



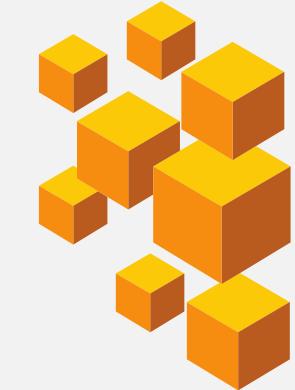
EquiTrials

Decentralized Patient-Centered Clinical Trial Platform

TRUST, TRANSPARENCY, AND
FAIRNESS IN MEDICAL RESEARCH

What's Broken in Clinical Trials Today

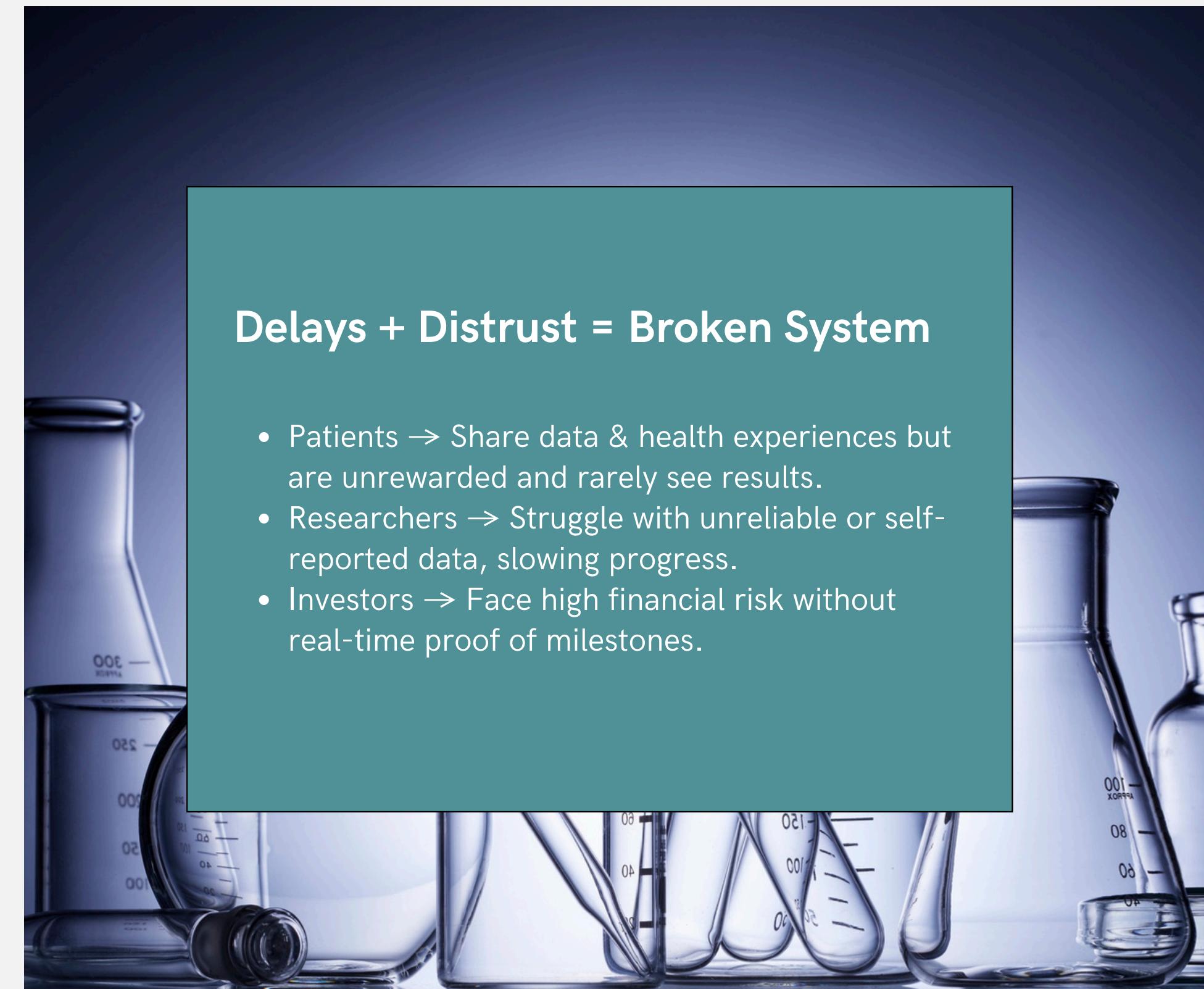
Clinical trials drive life-saving medical breakthroughs, but today the system is broken: trials are slow, costly, and lack transparency. Delays can cost billions and keep patients from timely treatments. Patients give their data without fair recognition, researchers face unreliable information, and investors lack accountability for progress. Our decentralized, patient-centered platform uses blockchain, AI, and token incentives to make trials faster, fairer, and globally trustworthy.

