

# Open Source Dividends

**Sharing is Caring!**

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# What is open science and why is it important?

## Open science is:

- Information, observations and data who's collection and methodology are transparent
- Scientific data that is available and usable by the public

## Research is more valuable to society when open:

- Increase the amount and speed of innovation
- Data Integrity: subject to Peer review, scrutiny, reproducibility
- Efficient and ethical: Known unknowns! Unnecessary experimentation on animal and humans.

# Closing Science for Private Interest

Intellectual Property Rights (IPR) creates a bias towards closed research

-Commercial interest trumps societal benefits

## Consequence:

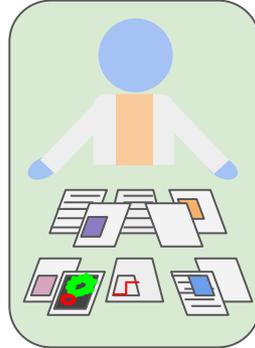
- Drag on the advancement of science, causes silos
- Cost of business is increased (litigation, inefficiency etc.)
- Health needs are neglected if there are no financial incentives (or considered “too risky”)
- Access to technologies is restricted (Price, timing of development etc)

## Example- The Bayh Dole act (1980s)

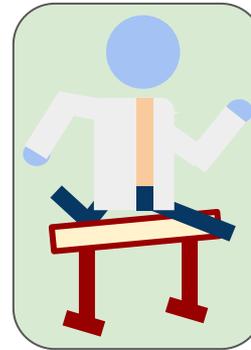
- Expanded the ability of private parties to patents and hold exclusive rights to invention developed with federal funds (like at Universities)
- Financial incentive to keep data closed and proprietary
- Sharp increase in patent applications

# Innovation Inducement Prize

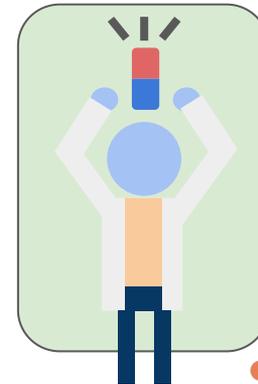
Open source dividends



Interim results prizes



End product prizes



# What is the Open Source Dividend (OSD)?

Corrects for an obvious market failure: the lack of economic incentives to share research inputs.

Prizes that reward and encourage collaboration and the sharing of knowledge, materials and technologies.

Given to persons or communities (groups or organizations) that openly and freely shared knowledge, data, materials or technology that was **judged to have been helpful or instrumental in the success of the end product**.

**Source of funds.** Can be a funded from:

1. Share of an end-product prize or;
2. Implemented entirely separately from an end product prizes, eg: percent of all drug sales into a fund to be allocated to the open source dividend.

# Benefits of Open Source Dividend

Open source dividend can revolutionize incentives to be open and share information.

Open source dividend can be implemented even without other reforms.

Open Source dividend lowers initial costs of acquiring intellectual property for final products.

Drug developers would both pay and benefit from this system:

1. pay by sharing the revenue from the product sales or rewards.
2. benefit by the expanded access to royalty free knowledge, materials and data, and fewer transaction costs.

# Implementing Open Source Dividends (OSD)

## The Sanders Prize Fund Bills

-**2005/ 2013** :Sanders Medical Innovation Prize Fund Act (HR 417 of 109 congress/ S.627 of 113th Congress)

- **2013**: Prize Fund for HIV/AIDS Act (S. 626 (113th))

### Goal:

Eliminate monopolies on new drugs, and use prizes to induce innovation that was responsive to **health needs**.

Reward developers of new prescription drugs and vaccines, as a substitute for the grant of a monopoly.

# How the OSD works in the Medical Innovation Prize Fund Act:

## Eligibility:

-persons or communities that openly shared knowledge, data, materials, and technology on a royalty-free and nondiscriminatory basis.

**Criteria** for the selection of recipients, and for determining the amount, of prize payments:

- number of patients who would benefit from medical innovation
- incremental therapeutic benefit from medical innovation
- The degree that medical innovation addresses priority health care needs
- Improved manufacturing efficiency and extend knowledge
- Sharing must be Open, Nondiscriminatory and Royalty-free

## Allocation of shares in the OSD

- A panel/jury would be appointed to evaluate nominations and allocate shares of the OSD where supported by evidence

**S.626, 113th Congress. SEC. 9. OPEN SOURCE DIVIDEND PRIZES.**

(a) In General.—In order to induce greater access and the open sharing of knowledge, data, materials, and technology, at least 5 percent of the prize payments from the Fund shall be dedicated to Open Source Dividend Prizes.

