MCP SERVER | NO CODE | CLOUD HOSTED

Half-Life Decay Tracker MCP for AI Agents

Model drug clearance and pharmacokinetic decay for medical simulations.

Half-Life Decay Tracker simulates how drug concentrations drop in the human body after a patient stops taking a medication. It calculates remaining amounts at specific milestones and predicts exactly when a substance hits target levels. Use it for pharmacokinetic modeling and medical simulations to see how drugs clear out over time. It's a precise way to model biological clearance without the manual math.

A+ Quality Score 100/100

half-life | drug-decay | pharmacokinetics | biomedical | dosage-tracking

MAINTAINED BY VINKIUS CLOUD FOR AI AGENTS · JULY 2026
vinkius.com/mcp/half-life-decay-tracker

SCAN TO VIEW

The connectivity layer between AI and the world's software.

Vinkius sits between AI and every application. All communication passes through Vinkius Cloud via the Model Context Protocol (MCP) — with governance, observability, and security at every layer.

Your AI Connections Run Through Vinkius Cloud

The world's largest managed MCP catalog

Vinkius is the connectivity layer where AI connects to the software your business already runs. We handle the hosting, the security, the credentials, the uptime — you get agents that actually do things.

We operate the world's largest managed MCP catalog. Major SaaS platforms, CRMs, databases, and cloud providers — running, monitored, production-ready. This MCP server is hosted and maintained by the Vinkius Cloud for AI Agents.

> *The agent doesn't manage credentials, doesn't manage uptime, doesn't manage security. Vinkius does.*
>
> — Architecture principle

Four Pillars of the Vinkius Runtime

01 — Security by design

Credentials stay encrypted at rest via AES-256. The AI agent never touches raw keys — they're injected into a sandboxed V8 isolate at runtime. Actions are logged, and connections have an emergency kill switch.

02 — Built on MCP Fusion

This MCP server was built with **MCP Fusion**, the open-source framework (Apache 2.0) that powers the entire Vinkius catalog. Schema-as-firewall strips undeclared fields, compiled PII redaction runs at zero overhead, and cryptographic lockfiles produce git-diffable audit trails.

03 — Deterministic observability

Eight immutable metrics per endpoint: request volume, p95 latency, error rate, active connections, cost attribution. A live payload feed logs every tool call with mutation detection.

04 — Autonomous operations

Servers are deployed, monitored, and patched autonomously. New capabilities and security patches ship weekly. Zero-downtime deployments ensure continuous availability across all managed MCP servers.

AES-256	Ed25519	24h TTL	V8 Isolate
Encryption at rest	PKI vault signatures	Ephemeral session keys	Sandboxed execution

One Token. Instant Access.

Every MCP server on Vinkius is accessed through a **Connection Token**. Tokens are generated in the cloud dashboard and produce a unique MCP endpoint URL. Paste this URL into any MCP-compatible client — no SDK required.

A single token can serve **multiple AI clients simultaneously**, or you can issue separate tokens per client for granular access control. Each token tracks its own request count, last activity timestamp, and can be individually enabled or revoked.

MCP ENDPOINT

```
https://edge.vinkius.com/{token}/mcp
```

Claude · Cursor · VS Code · Windsurf · Grok · Gemini

Security Is the Architecture

Security in Vinkius is not a feature — it's the foundation of the runtime. The gateway enforces multiple independent protection layers between AI agents and third-party APIs.

01 — Ed25519 PKI Vault

Every workspace has an Ed25519 Master Key. Session keys are generated ephemerally (24h TTL) and signed by the Master Key. Credentials never leave the vault boundary.

02 — V8 Isolate Sandboxing

Tool code runs inside isolated-vm V8 isolates with 64 MB memory caps and per-request timeouts. No filesystem access, no network access except through the SSRF-guarded fetch bridge.

03 — SSRF Guard

All outbound HTTP requests are DNS-resolved and validated before execution. Private IP ranges (10.x, 172.16-31.x, 192.168.x, AWS metadata 169.254.x) are blocked at the network layer.

