

# WFDB / PhysioNet Formats

George B. Moody

Harvard-MIT Division of Health Sciences  
and Technology

Cambridge, Massachusetts

# What are WFDB and PhysioNet?

- WFDB = WaveForm DataBase
  - subroutine (function) library
  - collection of formats directly readable and writable by the WFDB library
- PhysioNet: NIH/NCRR funded research resource
  - large collections of signals, time series, and related software freely available at <http://physionet.org/>

# What is a Waveform Database?

- A collection of records (recordings of signals and annotations), each consisting of:
  - one (text) header file
  - any number of (binary) signal files
  - any number of (binary) annotation files
- *Not a relational database!*

# WFDB Storage Formats

- Header files: short text files that name and describe signal files belonging to a record
- Signal files: binary files containing one or more digitized signals; most fixed-length binary formats are supported
- Annotation files: binary files containing labels, each pointing to a specific sample, with attributes describing a feature of the signal at that time

# Patient Information

- PhysioBank databases are constructed from deidentified data (a requirement for free access)
- Clinical databases incorporating WFDB files may include PHI in external files (recommended) or in header files with user-defined PHI fields (not recommended)

# Raw Data Storage

- Signals may have different sampling frequencies
- Signals may have different numbers of bits per sample
- Signals in the same record may be stored in different formats (e.g., to optimize for each signal)
- Measures taken at non-uniform intervals may be stored as annotations

# Event Definition and Storage

- New event types may be added without programming
- Existing event types may be modified by adding new information (but why?)
- Events may be fixed to a channel if appropriate
- Events may overlap
- Events can link to other events (and to external files by URI)

# Measurements of Channels

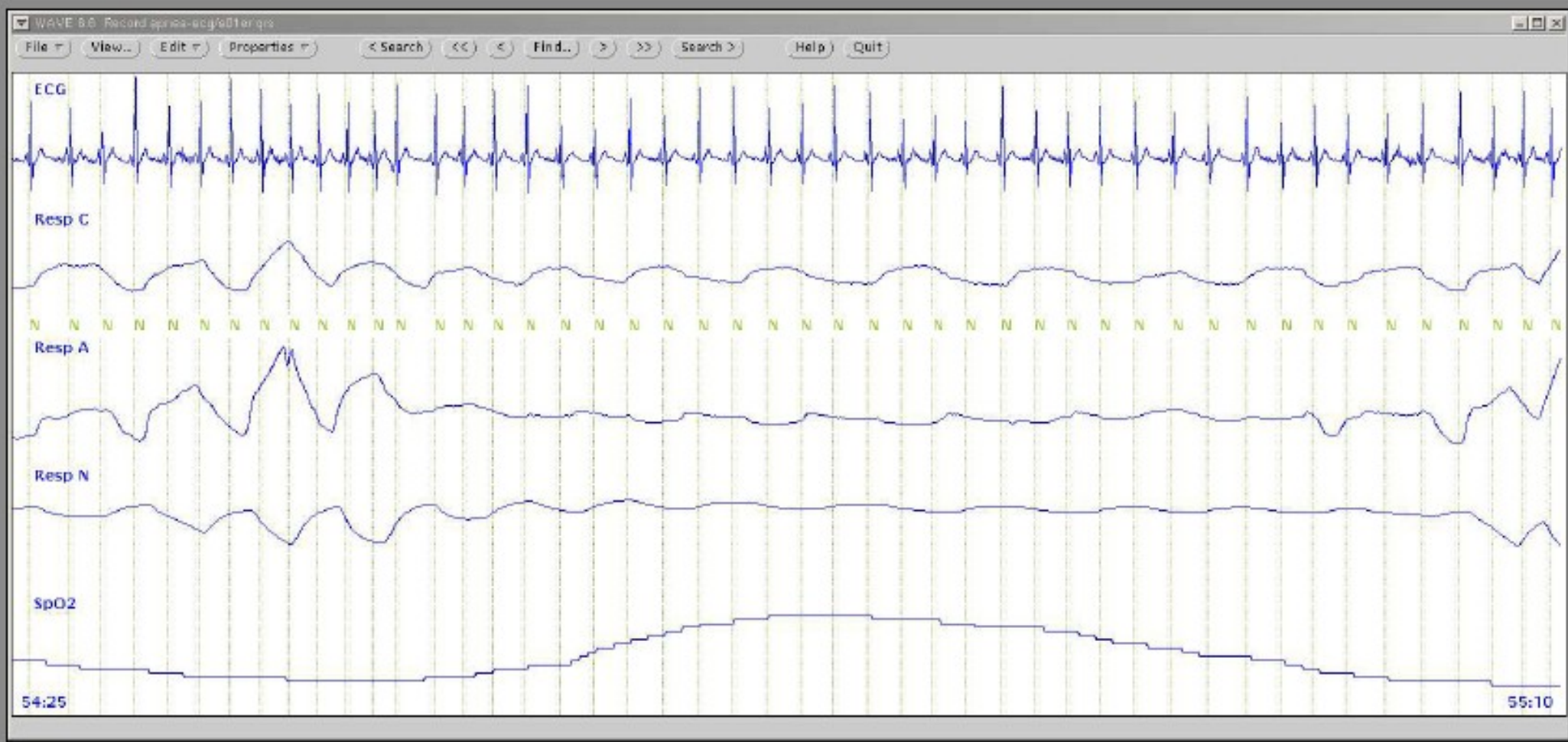
- All “channels” (signals, time series, periodic and non-periodic measurements) are readable as numbers or viewable graphically
- WFDB specifies a range of acceptable storage formats, does not dictate presentation



# Tabulations of Information

- Many WFDB applications extract information from WFDB-compatible files and present it in tabular form
- Tables are presentations of raw data; WFDB formats don't specify how data should be presented

# WAVE: a WFDB Viewer



# Further Information

- PhysioNet: <http://physionet.org/>
- Examples of WFDB records:  
<http://physionet.org/physiobank>
- Web-based viewer:  
<http://physionet.org/cgi-bin/chart>
- WFDB library:  
<http://physionet.org/physiotools/wfdb.shtml>
- and more: [george@mit.edu](mailto:george@mit.edu)