(b) Procedures.—

(1) IN GENERAL.—The Prize Fund Director shall adopt procedures for the allocation of Open Source Dividend Prizes. Such procedures shall—

(A) be fully transparent regarding the process for evaluating the value of open sharing of knowledge, data, materials, and technology;

(B) reward the open, nondiscriminatory, and royalty-free sharing of knowledge, data, materials, and technology that has contributed to the development of the new qualifying treatment for HIV/AIDS or manufacturing processes that are rewarded under section 7;

(C) in the case of rewards for contributing to the development of new qualifying treatment for HIV/AIDS or manufacturing processes rewarded under section 7, provide for a time-limited period of nominations for persons or communities whose contributions were considered useful, including the evidence to support such nominations to describe the significance of the contribution; and

(D) provide for rules and procedures to protect against conflicts of interest.

(2) PUBLIC AVAILABILITY OF NOMINATIONS.—The nominations described in paragraph (1)(C), and the evidence supporting such nominations, shall be public. The public shall be allowed to provide commentary and additional evidence on such nominations before awards are made.

# OSD continued.

## Some proposed OSD Funding levels

- In 2015, the US GDP was \$18,036.6 billion, the NIH budget was \$30.298 billion
- S. 626 (113th congress), the Medical Innovation prize fund. The annual funding for the OSD would be .05 of 0.0055 or 0.000275 of GDP. This was equal to \$4.96 billion in 2015, roughly 16 percent of the 2015 NIH budget.
- S.627 (113th Congress), the Prize Fund for HIV/AIDS Act. The OSD funding would be .05 of .0002, or 0.00001 of GDP. This was equal to \$180 million in 2015, roughly 6 percent of the NIH budget for HIV/AIDS.
- Standalone ODS, without other delinkage reforms. At current levels of spending on drugs, the OSD would receive more than \$4 billion in funding for every 1 percent of drug sales.

# What does open source research look like

-HIV sequence from all over the world. Allows for identification of HIV drug resistance trend.

Stanford University  
HIV DRUG RESISTANCE DATABASE  
A curated public database to represent, store and analyze HIV drug resistance data.

HOME   GENOTYPE-RX   GENOTYPE-PHENO   GENOTYPE-CLINICAL   HIVdb PROGRAM   ABOUT HIVdb




Surveillance Mutations

**Query Pages**



**Genotype-treatment**  
Retrieve sequences (and/or mutations) from persons receiving selected HIV drugs

Retrieve sequences and treatments from viruses with specific mutations



**Genotype-phenotype**  
Retrieve drug susceptibility data for isolates with selected mutations

Download genotype-phenotype research datasets



**Genotype-clinical**  
Summaries of genotype-clinical outcome studies

Genotype-clinical outcome datasets (download)



**References**  
Published drug resistance studies in HIVDB

Published studies by Stanford database group

HIVdb Program

Drug Resistance Summaries (Download PDF)