04 — DLP & PII Redaction

A ResponseGuard pipeline intercepts every tool response. Configurable redaction patterns strip sensitive fields (emails, SSNs, card numbers) before data reaches the AI agent.

05 — Cryptographic Audit Trail

Every request is signed into a SHA-256 hash chain with Ed25519 signatures. Events form a tamper-proof, SIEM-exportable forensic record.

06 — Honeytoken Trap System

Phantom credentials are injected into isolated environments. If a honeytoken is used outside Vinkius infrastructure, the server is quarantined instantly.

Emergency Kill Switch

EU AI Act Art. 14(1) Compliant

The kill switch is an **emergency halt** mechanism — not a simple toggle. When triggered, it executes three actions atomically:

01 — Server deactivated

The MCP server is immediately taken offline across the entire cluster.

02 — All tokens revoked

Every connection token is invalidated. Total lockout — reconnection blocked until new tokens are issued.

03 — WebSocket connections killed

Active connections terminated via Redis pubsub broadcast. Propagates to every runtime node in the cluster.

Full Visibility. Zero Guesswork.

The Vinkius cloud dashboard includes a full MCP Governance suite — real-time analytics and security controls for production AI operations.

Control Plane

KPI dashboard with request volume, latency, success rate, token consumption, and AI-generated operational briefings.

Agent Activity

Which AI clients are connecting, how often, and what they're doing — real-time session tracking.

FinOps

Cost tracking per tool, payload compression savings, budget optimization signals, and consumption trends.

Tool Health

Slowest and most error-prone tools, with actionable root-cause insights and performance baselines.

Firewall & DLP

PII redaction activity, sensitive data protection counters, and security event timeline.

Incident Log

Error trends, failure rates, status-code breakdowns, and forensic audit trail access.

> Get started at **cloud.vinkius.com** — connect your AI agent in under 60 seconds.

Half-Life Decay Tracker MCP

3 tools available
Cloud-hosted on Vinkius

Half-Life Decay Tracker simulates how drug concentrations drop in the human body after a patient stops taking a medication. It calculates remaining amounts at specific milestones and predicts exactly when a substance hits target levels. Use it for pharmacokinetic modeling and medical simulations to see how drugs clear out over time. It's a precise way to model biological clearance without the manual math.

Imagine you're trying to map out how a specific medication clears a patient's system after they stop their dosing schedule. You need to know the numbers. But manual calculations for exponential decay are tedious and leave too much room for error. This MCP handles that heavy lifting for you. Instead of wrestling with formulas, you can just ask your agent to give you a snapshot of the current concentration or tell you how much of the drug is left after a week. It's built to handle the core math of biological clearance. It's a go-to for anyone doing pharmacokinetic modeling or running medical simulations. When you find this in the Vinkius catalog, you're getting a tool that turns complex pharmacological math into a simple conversation. You can figure out exactly when a drug hits a negligible level or see the predicted decay at key recovery points like day three or day fourteen. It takes the guesswork out of drug behavior. Focus on the actual science of patient care or trial design.

Core Capabilities

01 — Get current drug concentration percentages

See exactly what percentage of a medication remains in the system at any given moment.

02 — Predict drug levels at specific day milestones

Get the predicted percentage of a drug remaining at common recovery points like day 1, 3, 7, and 14.

03 — Calculate time until a drug hits a target threshold

Find out the exact hours or days until a drug concentration drops below a specific percentage.

04 — Simulate biological clearance patterns

Model how substances exit the body based on known half-life principles.

05 — Model pharmacokinetic decay for various substances

Run decay simulations for different medications to see how they behave over time.

One Click on Vinkius — From Prompt to Execution

Available at **vinkius.com/mcp/half-life-decay-tracker** — connect your AI agent in three steps.

