towards Health Equity

An “expert in the loop” approach can identify key needs, like health equity data gaps

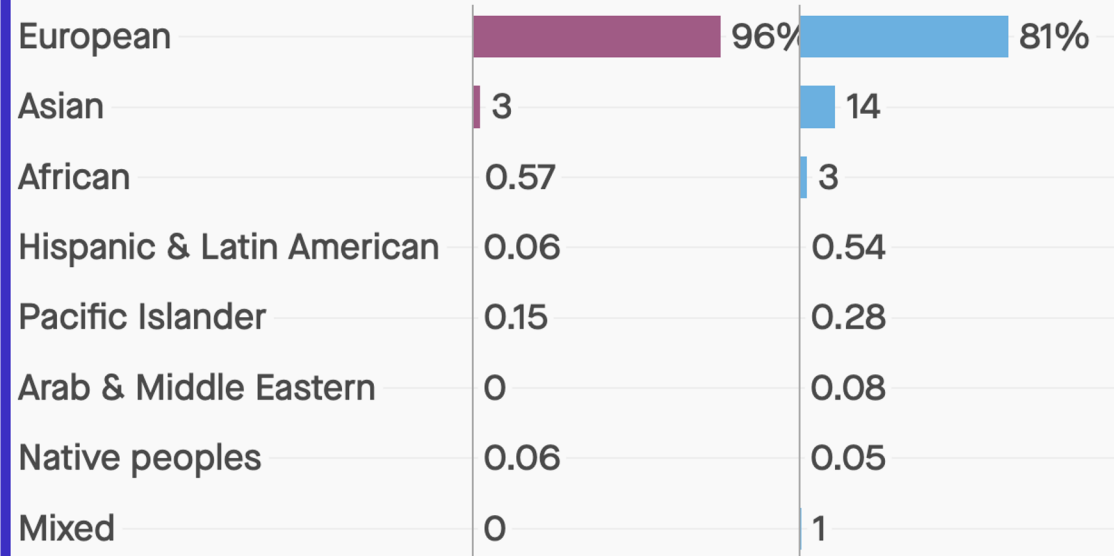
In a highly technical industry like Life Sciences, it's important to train models with **domain-specific language** to **understand biomedical language**.

Can be used to also **identify when there is insufficient data** for key populations and unmet needs.

Little progress is being made to improve diversity in genomics

Share of samples in genetic studies, by ancestry

■ 373 studies, up to 2009 ■ 2,511 studies, up to 2016



△ T L △ S | Data: Popejoy & Fullerton. Nature, 2016

Share

Medical Affairs Use Case: Literature Monitoring

Decision Automation: Medical Tagging in Literature

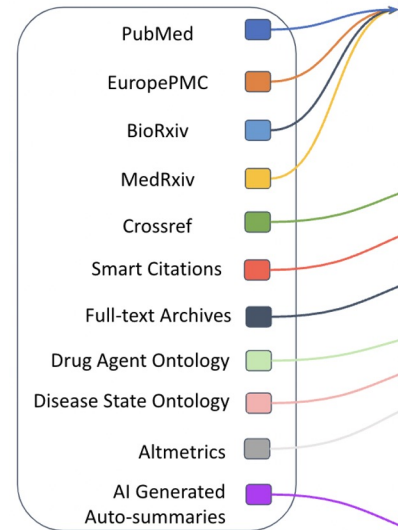
Unification of Citation Indices, Ontologies, Full-text sources