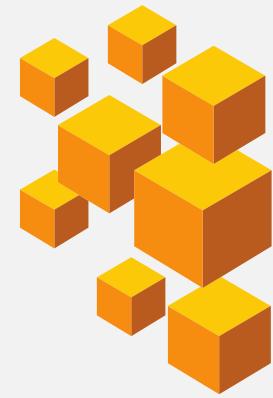


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Delays + Distrust = Broken System

- Patients → Share data & health experiences but are unrewarded and rarely see results.
- Researchers → Struggle with unreliable or self-reported data, slowing progress.
- Investors → Face high financial risk without real-time proof of milestones.





Global Challenges

Patients

Over 85% of clinical trials fail to recruit enough participants (NIH, 2023).

- Patients contribute health data and time but are rarely compensated or informed.
- Lack of transparency → distrust in the research process.

Researchers

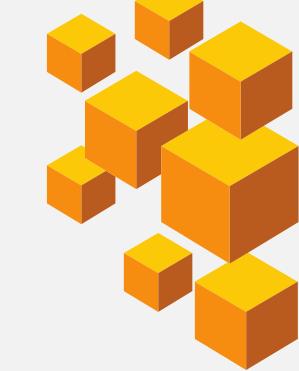
Self-reported data is often incomplete or inaccurate, lowering trial reliability.

- Clinical trial delays cost sponsors \$600,000-\$8M per day (Tufts Center for the Study of Drug Development).
- Data manipulation scandals have eroded trust in published results.

