

Surveillance of HIV Drug Resistance in North America  
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# From Genetic Strings to Analyzable Data

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# Stanford HIVDB Programs

The screenshot shows a Microsoft Internet Explorer browser window displaying the Stanford HIV Drug Resistance Database website. The browser's address bar shows the URL <http://hivdb.stanford.edu/>. The website's main heading is "Stanford HIV Drug Resistance Database". Below the heading is a descriptive paragraph: "A curated database containing nearly all published HIV RT and protease sequences: a resource for researchers studying evolutionary and drug-related variation in the molecular targets of anti-HIV therapy." A navigation menu includes links for Home, Seq Analysis, Database Queries, Resistance Notes, User Guide, and Contact Us. The page is organized into three main sections: "Database Query Pages", "Sequence Analysis Programs", and "Drug Resistance Notes".

**Stanford HIV Drug Resistance Database**

A curated database containing nearly all published HIV RT and protease sequences: a resource for researchers studying evolutionary and drug-related variation in the molecular targets of anti-HIV therapy.

Home   Seq Analysis   Database Queries   Resistance Notes   User Guide   Contact Us

**Database Query Pages**

- [Protease inhibitors, RT inhibitors](#)  
Retrieve sequences of isolates from persons receiving a selected antiretroviral therapy
- [Protease mutations, RT mutations](#)  
Retrieve sequences of isolates containing selected mutations
- [Protease inhibitor susceptibilities, RT inhibitor susceptibilities](#)  
Retrieve published drug susceptibility data for isolates with selected mutations
- Mutation profiles: [Protease](#), [RT](#), [Position summary](#)  
Retrieve summary mutation data according to treatment and subtype
- Other pages: [References](#), [Advanced query pages](#), [GenBank](#), ...

**Sequence Analysis Programs**

- [HIVseq](#)  
Compare new RT and protease sequences to published sequences with the same mutations.
- [HIVdb](#)  
Infer drug resistance to 17 available drugs using rules hyperlinked to data within the database.
- [HIValg](#)  
Compare algorithms ANRS, HIVdb, Rega, and/or one created using the [Algorithm Specification Interface \(ASI\)](#).

**Drug Resistance Notes**

Done   Internet

Start   Inbox - Microsoft ...   M:\BR\_SB\IVR SEC...   Strings to Analyza...   Adobe Acrobat Pro...   Stanford HIV ...   Stanford HIV Drug Resistance Database - Microsoft Internet Explorer

# Alignment Simple RT

| Consensus      | Subtype  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|----------------|----------|---|---|---|---|---|---|---|---|---|----|----|----|----|
|                |          | P | I | S | P | I | E | T | V | P | V  | K  | L  | K  |
| 00980054040045 | B        | - | - | - | - | - | - | - | - | - | -  | -  | -  | -  |
| 00980054040018 | B        | - | - | - | - | - | D | - | - | - | -  | -  | -  | -  |
| 00985465040005 | B        | - | - | - | - | - | - | - | - | - | -  | -  | -  | -  |
| 00985465040005 | B        | - | - | - | S | - | - | - | - | - | -  | -  | -  | -  |
| 00985465040010 | B        | - | - | - | - | - | - | - | - | - | -  | -  | -  | -  |
| 00990177040077 | C        | - | - | - | - | - | - | - | - | - | -  | -  | -  | -  |
| 00990177040091 | B        | - | - | - | - | - | - | - | - | - | -  | -  | -  | -  |
| 00990177040093 | B        | - | - | - | - | - | - | - | - | - | -  | -  | -  | -  |
| 00990177040094 | B        | - | - | - | - | - | - | - | - | - | -  | -  | -  | -  |
| 00990177040097 | B        | - | - | - | - | - | - | - | - | - | -  | -  | -  | -  |
| 00990177040099 | B        | - | - | - | - | - | - | - | - | - | -  | -  | -  | -  |
| 00990177040100 | B        | - | - | - | - | - | - | - | - | - | A  | -  | -  | -  |
| 00990177040104 | B        | - | - | - | - | - | - | - | - | - | -  | -  | -  | -  |
| 00990177040105 | B        | - | - | - | - | - | - | - | - | - | -  | -  | -  | -  |
| 00990177040130 | B        | - | - | - | - | - | D | - | - | - | -  | -  | -  | -  |
| 00990177040132 | B        | - | - | - | - | - | - | - | - | - | -  | -  | -  | -  |
| 00990177040144 | B        | - | - | - | - | - | - | - | - | - | -  | -  | -  | -  |
| 00990177040145 | B        | - | - | - | - | - | D | - | - | - | -  | -  | -  | -  |
| 00990177040155 | B        | - | - | - | - | - | D | - | - | - | -  | -  | -  | -  |
| 00990222040001 | B        | - | - | - | - | - | - | - | - | - | -  | -  | -  | -  |
| 00990222040005 | CRF02_AG | - | - | - | - | - | - | - | - | - | -  | -  | -  | -  |
| 00990222040066 | B        | - | - | - | - | - | D | - | - | - | -  | -  | -  | -  |
| 00990222040069 | B        | - | - | - | - | - | D | - | - | - | -  | -  | -  | -  |