01 Connect the MCP to your AI client via Vinkius.

02 Provide the initial dose amount and the drug's specific half-life.

03 Ask for current status, milestone data, or threshold predictions.

The bottom line is you get instant, accurate drug clearance data without doing any manual math.

Built For

Pharmacologists, clinical trial coordinators, and medical researchers who need to predict drug clearance patterns without doing manual calculations. It's for anyone tired of wrestling with exponential decay formulas.

Pharmacologist

Modeling drug behavior for new compounds during research to determine safe wash-out periods.

Clinical Trial Coordinator

Estimating patient clearance windows for study protocols to ensure safe drug transitions.

Medical Student

Visualizing pharmacokinetic principles and decay curves for pharmacology exams and projects.

Biomedical Researcher

Simulating drug wash-out periods for complex multi-drug interactions in laboratory settings.

What Changes When You Connect

01 Skip the manual math for exponential decay by using `calculate_milestone_decay` to get instant results.

02 Get precise time to zero estimates for patient safety using `predict_threshold_arrival`.

03 See real-time snapshots of drug presence with `check_current_status` instead of guessing.

04 Reduce human error in pharmacokinetic modeling by relying on consistent biological clearance principles.

05 Speed up clinical trial planning by quickly simulating drug wash-out periods across different half-lives.

Real-World Applications

Adjusting safety windows for new compounds

A researcher needs to know how much of a 500mg dose remains after 48 hours to adjust a study's safety window.

Visualizing decay for pharmacology presentations

A student wants to visualize how a drug with a 6-hour half-life drops below 1% for a pharmacology presentation.

Estimating medication clearance for new starts

A clinical coordinator needs to estimate when a patient's medication will be effectively cleared before starting a new drug.

Quick snapshot for simulation reports

A lab tech needs a quick snapshot of drug levels at the 7-day and 14-day marks for a simulation report.

Patterns to Avoid

Guessing decay percentages manually

✗ AVOID

Trying to estimate what percentage of a drug is left in the body by doing mental math.

✓ INSTEAD

Use `calculate_milestone_decay` to get the exact percentage for days 1, 3, 7, and 14.

Forgetting to account for elapsed time

✗ AVOID

Asking for a drug level without specifying how long it's been since the last dose.

✓ INSTEAD

Provide the exact hours passed since the last dose to `check_current_status`.

Using the tool for non-biological substances

✗ AVOID

Attempting to model radioactive decay or chemical reactions without biological clearance factors.

✓ INSTEAD

This tool is for biological clearance; for chemical half-lives without biological factors, use a standard physics calculator.

The Right Fit

Use this if you need to model biological clearance, pharmacokinetic decay, or drug wash-out periods in a medical or research context. It's perfect for anyone who needs to know how much is left or how long until it's gone based on a known half-life. Don't use this if you're trying to track actual real-time blood levels in a live patient as it's a simulation, not a lab monitor. For real-time patient monitoring, you need a connected medical device. For physics-based decay without biological factors, a basic calculator is better.

Half-Life Decay Tracker for Pharmacokinetic Modeling

Mapping out how a drug clears a patient's system usually involves a lot of manual calculation. You have to grab the initial dose, look up the half-life, and then run exponential decay formulas for every single day of the study. It's a mess of tabs, calculators, and copy-pasting that makes it easy to lose track of the numbers.

With this MCP, you just tell your agent the dose and the half-life. It handles the math and gives you the data points you need instantly. You get a clear picture of the drug's journey through the body without the headache of manual modeling.

Half-Life Decay Tracker for Clinical Trial Simulations

You can stop manually calculating milestones for day three, seven, or fourteen. You also don't have to guess how long it takes for a substance to hit a negligible level.

This tool puts the math in the background so you can focus on the actual pharmacology. It's about getting accurate data faster.

Half-Life Decay Tracker: 3 Tools for Drug Modeling

Use these tools to calculate drug levels, predict clearance times, and simulate biological decay patterns.

