MedIQ Smart Medical Intelligence Platform User Guide

Goal:

Deliver **clinically scoped** responses that combine **disease knowledge** from the PDF medical encyclopedia with **diagnostic test intelligence** from the CSV, producing a unified **natural-language** answer that helps doctors, lab technicians, and clinical researchers make faster **point-of-care decisions**.

Example Query/Filters:

- What are the primary causes and risk factors for Alopecia?

Ask MedIQ

What are the primary causes and risk factors for Alopecia?

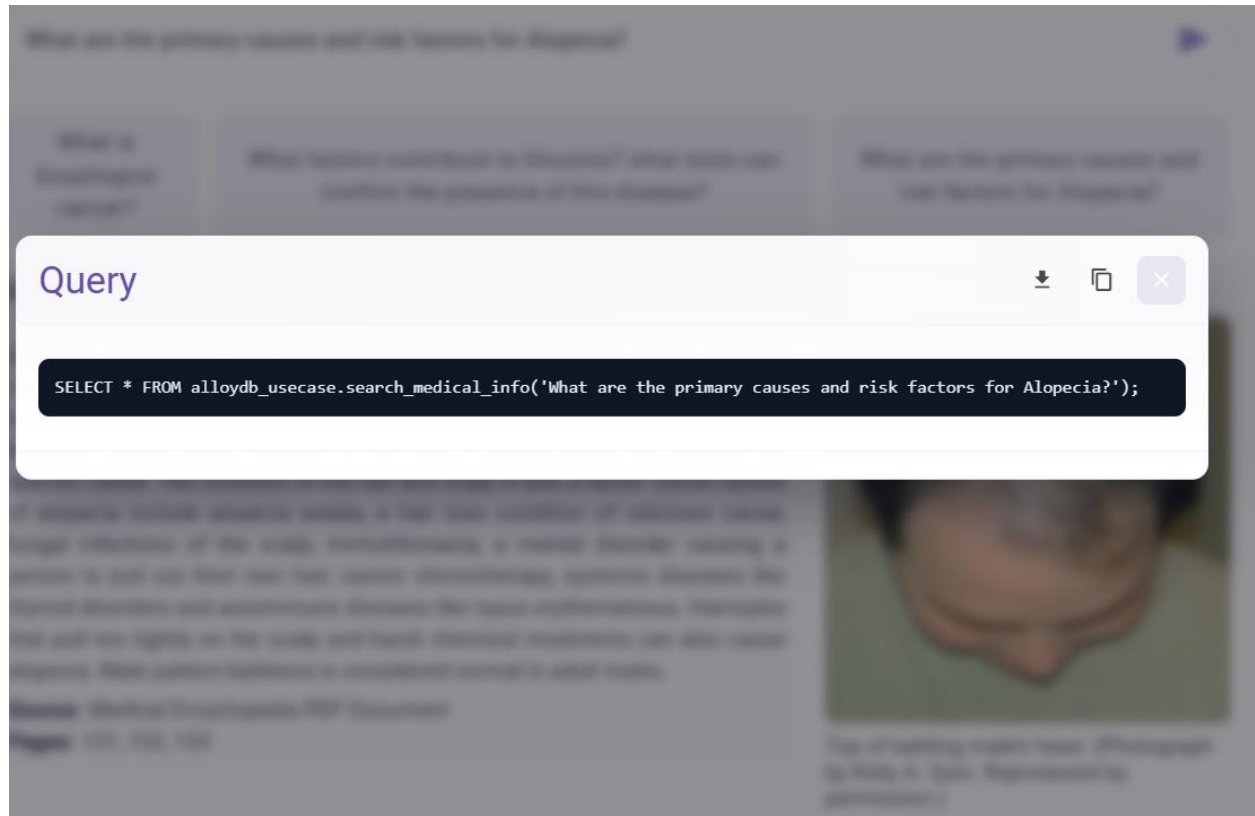| What is Esophageal cancer? | What factors contribute to Sinusitis? what tests can confirm the presence of this disease? | What are the primary causes and risk factors for Alopecia? |

Alopecia   View query

Alopecia, or hair loss, can occur for many reasons, including pulling hair out, cancer chemotherapy, or underlying health problems. The pattern of hair loss and the condition of the hair and scalp can provide clues to the specific cause. Alopecia areata is a hair loss condition of unknown cause. Fungal infections of the scalp, trichotillomania, cancer chemotherapy, systemic diseases like thyroid disorders, and autoimmune diseases like lupus erythematosus can also cause hair loss. Hairstyles that pull too tightly on the scalp and harsh chemical treatments can also lead to alopecia, especially among black women. Male pattern baldness is considered normal in adult males.

Source: Medical Encyclopedia PDF Document
Pages: 131, 132, 133

Top of balding male's head. (Photograph by Kelly A. Quin. Reproduced by permission.)