Investors / Sponsors

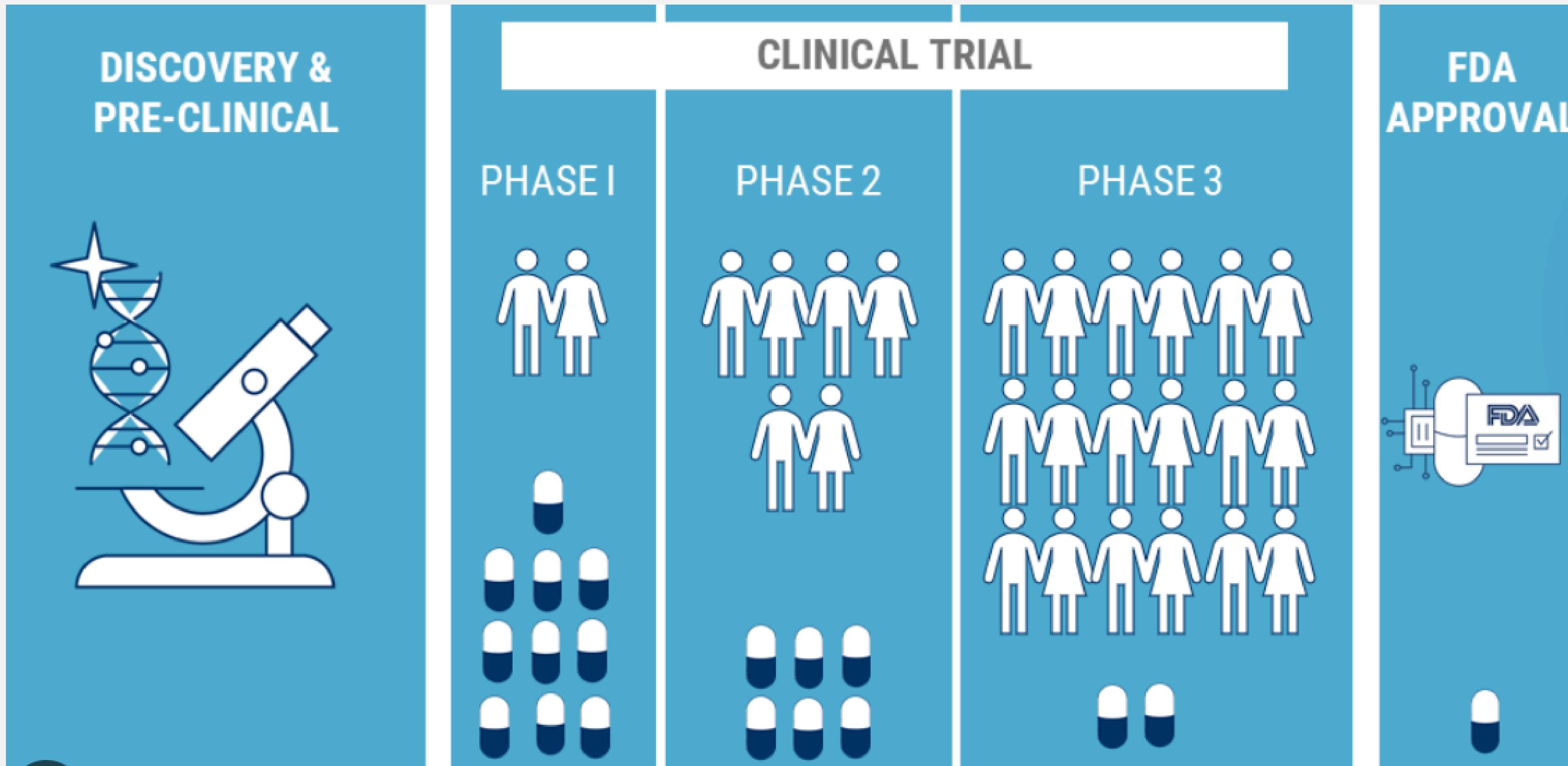
80-90% of drug candidates entering trials never reach the market.

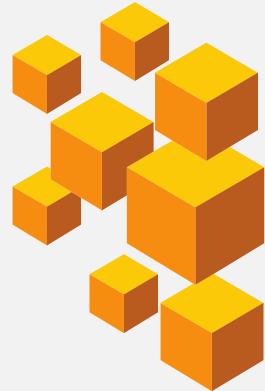
- Lack of real-time, milestone-based tracking makes funding risky.
- Billions lost annually due to trial inefficiencies and delays.



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How Clinical Trials Work





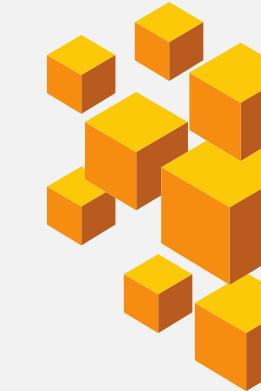
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Three Pillars of Impact

- **Blockchain** → verifiable data and milestone-based funding for investors
- **AI** → real-time health insights for patients and better trial reliability for researchers
- **Token Economy** → patients rewarded fairly for participation

- For Patients
 - Earn rewards for verified participation
 - Access to personal health insights
- For Researchers
 - Reliable, real-time data collection
 - Reduced trial delays through engaged participants
- For Investors
 - Milestone-based funding with smart contracts
 - Transparent progress tracking, reducing financial risk