#	TOOL	DESCRIPTION
01	`check_current_status`	Tells you the current amount and percentage of a drug left in the system.
02	`calculate_milestone_decay`	Gives you the predicted percentage of a drug remaining at specific time intervals.
03	`predict_threshold_arrival`	Estimates the exact time it takes for a drug to drop below a certain percentage.

See It in Action

Real prompts you can use once this MCP is connected to your AI agent through Vinkius Cloud.

U How much of a 500mg dose will remain after 48 hours if the half-life is 12 hours?

After 48 hours, which represents 4 half-lives, **31.25 mg** of the initial 500mg dose remains in the system (**6.25%** of the original amount).

TIME PASSED	DOSE REMAINING	PERCENTAGE
12 hrs	250 mg	50%
24 hrs	125 mg	25%
36 hrs	62.5 mg	12.5%
48 hrs	31.25 mg	6.25%

U Check the current status for a 100mg dose with a 24-hour half-life, given that 72 hours have passed since the last dose.

Based on a 24-hour half-life and 72 hours elapsed, here is the current status:

- **Current Amount:** 12.5 mg
- **Percentage Remaining:** 12.5%
- **Half-lives Elapsed:** 3

U How long until a drug with a 6-hour half-life drops below 1% of its original concentration?

It will take approximately **72 hours** (or 3 days) for the concentration to drop below the 1% threshold.

Frequently Asked Questions

01 **Can the Half-Life Decay Tracker help with drug wash-out periods?**

Yes, it simulates how quickly a drug leaves the system so you can plan safe intervals between different medications.

02 **How does the Half-Life Decay Tracker handle different drug types?**

You provide the specific half-life and initial dose, and it calculates the decay based on those parameters.

03 **Is the Half-Life Decay Tracker accurate for medical research?**

It uses standard exponential decay principles, making it a reliable tool for pharmacokinetic modeling and simulations.

04 **Can I use the Half-Life Decay Tracker to see drug levels at specific days?**

Yes, it can calculate the predicted percentage remaining at common milestones like 1, 3, 7, and 14 days.

05 **What happens if I need to know when a drug is almost gone?**

The tool can predict the exact time it takes for a substance to drop below a specific percentage threshold you set.

06 **Can I use the Half-Life Decay Tracker for non-human subjects?**

While designed for human biological clearance, the math works for any substance with a known half-life.

Go Live in 60 Seconds

Get your connection token from **cloud.vinkius.com**, then paste the endpoint URL into any MCP-compatible client.

YOUR MCP ENDPOINT

```
https://edge.vinkius.com/[TOKEN]/mcp
```

CLIENT	WHERE TO CONFIGURE
Claude AI	Profile → Customize → Connectors → "+" → Add custom connector → Paste endpoint
Cursor	Settings → Features → MCP Servers → "+ Add New MCP Server" → Type: SSE → Paste endpoint
VS Code	Ctrl/Cmd+Shift+P → "MCP: Add Server" → add `"half-life-decay-tracker": { "url": "…" }`
Windsurf	MCP Settings → `mcp_settings.json` → Add endpoint URL
ChatGPT	Settings → Tools & plugins → Add MCP server → Paste endpoint
Gemini	Extensions → Add MCP Server → Paste endpoint URL

ASK AN AI ABOUT THIS

Let your preferred AI explain this MCP server

- Ask ChatGPT
- Ask Claude
- Ask Perplexity
- Ask Gemini
- Ask Grok

READY TO CONNECT

Half-Life Decay Tracker is live on Vinkius Cloud.

Get your connection token, paste it into your AI agent, and start building. No SDK. No deployment. Just results.

Start at cloud.vinkius.com →

vinkius.com · support@vinkius.com

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DOCUMENT INFORMATION

Generated	July 2026
MCP Server	Half-Life Decay Tracker MCP
Server ID	`019f3051-bf06-702f-92fd-f1ccb4bbd40e`
Platform	Vinkius Cloud for AI Agents
Endpoint	`https://edge.vinkius.com/{token}/mcp`

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