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AI in Toxicology & Biocompatibility: Game-changer or Risk Factor or Both?

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Audience Poll

How much has AI impacted your work?

A) Not at all

B) Slight productivity enhancement

C) Thought partner

D) Transformational

E) It can take my job



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Part One

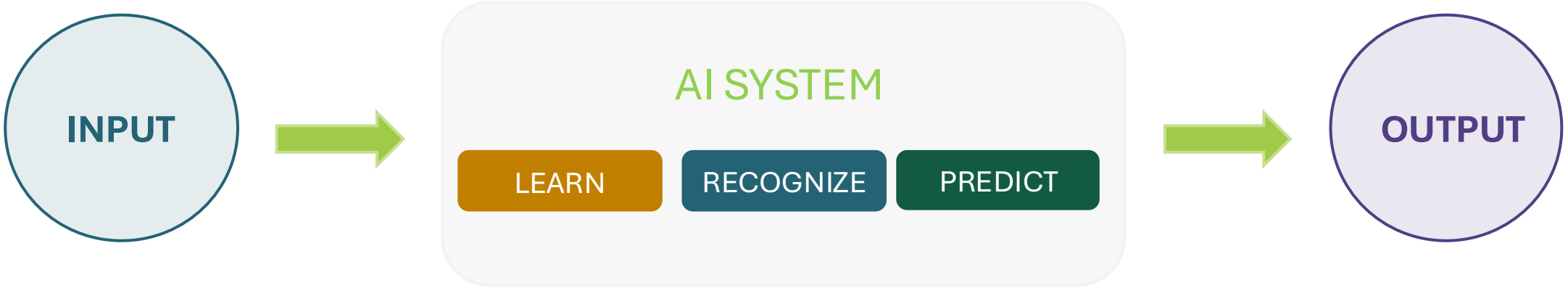
What is AI?

What does artificial intelligence actually mean in its broadest sense and how does it work?

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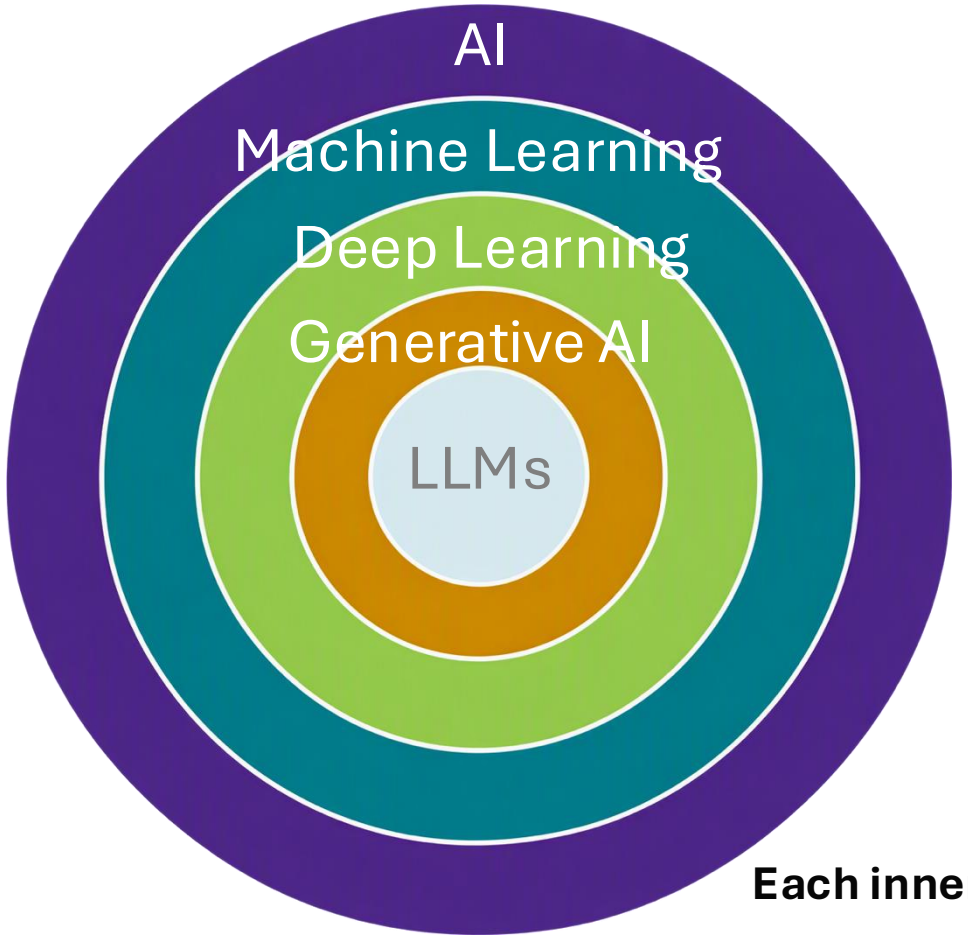
What is Artificial Intelligence (AI)?