Our MVP: How EquiTrials Works

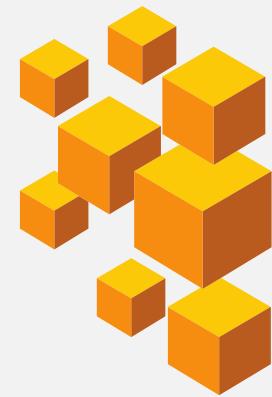


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Architecture: 6 Smart Contracts

1. **ConsentContract:** Zero-knowledge patient authorization using Compact circuits
2. **DataContract:** Encrypted hash storage for privacy-preserving data submission
3. **ValidationContract:** AI-powered quality scoring with cryptographic verification
4. **MilestoneContract:** Automated progress tracking and completion detection
5. **TokenContract:** Fair compensation distribution based on data quality
6. **FundingContract:** Milestone-based escrow reducing sponsor financial risk

Example: ConsentContract



EquiTrials

```
pragma language_version >= 0.16 && <= 0.17;

import CompactStandardLibrary;

// Consent states
enum ConsentStatus { NONE, GIVEN, REVOKED }

// LEDGER STATE (on-chain)
export ledger patientConsents: Map<Bytes<20>, ConsentStatus>;
export ledger consentAuthorities: Map<Bytes<20>, Bytes<32>>;
export ledger round: Counter;

// WITNESS (private)
witness patientSecretKey(): Bytes<32>;

// Helper: derive stable authorization key
circuit deriveAuthKey(patientID: Bytes<20>, secret: Bytes<32>): Bytes<32> {
    return persistentHash<Vector<4, Bytes<32>>([
        pad(32, "consent:authkey"),
        patientID as Field as Bytes<32>,
        round.read() as Field as Bytes<32>,
        secret
    ]);
}
```

```
// MAIN FUNCTIONS
export circuit giveConsent(patientID: Bytes<20>): [] {
    // Disclose patientID for ledger operations
    const disclosedPatientID = disclose(patientID);

    // Check consent status
    assert(patientConsents.lookup(disclosedPatientID) != ConsentStatus.GIVEN, "already given");

    // Store who can revoke consent
    const secret_key = patientSecretKey();
    const authKey = disclose(deriveAuthKey(patientID, secret_key));

    consentAuthorities.insert(disclosedPatientID, authKey);
    patientConsents.insert(disclosedPatientID, ConsentStatus.GIVEN);
    round.increment(1);
}

export circuit revokeConsent(patientID: Bytes<20>): [] {
    // Disclose patientID for ledger operations
    const disclosedPatientID = disclose(patientID);

    // Check consent status
    assert(patientConsents.lookup(disclosedPatientID) == ConsentStatus.GIVEN, "no active consent");

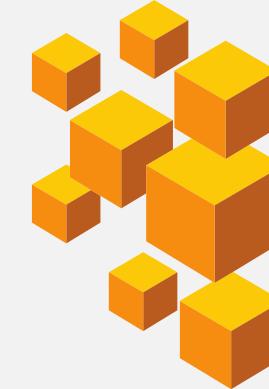
    // Prove you are the same person who gave consent
    const secret_key = patientSecretKey();
    const authKey = disclose(deriveAuthKey(patientID, secret_key));

    assert(consentAuthorities.lookup(disclosedPatientID) == authKey, "not authorized to revoke");

    patientConsents.insert(disclosedPatientID, ConsentStatus.REVOKED);
    round.increment(1);
}

export circuit checkConsent(patientID: Bytes<20>): ConsentStatus {
    // Disclose patientID for ledger operation
    const disclosedPatientID = disclose(patientID);
    return patientConsents.lookup(disclosedPatientID);
}
```