Decision Augmentation: Identification of Trending Themes

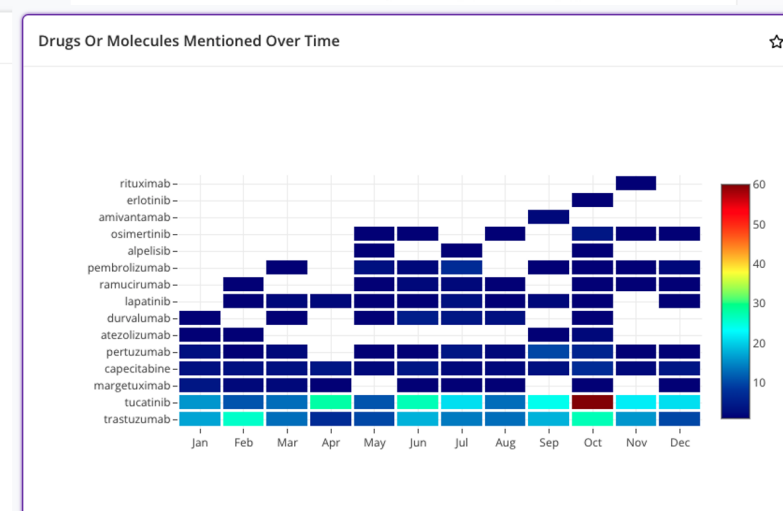
Auto-summaries of articles to support full-text selection

Decision Support: Relevancy Scoring for Evidence Review

Analytics of drug relevancy and trending disease states to inform gap analyses and integrated evidence generation



The screenshot displays a user interface for literature monitoring. At the top, navigation links include 'Back To Immunology', 'Article Detail', 'Copy Citation', and 'Bookmark Article'. The main article title is 'Effects of the Moderate CYP3A4 Inhibitor Erythromycin on the Pharmacokinetics of Palbociclib: A Randomized Crossover Trial in Patients With Breast Cancer'. Below the title, the article is dated August 1, 2021, and lists authors: R. Molenaar-Kuijsten, L. Braal, C.L. Groenland, S.L. De Vries, N. Rosling, H. Beijnen, J.H. Koolen, S.L. Vulink, A.J. Van Dongen, M.G. Mathijssen, R.H. Huitema, A.D. Steeghs, and N. Computers in Human Behavior. The article is categorized under 'Journal Article'. An 'Auto-summary' section provides a brief overview of the study. A 'Knowledge Graph' section shows 'Drug Agents' with a count of 14 and 'Disease State' with a count of 1. The main text of the article is visible, discussing the pharmacokinetics of palbociclib and its interaction with erythromycin.