The above is a simplified AA alignment.

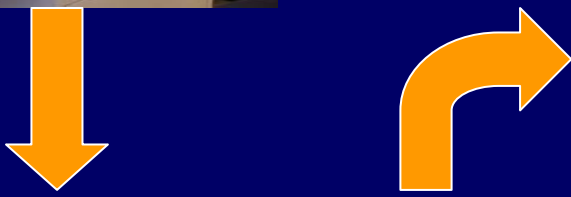
No mixtures are included in this alignment.

If mixtures are found and they exist as wildtype and mutant, the mutant AA is included.

If a mixture of two or more mutant AAs is found, then the worst mutation is selected.



# Local Access database: HIV drug resistance person view



```
>00000311041234
CYTCAKANNNNHHYTTGGCAACGACCCCTCGTCACAATAAAGATAKNGG
GGGCAGCTAAAGGAAGCTCTATTAGATACAGGAGCAGATGATACAGTAT
GAAGAAATGACTTTGCCAGGAAAATGGAAACCAAAAATGATAGGGGGAA
TGGAGGTTTTATCAAAGTAAGACAGTATGAGCAAGTACTAGTAGAAATCT
GTGGACATAAAGCTATAGGTACAGTATTAGTAGGACCTACACCTGTCAAC
ATAATTGGAAGAAATCTGTTGACTCAGATTGGTTGCACTTTAAATTTCC
CATTAGTCCTATTGAAACTGTACCAGTAAATTAAGCCAGGAATGGATG
GCCCAAAAATTAACAATGGCCATTGACAGAAGAAAAAATAAAGCACTA
GTAGAAATTTGACAGAAATGGAAAAGGAAGGGAAAAATTTCAAAAATTGG
GCCTGAAATCCATACAATACTCCAGTGTGGCCATAAAGAAAAAAGACA
GTACTAAATGGAGAAAATTAGTAGATTTTCAGAGAGCTTAATAAGAGAAT
CAAGATTTCTGGGAAGTTCAATTAGGAATACCACATCCTGCAGGGTTAAA
```

**Resistance PersonView**

### HIV Drug Resistance Person View

[Return to Main Specimen Entry Form](#)

StudyID:

SubType:

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**Protease Inhibitors:**

Major Mutations:

|    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|
| 30 | 46 | 48 | 50 | 82 | 84 | 90 |
| -- | L  | -- | -- | A  | -- | M  |

Resistance Scores:

|          |            |          |            |            |           |          |
|----------|------------|----------|------------|------------|-----------|----------|
| APV:     | IDV:       | NFV:     | RTV:       | SQV:       | LPV:      | ATV:     |
| Moderate | High-Level | Moderate | High-Level | High-Level | Low-Level | Moderate |

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**Nucleoside Reverse Transcriptase Inhibitors (NRTI):**