What are the primary causes and risk factors for Alopecia?

What is Esophageal cancer?

What factors contribute to Sinusitis? what tests can confirm the presence of this disease?

What are the primary causes and risk factors for Alopecia?

Query

```
SELECT * FROM alloydb_usecase.search_medical_info('What are the primary causes and risk factors for Alopecia?');
```

- What factors contribute to Sinusitis? what tests can confirm the presence of this disease?

Ask MedIQ

What factors contribute to Sinusitis? what tests can confirm the presence of this disease? ➤

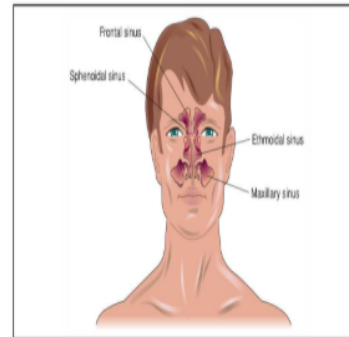| What is Esophageal cancer? | What factors contribute to Sinusitis? what tests can confirm the presence of this disease? | What are the primary causes and risk factors for Alopecia? |

Sinusitis   View query

Sinusitis is an inflammation of the sinuses often caused by an infection. The sinuses are air pockets located within the bones of the face. When the lining of the sinuses is swollen, it interferes with the normal flow of mucus, trapping it and creating an environment for bacteria to grow. Sinusitis is almost always due to an infection, but allergies can mimic the symptoms. Bacteria are the most common cause, with Streptococcus pneumoniae and Haemophilus influenzae being frequent culprits. In children, Moraxella catarrhalis may be the cause. Fungi like Aspergillus, Candida, or Mucorales can cause sinusitis in people with weakened immune systems. Acute sinusitis often follows an upper respiratory infection or cold, with symptoms like congestion, discolored nasal drainage, fever, headache, sinus pain, and pressure. Chronic sinusitis lasts for at least three months and includes symptoms like sinus pain, pressure, nasal congestion, sore throat, and bad breath.

Source: Medical Encyclopedia PDF Document
Pages: 3414

Sinusitis is the inflammation of the sinuses caused by a bacterial infection. Sometimes diagnosis may be problematic because the symptoms often mimic those of the common cold. Sinusitis is usually treated with antibiotics. (Illustration by Electronic Illustrators Group.)

Here are some diagnostic tests that can confirm the presence of Sinusitis

1. White Blood Cells
2. Neutrophils
3. Lymphocytes
4. Monocytes
5. Eosinophils
6. Basophils
7. Temperature
8. Oxygen Saturation
9. C-Reactive Protein

22. RDW

23. Platelet Count

24. Sodium

25. Potassium

26. Chloride

27. Bicarbonate

28. Glucose

29. Urea Nitrogen

30. Creatinine

31. Alanine Aminotransferase (ALT)

32. Asparate Aminotransferase (AST)

33. Alkaline Phosphatase

34. Bilirubin, Total

35. Protein, Total

36. Albumin

37. Globulin

38. Lactate Dehydrogenase (LD)

39. Creatine Kinase (CK)

40. Creatine Kinase, MB Isoenzyme

41. Triglycerides

42. Cholesterol, Total

43. Cholesterol, HDL

44. Cholesterol, LDL, Calculated

45. Cholesterol Ratio (Total/HDL)

46. Thyroid Stimulating Hormone

47. Ferritin

48. Iron

49. Vitamin D

50. D-Dimer

Source: Disease Test Confirmation CSV File

Key Alloy DB Components:

- **AlloyDB for PostgreSQL** (provides the database foundation)
- **Embeddings** creation (with google_ml extension) using text-embedding-005 model
- **Vector similarity** (with pgvector extension) using cosine similarity
- AlloyDB AI Query Operator: **ai.generate** for creating natural language response from search results
- **ScaNN** (optional, for large-scale deployments): Prefer ScaNN index with post-creation ANALYZE when working with very large corpora and if supported in your environment

Technical Challenge & Business Impact:

Challenge:
Coordinating **multi-source** (PDF & CSV sources) grounding directly inside SQL combining embeddings, **semantic retrieval**, and **response generation** across two distinct data sources combining power of unstructured PDF data and structured tabulated data (PDF chunks and CSV rows) within a single **TVF** (Table-Valued Function: A function that returns a table in PostgreSQL allows users to encapsulate logic in a reusable manner while outputting a set of records) demands careful query planning and orchestration.

Impact:
This demo produces higher-quality **clinical answers** exactly when needed, giving doctors and lab technicians a concise, **evidence-tagged** response that unifies **disease knowledge** with **diagnostic test checklists**, reducing the time spent cross-verifying multiple documents.

Architecture Diagram