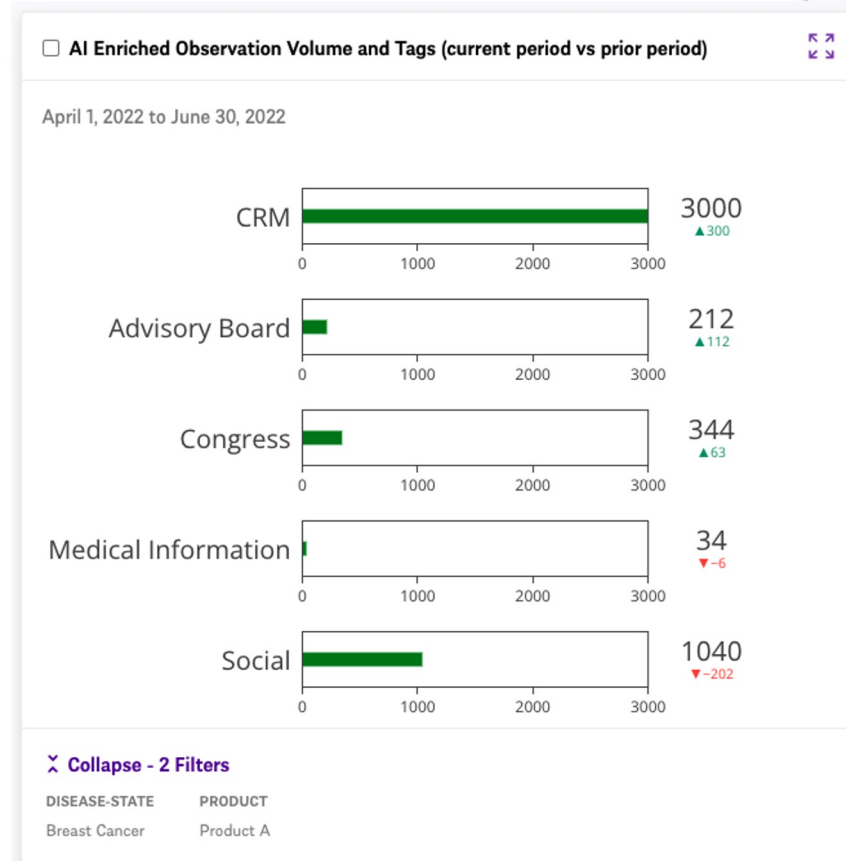


Medical Affairs Use Case: Insights Management

Decision Automation: Medical Tagging in Observations

Decision Augmentation: Identification of Medical Themes

Decision Support: Clustering Data for Pre-Insight Review



Dashboard My Action Items (16) Insights

Medical Insights Management

Insights

Filters

Search
Enter a keyword

Load a Saved Filter Set
Select

☒ View Actionable Insights

Country
Select

Region
Select

Territory
Select

Therapeutic Area
Select

Product
Select

Theme
Select

Source
Select

Date Range
Start Date
Select

End Date
Select

500 Pre-Insights 10 Actionable Insights

Actionable Insight

INSIGHTS SCORE: 74 SENTIMENT: Supported TOTAL OBSERVATIONS: 22 SOURCES: 12 CRM 5 Advisory Board 3 Social 2 Other

PRE-INSIGHT AI IDENTIFIED SUMMARY

Massive studies show rise in Cardiovascular Ds after COVID-19. Vaccines may be deadly in Rare Cases. Covid-19 may drive negative consequences beyond ARS.

Related Observations AI Suggested Related Observations

OBSERVATIONS DATE RANGE
September 1, 2021 - November 10, 2022

April 1, 2021 Submitted by: Aderinsola Akintilo KOL: Faye Zheng, MD Source: Field
Massive study shows a long-term, substantial rise in risk of cardiovascular disease, including heart attack and stroke, after a SARS-Covid-19 infection.
Supporting Contrasting

March 1, 2021 Submitted by: Richard Graves KOL: Brian Peet, MD Source: Advisory Board
Massive study shows a long-term, substantial rise in risk of cardiovascular disease, including heart attack and stroke, after a SARS-Covid-19 infection.
Supporting Contrasting

Feb 1, 2021 Submitted by: Aderinsola Akintilo KOL: Faye Zheng, MD Source: Strategic Meeting
Covid-19 Vaccines Were Deadly in Rare Cases. Governments Are Now Weighing Compensation.
Supporting Contrasting

View All 20 Related Observations

View Less Copy Link Share

Actionable Insight

Medical Affairs Use Case: Medical Writing

What is Auto-Summarization and why do we need it?

The screenshot shows the PubMed.gov search results page for the query 'covid-19'. The page features the NIH National Library of Medicine header, the PubMed.gov logo, and a search bar with the query 'covid-19'. Below the search bar, there are links for 'Advanced', 'Create alert', 'Create RSS', and 'User Guide'. The search results are displayed in a table with columns for 'Save', 'Email', and 'Send to'. The results are sorted by 'Best match' and the display options are set to 'Display options'. The total number of results is 263,709, which is circled in red. The page number is 1 of 26,371.

NIH National Library of Medicine
National Center for Biotechnology Information

Log in

PubMed.gov

covid-19

Search

Advanced Create alert Create RSS User Guide

Save Email Send to

Sorted by: Best match Display options

MY NCBI FILTERS

263,709 results

Page 1 of 26,371

Medical Affairs Use Case: Medical Writing

Discovery of a Novel Src Homology-2 Domain Containing Protein Tyrosine Phosphatase-2 (SHP2) and Cyclin-Dependent Kinase 4 (CDK4) Dual Inhibitor for the Treatment of Triple-Negative Breast Cancer

Xiaoyu Chen, Chengxia Shu, Wenqiang Li, Qiangqiang Hou, Guangmei Luo, Kexin Yang, Xiaoxing Wu