PIs

NRTIs

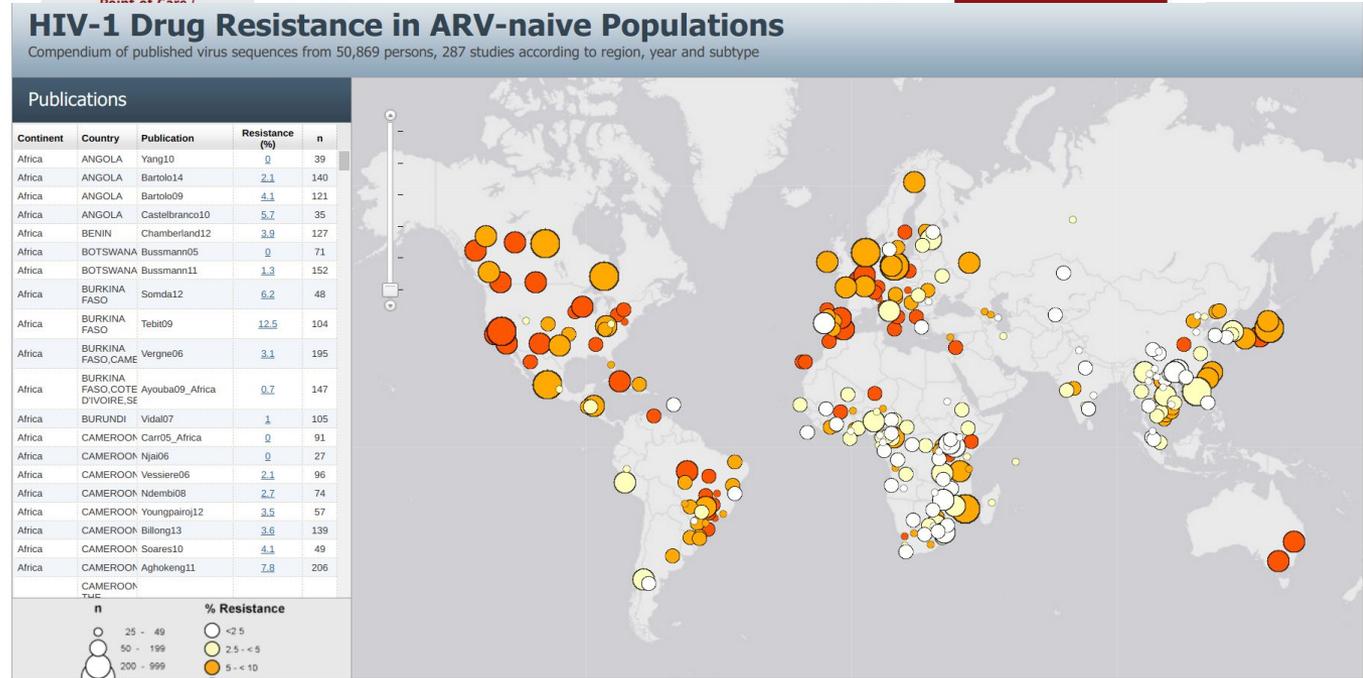
NNRTIs

INSTIs

HIVseq Program

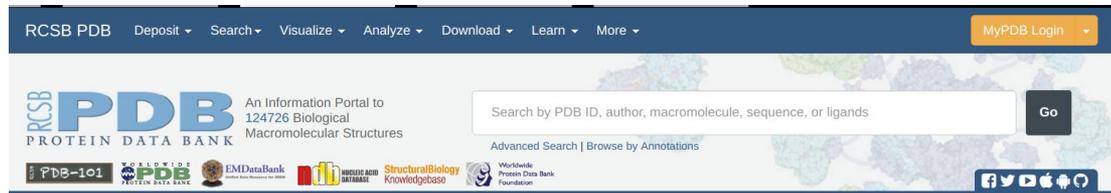
HIValg Program

HIV-1 Genetic Variability for Drug Resistance



# Protein structures and docking experiments can help us design better drugs

Fig 2



Welcome

Deposit

Search

Visualize

Analyze

### A Structural View of Biology

This resource is powered by the Protein Data Bank archive-information about the 3D shapes of proteins, nucleic acids, and complex assemblies that helps students and researchers understand all aspects of biomedicine and agriculture, from protein synthesis to health and disease.

As a member of the wwPDB, the RCSB PDB curates and annotates PDB data. The RCSB PDB builds upon the data by creating tools and resources for research and education in molecular biology, structural biology, computational biology, and beyond.

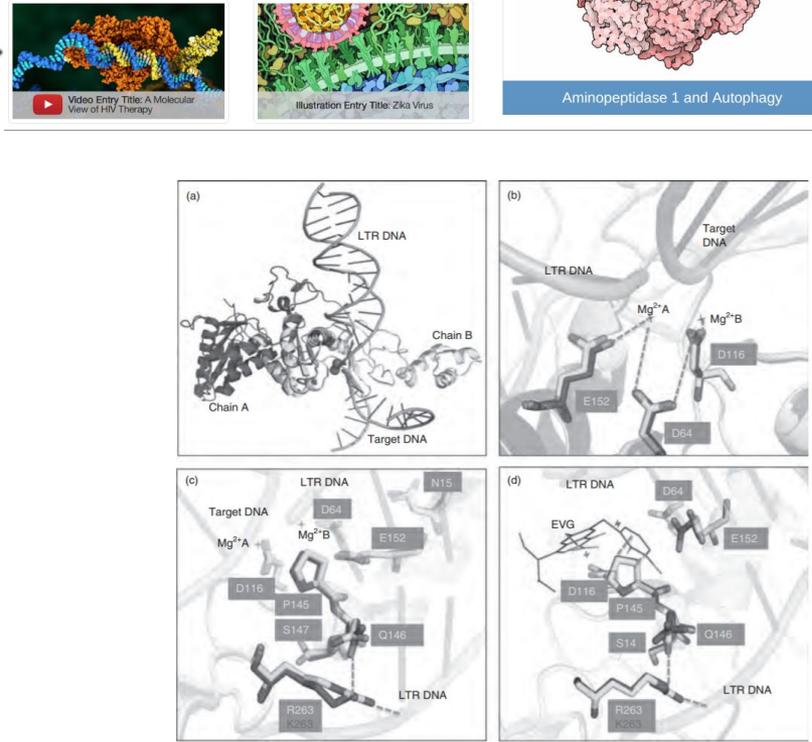
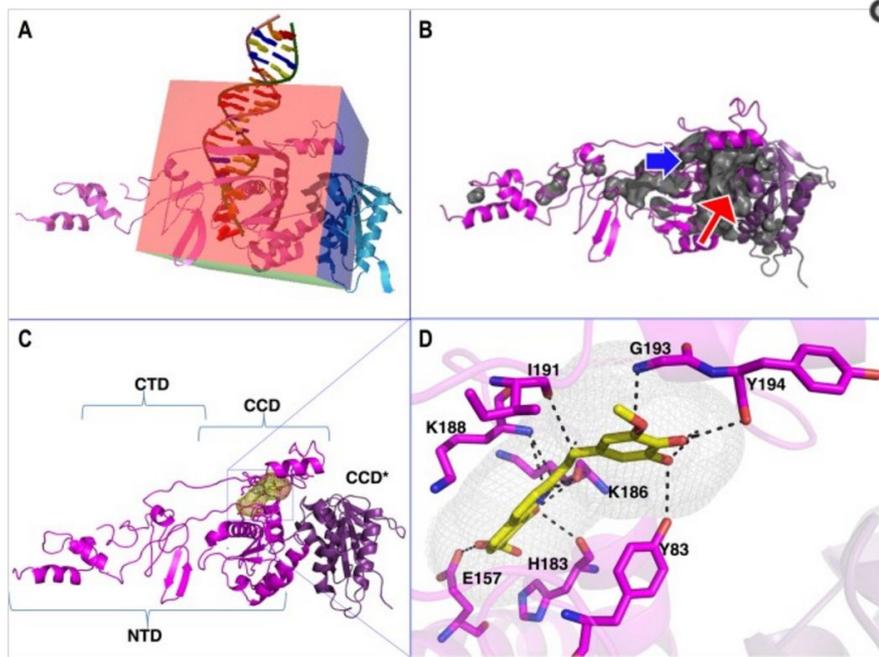
Cast Your Vizzies Vote for RCSB PDB