Major Mutations:

|    |     |     |     |     |     |     |     |     |     |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 98 | 103 | 106 | 108 | 181 | 188 | 190 | 225 | 230 | 236 |
| G  | N   | --  | I   | --  | --  | --  | --  | --  | --  |

Resistance Scores:

|            |            |            |
|------------|------------|------------|
| DLV:       | EFV:       | NVP:       |
| High-Level | High-Level | High-Level |

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**Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTI):**

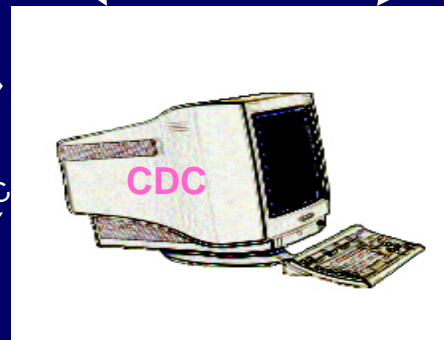
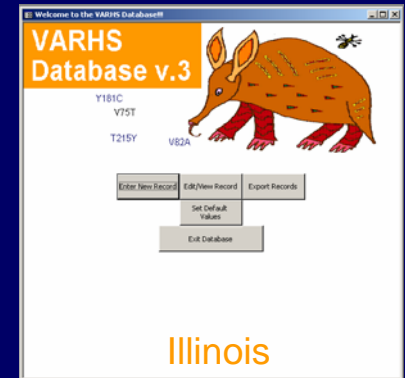
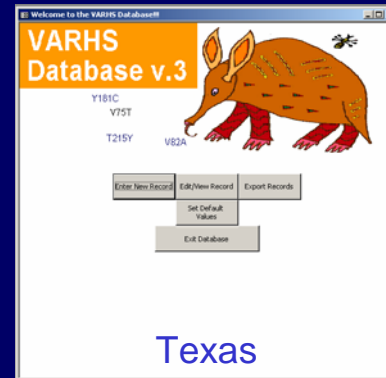
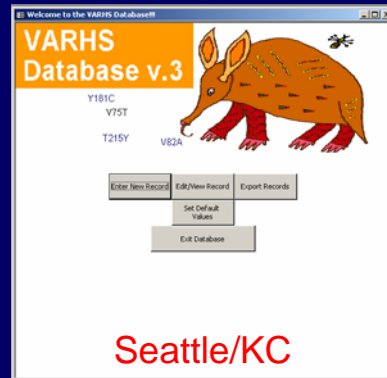
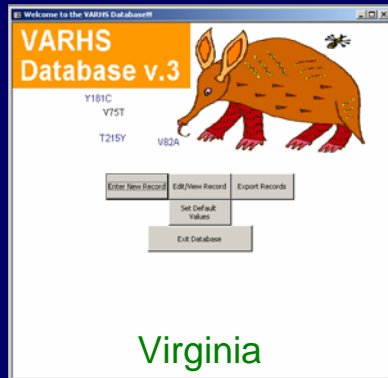
Major Mutations:

|    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |
|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 41 | 62 | 65 | 67 | 69 | 70 | 74 | 75 | 77 | 100 | 115 | 116 | 151 | 181 | 184 | 210 | 215 | 219 |
| L  | -- | -- | N  | -- | -- | -- | -- | -- | --  | --  | --  | --  | --  | I   | --  | --  | --  |

Resistance Scores:

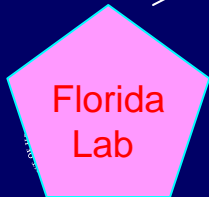
|           |           |          |          |            |            |           |          |
|-----------|-----------|----------|----------|------------|------------|-----------|----------|
| 3TC:      | FTC:      | ABC:     | AZT:     | D4T:       | DDC:       | DDI:      | TDF:     |
| Low-Level | Low-Level | Moderate | Moderate | High-Level | High-Level | Potential | Moderate |