AI is the broad concept of machines being able to perform tasks that normally require human intelligence – such as recognizing patterns, making predictions.

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AI is the umbrella



AI: Broad field, machines perform intelligent functions

Machine learning: Finds patterns from examples, learns from data

Deep learning: Uses layered neural networks for complex patterns

Generative AI: Creates new content; **LLMs** focus on language

Each inner circle is one more specialized kind of AI

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How layers of AI show up

Fraud detection

Smart Home Thermostat

Credit scoring

Traditional AI

Email spam Filtering

Predictive forecasting

Movie Rec.

Machine Learning

Self-driving cars

Face ID

Deep Learning

Image/video creation

Enterprise AI

Generative AI

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What are the Building Blocks of Modern AI?

1. Algorithms

Algorithms are the instructions, like recipe for baking a cake, that tell an AI system how to process information, identify patterns and produce an output.

2. Data

Data provides the examples from which AI learns. Its quality, relevance and diversity strongly influence the accuracy and fairness of the results.

3. Computing Power

Computing power enables AI to process large datasets and perform billions of calculations quickly. Powerful processors such as GPUs make modern AI models possible.

4. Learning

Learning is the process of improving through experience. During training, the AI compares its predictions with expected outcomes and adjusts itself to perform better over time.

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Prompting

When you prompt an AI, it uses patterns and connections learned during training - like drawing from a massive digital library. It then predicts and generates the response most relevant to your request. It does not “think” like a human; it calculates the most likely helpful answer based on its training.

Hallucinations

Sometimes AI “hallucinates” and produces information that sounds believable but is inaccurate. This usually happens when information is missing or unclear. Instead of verifying facts, AI generates responses by predicting which words are most likely to come next based on statistical patterns.

AI is highly effective at summarizing information and identifying patterns. However, it does not “understand” information as humans do and may struggle to distinguish reliable facts from inaccurate information.

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Agentic AI turns a goal into action

1. Defines the goal

Interprets the outcome you want, along with any instructions or limits.

2. Builds a plan

Breaks the goal into manageable steps and decides the best order to complete them.

3. Works with tools

Searches for information, runs code, and uses connected apps to carry out the task.

4. Adapts in real time

Reviews the results, handles errors, and changes its approach when needed.

Examples: Ask an Agentic AI "to plan an in-person meeting in USA" and it might research venues, check availability, compare flight prices, draft itinerary and send the calendar invites without any back-and-forth.

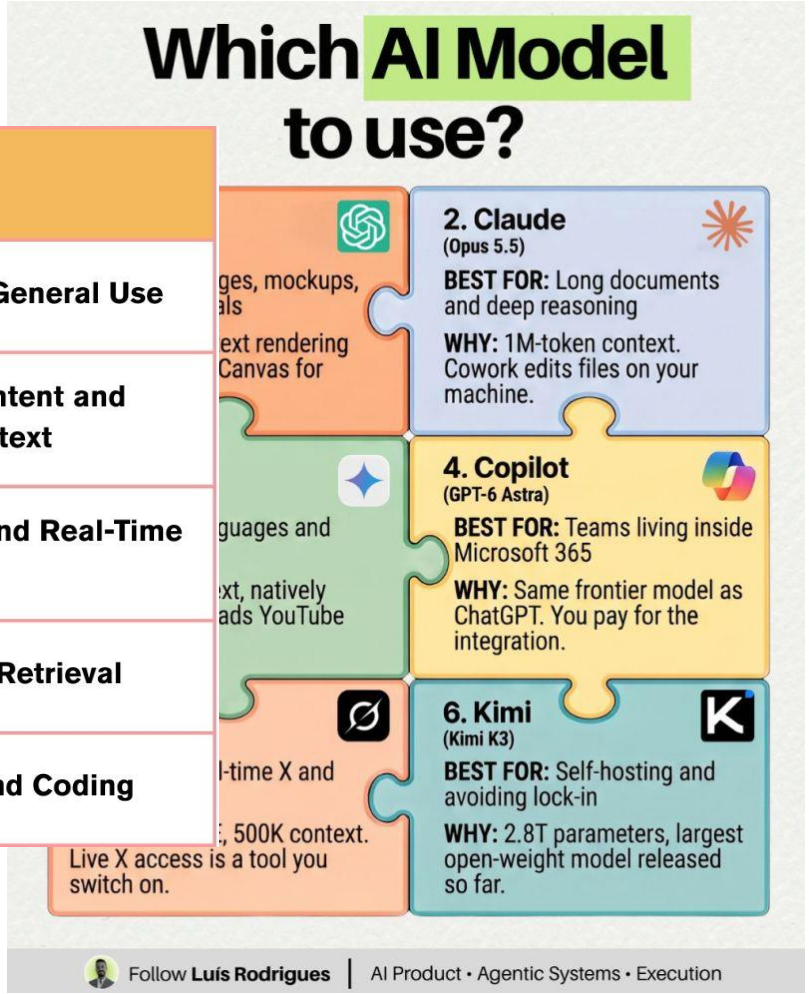
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Which AI Tools Should You Know?