Video Entry Title: A Molecular View of HIV Therapy

Illustration Entry Title: Zika Virus

### November Molecule of the Month

Aminopeptidase 1 and Autophagy



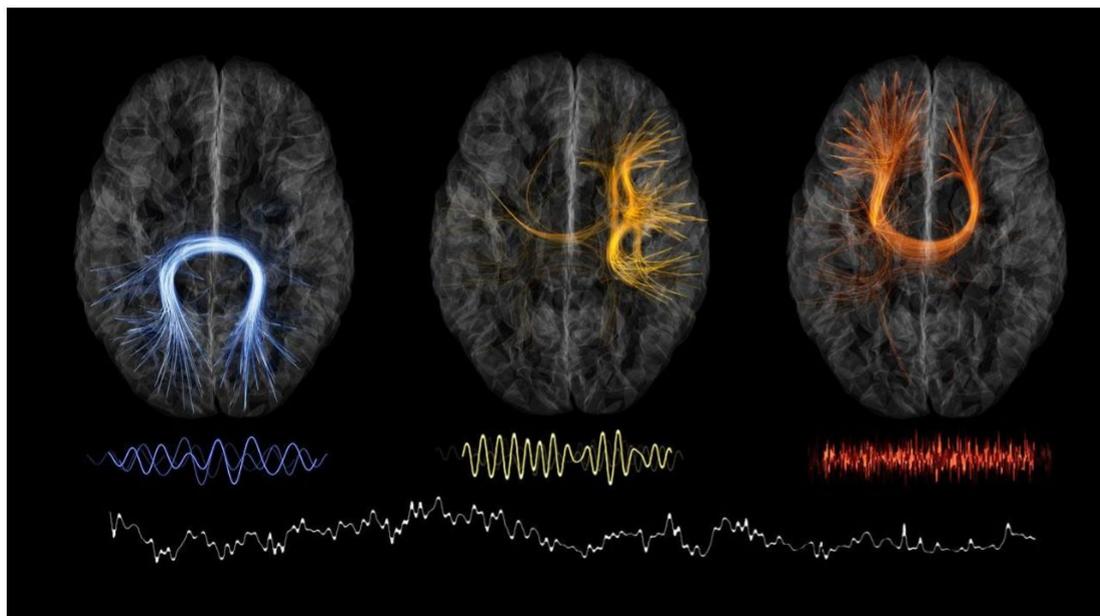
# Montreal Neurological Institute (MNI)



Releasing results and data from tissue samples in MNI's **biobank** and to its extensive **databank of brain scans** and other data

The institute will **not pursue patents on any of its discoveries**. Any organization or institute that collaborates with MNI will also have to follow open-science principles

MNI will be the first scientific institute to follow that path MNI is developing metrics to monitor its open-science experiment (5 years)



“There is a fair amount of patenting by people at the institute, but the outcomes have not been very useful,”, adding that the institute would rather provide data that others could use to develop medicines...

“It comes down to what is the reason for our existence? It’s to accelerate science, not to make money.”

-Guy Rouleau, the director of McGill University’s Montreal Neurological Institute (MNI)



# Thank you