# National SAS database created from exports through SDN

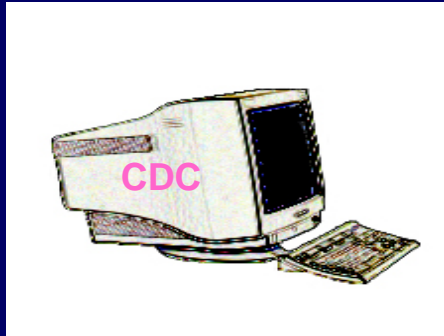


>00000311041234  
GTGGACATAAAGCTATAGGT  
ACAGTATTAGTAGGATGACC

>111123201044567  
GTGGACATACCGTCAGGTAC  
AGTATTAGTAGGATGGTCCA



# National Reports



```

options linesize=120;
data _null_;
file 'E:\bysexrace.doc';
VARHS: National Prevalence of HIV drug resistance'
Overall and by Gender and Race';
proc print;
var Any Drug Class NRTI NNRTI PI >= 2 Drug Classes;
run;

```

|         | Any Drug Class<br>% | NRTI<br>% | NNRTI<br>% | PI<br>% | >= 2 Drug Classes<br>% |
|---------|---------------------|-----------|------------|---------|------------------------|
| OVERALL | 13.5                | 6.5       | 8.2        | 3.0     | 3.4                    |
| MALE    | ---                 | ---       | ---        | ---     | ---                    |
| White   | ---                 | ---       | ---        | ---     | ---                    |
| Black   | ---                 | ---       | ---        | ---     | ---                    |
| Other   | ---                 | ---       | ---        | ---     | ---                    |
| FEMALE  | ---                 | ---       | ---        | ---     | ---                    |
| White   | ---                 | ---       | ---        | ---     | ---                    |
| Black   | ---                 | ---       | ---        | ---     | ---                    |
| Other   | ---                 | ---       | ---        | ---     | ---                    |



VARHS: National Prevalence of HIV drug resistance  
Overall and by Participating Area


|            | Any Drug Class<br>% | NRTI<br>% | NNRTI<br>% | PI<br>% | >= 2 Drug Classes<br>% |
|------------|---------------------|-----------|------------|---------|------------------------|
| OVERALL    | 13.5                | 6.5       | 8.2        | 3.0     | 3.4                    |
| STATE/AREA |                     |           |            |         |                        |
| Alabama    | ---                 | ---       | ---        | ---     | ---                    |
| Arkansas   | ---                 | ---       | ---        | ---     | ---                    |
| .          |                     |           |            |         |                        |
| .          |                     |           |            |         |                        |
| .          |                     |           |            |         |                        |
| Washington | ---                 | ---       | ---        | ---     | ---                    |

(confidence intervals, too!)



# NEDSS HIV PAM Person View

e-HARS - Microsoft Internet Explorer



**e-HARS**  
The evaluation  
HIV/AIDS  
Reporting System

- e-HARS Home
- Documents/Forms
- Reports
- Admin tasks
- Help
- Logoff

eHARS 1.1.2

### Document Summary

Document saved successfully - Saturday, November 8, 2003 6:27:58 PM EST

Document : Lab Report  
Document ID : GA00-000048240-2  
Name : Pepperdine

Status : R - Required Field  
**REQUIRED**  
FIELDS MISSING  
1. Sex at birth is missing.  
**WARNING**  
FORM INFORMATION MODULE  
1. This document initiated an investigation.  
Note : If these data are not included on the paper document, you do not have to enter them into e-HARS. See the documentation for more information.

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### Person View Summary

Person View Updated - Saturday, November 8, 2003 6:27:59 PM EST

Name : Pepperdine  
State No :  
e-HARS UID : GA00S000048239-0

Diagnosis : Unknown  
Mode : 499 - No risk reported  
Status : R - Required Field  
Date of birth : was : (empty) - is now : 12/24/1965  
Race : was : (empty) - is now : R3  
Categ : was : (empty) - is now : 9  
Mode : was : (empty) - is now : 499  
Date of first positive lab test : was : (empty) - is now : 05/05/1999  
**REQUIRED**  
FIELDS MISSING  
1. Sex at birth is missing.  
2. Living Status (Mortality Status) is missing.  
3. There is no State Number assigned to this person.

Done Trusted sites