The treatment of triple-negative breast cancer (TNBC) remains a huge clinical challenge and dual-targeted small-molecule drugs might provide new therapeutic options for this type of breast cancer. In this work, we discovered a series of SHP2 and CDK4 dual inhibitors through a fused pharmacophore strategy and structural optimization. Notably, lead compound 10 with excellent SHP2 ($IC_{50} = 4.3$ nM) and CDK4 ($IC_{50} = 18.2$ nM) inhibitory activities effectively induced G0/G1 arrest to prevent the proliferation of TNBC cell lines. Furthermore, compound 10 showed great in vivo pharmacokinetic properties ($F = 45.8\%$) and exerted significant antitumor efficacy in the EMT6 syngeneic mouse model. Western blotting and immunohistochemical analysis confirmed that 10 effectively targeted on both SHP2 and CDK4 and activated the immune response in tumors. These results indicate that lead compound 10, as the first SHP2 and CDK4 dual inhibitor, merits further development for treating TNBC.

J Med Chem. 2022 May 12;65(9):6729-6747.
doi: 10.1021/acs.jmedchem.2c00063.

Turing Test: Which was written by the AI?

A

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How can Medical Affairs improve AI performance?

An “out of vocabulary” problem

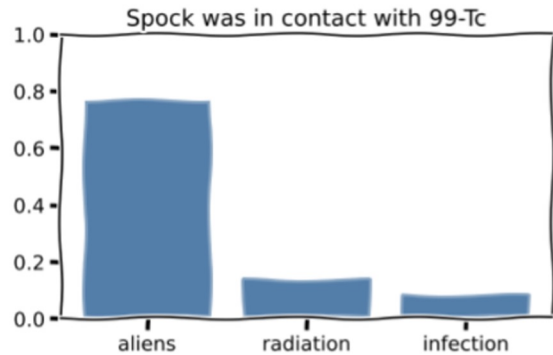
- Linguistically, Life Sciences move very fast. Research codes, new products names, new treatments, and new variants are coined at an incredible rate.
- Large language models, like GPT-3, and BERT—including BioBert and SciBert—and their predecessors, such as GloVe and Word2Vec, cannot keep pace with rapid linguistic evolution in the Life Sciences.
- There will always be words that they have never been exposed to, and, as such, are unable to meaningfully represent. When faced with unknown concepts, LLMs fail in unpredictable ways, which undermines trust.

A neurosymbolic approach, which combines rules-based approaches with deep-learning techniques, can improve the resilience of any over off-the-shelf models, regardless of their size and complexity.

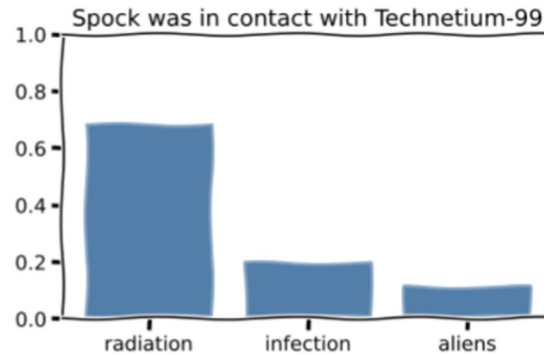
– W. Saba and A. Tomkins 2022

What role can Medical Affairs play when it comes to using AI?

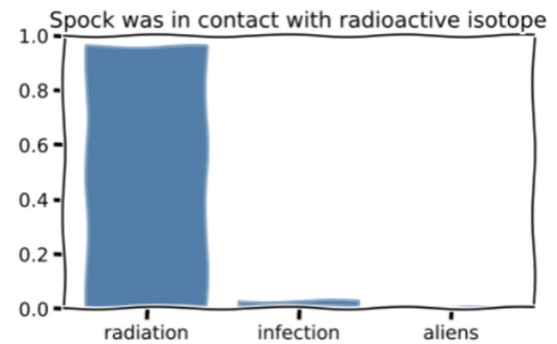
An “out of context” problem



Raw Text Performance



Preferred-Term Resolution



Ontological Type Resolution

What is AI and why does it matter?

Let's review

- Define key terminology and capabilities of artificial intelligence
- What are the types of AI
- Examine ways AI can enhance Medical Affairs workflows
- Build a partnership between AI and Medical Affairs