Real-time PCR Data Markup Language

A new standard for archiving and exchanging real-time PCR data

Steve Lefever
On behalf of the RDML consortium
qPCR = golden standard for nucleic acids quantification
Dedicated and precise instruments needed

Different software/output format for each instrument/manufacturer

Limits possibility to exchange and reanalyse data

RDML
History of RDML

- Birth on September 1st 2005 – Jan Hellemans
- 2005 – 2007 : Open discussion about RDML
- January 1st 2008 : start of the RDML consortium
- April 1st 2008 : RDML joins MIBBI
- January 12th 2009 : RDML paper accepted in Nucleic Acid Research

**SURVEY AND SUMMARY**

**RDML: structured language and reporting guidelines for real-time quantitative PCR data**

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doi:10.1093/nar/gkp056*
- Develops and maintains the RDML data exchange format
- Key developer group, a member community and supporters
- 41 supporters and members from 20 different countries
• Minimum Information for Biological and Biomedical Investigations

• http://www.mibbi.org

• Published in August 2008 by Nature Biotechnology

Promoting coherent minimum reporting guidelines for biological and biomedical investigations: the MIBBI project

• RDML adopted as standard for qPCR experiments

- Microarrays
  - MIAME
  - MAGE-ML

- qPCR
  - MIQE
  - RDML
What is RDML?

- RDML = **Real-time PCR Data Markup Language**
- Universal format to store and exchange qPCR data
- Structured
- Based on XML
- Platform independent
- Easy to extend
- Small RDML files

![flowchart]

- Instrument software
- Public repositories, journals
- Colleagues, collaborators
- Third party software, databases
What is RDML?
- File size reduction

Vermeulen et al.
- Prognostic gene study in neuroblastoma

Excel files
- ~ 11 Mb

RDML file
- ~ 300 Kb

732 samples
64 targets
128 384-well plates
What is XML?

- eXtensible Markup Language
- Language to store data in a structured manner
- Defines elements delimited by opening and closing tags
- Easily extensible

```xml
<gene>
  <symbol>actb</symbol>
  <function>muscle contraction</function>
  <location>chromosome 7: 5533308-5569941</location>
</gene>
```
RDML structure

- List of Id’s
- List of experimenters
- List of targets
- List of samples
- List of protocols
- Documentation

Experiments
- Runs
  - Reactions
    - Datapoints

annotation ——/\—— qPCR data
RDML structure

- qPCR data
- Experiment annotation
- Multiple experiments per file
- Standard vocabulary (MIQE)
  - reaction
  - Cq

Center for Medical Genetics
List of Id’s

- List of experimenters
- List of targets
- List of samples
- List of protocols
- Documentation

- Accession numbers for online repositories or journals
RDML structure

- List of Id's
- List of experimenters
- List of targets
- List of samples
- List of protocols
- Documentation

- Target annotation
- Oligonucleotide sequences
RDM structure

- List of Id’s
- List of experimenters
- List of targets
- List of samples
- List of protocols
  - Any type of protocol
- Documentation
RDML structure

List of Id’s
List of experimenters
List of targets
List of samples
List of protocols

Documentation

Additional information
RDML supporting software

- **RT PRIMER DB**
- **qbasePLUS**

- Under development:
  - **Primer3Plus**
  - RDML viewer and editor

- More to come
- www.rdml.org
- Tool for creating RDML files
- Tool for converting RDML file to .csv files
- Libraries in Java, C, .NET and PHP
• Online generation of an RDML file
• Importing the RDML file in qBasePlus for analysis
• Convert RDML file into .csv files
Conclusion

- Data standard for qPCR data
- Universal and extensible
- Easy exchange of data
- Broad acceptance by community
- Submit data in RDML format to journals
- www.rdml.org
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