Major AI Tools

AI Model	Best For	Strengths	Weaknesses
ChatGPT	Multimodal interaction	Custom GPTs, DALL·E, code execution	Expensive, steep learning curve
Claude	Creative, ethical content	Long-form, summarization, safe output	No se
Gemini	Research + multimedia	Real-time web data, images, Google integration	Co int
Perplexity	Research & fact retrieval	Fast, accurate, well-cited answers	No cre
Microsoft Copilot	Office productivity	Word, Excel, PowerPoint integration	Re Mi
Surfer AI	SEO content optimization	Keyword density, real-time competitor insights	Ni SE
Jasper AI	Content marketing & copywriting	Brand voice, email/blog/social templates	No tas
Grok AI	Conversational & casual engagement	Real-time social input, unique voice	Inf lim
DeepSeek	Document review & research	200K context window, deep reasoning	UI and tone need improvement

AI MODEL	BEST FOR
ChatGPT	Creative Writing and General Use
Gemini	For Multimedia Content and Extended Context
Grok	Advanced Reasoning and Real-Time Data
perplexity	Quick Information Retrieval
Claude	Technical Writing and Coding



Reference: https://doneforyou.com/ai-model-comparison-which-ai-reigns-supreme-in-2025/

Reference: https://www.xantage.co/xantage-blog-posts/how-to-choose-the-best-ai-model-in-2025-the-definitive-guide

Reference: https://blog.syzgroup.com/syz-the-moment/which-ai-model-to-use

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Part Two

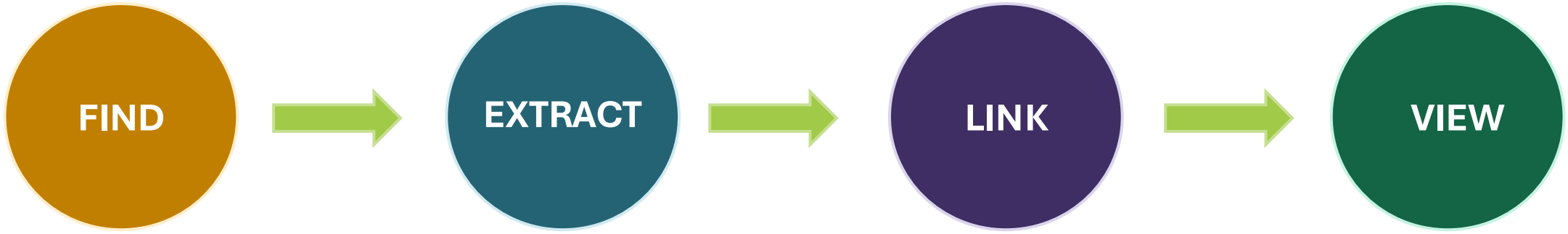
AI in Toxicology

How can artificial intelligence support biocompatibility and toxicology activities?

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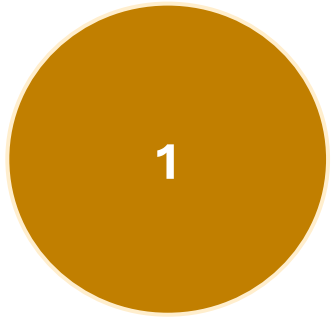
Toxicology works starts with finding and organizing evidence



AI opportunity: reduce manual searching and handling so we can spend more time reviewing evidence

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AI can support the workflow at different levels



ASSIST

Summarize, classify, extract from supplied approved materials

Human Verifies



CONNECT

A controlled assistant could query curated; governed toxicology datasets

Access & Quality controls



AUTOMATE

Planed AI-powered data assistant may answer queries over curated data

Validation

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Responsible use means traceability, privacy and expert review



TRACE

Require source and page references, check the source and not just the summary



PROTECT

Use approved tools, protect confidential personal and regulated data



VALIDATE

Check extraction, calculations, omissions and conflicts, expert review remains essential

AI output can be confidently wrong. The toxicologist/author owns the interpretation and decision.

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Part Three

AI: EU Regulations and US Guides

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