Our MVP: How EquiTrials Works



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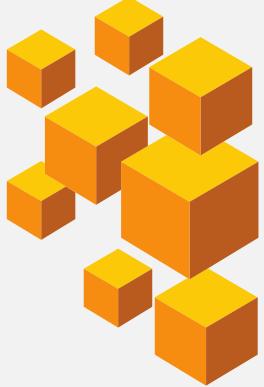
Patient Data → AI Validation → ZK Proof Generation →
Midnight Blockchain



Milestone Detection → Smart Contract Execution →
Automatic Token Rewards

Built with Midnight's privacy-first blockchain infrastructure, EquiTrials demonstrates how zero-knowledge technology can solve real-world trust and incentive problems in medical research while maintaining regulatory compliance.



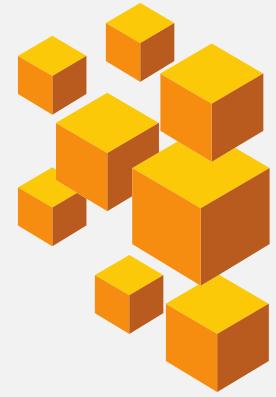


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Strategic Partnerships for Community Engagement

- 01 Building strong networks enhances collaboration efforts.
- 02 Diversity in partnerships drives innovative solutions.
- 03 Together, we create a lasting impact.





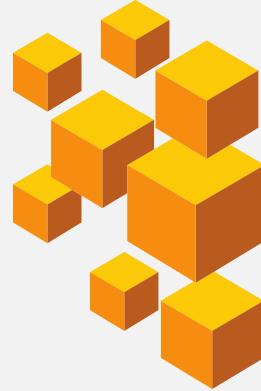
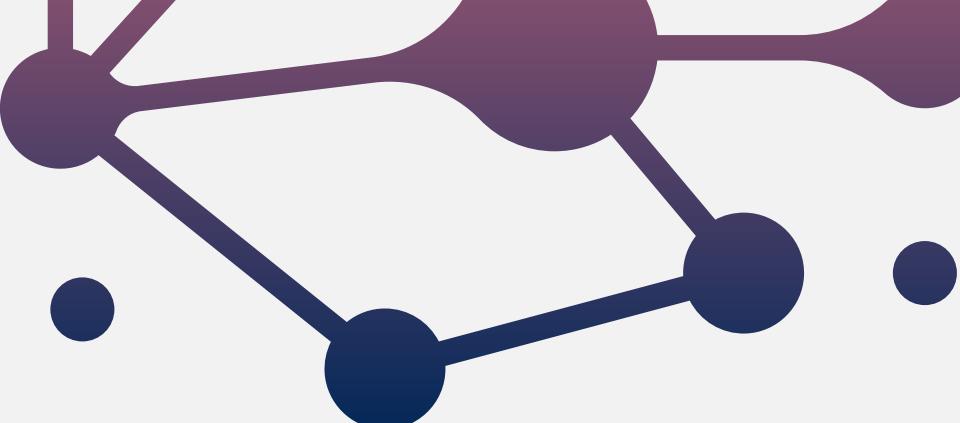
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Our Partners

- **Hospitals & Clinics** → Access to patients and clinical data
- **Research Institutions & Universities** → Expertise in trial design and analysis
- **Biotech & Pharma Companies** → Funding and real-world trial opportunities
- **Wearable / Health Tech Providers** → Real-time patient monitoring
- **Regulatory Bodies** → Guidance for compliance and ethical trials
- **Investors & Venture Funds** → Milestone-based funding for trials



Collaboration is the key to transparent, efficient, and fair clinical trials.



EquiTrials



**No more delays. No more data gaps. No more wasted money.
Just trust, transparency, and patient-first clinical trials.**

We are ***redefining clinical trials***, putting ***patients first***, giving researchers ***reliable insights***, and ***ensuring investors can trust the process***. Together, we build a *transparent, fair, and inclusive* healthcare ecosystem that accelerates innovation and saves lives.