

Communicating Science (in English)

Tim Skern

Department of Medical Biochemistry, MUW
(timothy.skern@meduniwien.ac.at)

Current address:

Institute of Infectious Diseases and Molecular Medicine
University of Cape Town

© Tim Skern, 2005

Experience is the name
we give to our mistakes

- Oscar Wilde

Or:

Good judgement comes from experience;

experience comes from bad judgement!

Overview for today:

- General
- Writing
- Speaking

Telling a scientific story

- Why did you do something?
(Introduction)
- What did you do?
(Results)
- What did you discover?
(Discussion)

Telling a scientific story another way

- Tell them what you are going to tell them (Introduction)
- Tell them your story? (Results)
- Tell them what you told them? (Discussion)

Three important goals

- Clarity
- Brevity
- Coherence

Three important attributes

- Creativity
- Imagination
- Fantasy

i.e.: the same ones you need for science itself!

Take-home message generally

- Learn from your mistakes!
- Learn to criticise yourself
(i.e. suggest improvements yourself)
- Learn to accept criticism
(i.e. listen to what others suggest)

Writing scientific English

FEBS Journal 272 (2005) 2602–2611 © 2005 FEBS



The binding of foot-and-mouth disease virus leader proteinase to eIF4G1 involves conserved ionic interactions

Nicole Foeger*, Elisabeth Kuehnelt, Regina Cencic and Tim Skern

Max F. Perutz Laboratories, University Departments at the Vienna Biocenter, Department of Medical Biochemistry, Medical University of Vienna, Austria

Keywords

Foot-and-mouth disease virus; papain-like proteinase; self-processing; exosite; protein synthesis inhibition

Correspondence

T. Skern, Max F. Perutz Laboratories, University Departments at the Vienna Biocenter, Department of Medical Biochemistry, Medical University of Vienna, Dr Bohr-Gasse 8/3, A-1030 Vienna, Austria
Fax: +43 14277 9816
Tel: +43 14277 61620
E-mail: timothy.skern@meduniwien.ac.at
Website: <http://www.meduniwien.ac.at/meduch>

Present addresses

*Division of Cell Biology and †Division of Tumor Genetics, German Cancer Research Center, Im Neuenheimer Feld 280, D-69120 Heidelberg, Germany

(Received 22 February 2005; revised 20 March 2005; accepted 24 March 2005)

doi:10.1111/j.1742-4656.2005.04699.x

The leader proteinase (L^{pro}) of foot-and-mouth disease virus (FMDV) initially cleaves itself from the polyprotein. Subsequently, L^{pro} cleaves the host proteins eukaryotic initiation factor (eIF) 4G1 and 4GH. This prevents protein synthesis from capped cellular mRNAs; the viral RNA is still translated, initiating from an internal ribosome entry site. L^{pro} cleaves eIF4G1 between residues G674 and R675. We showed previously, however, that L^{pro} binds to residues 640–669 of eIF4G1. Binding was substantially improved when the eIF4G1 fragment contained the eIF4E binding site and eIF4E was present in the binding assay. L^{pro} interacts with eIF4G1 via residue C133 and residues 183–195 of the C-terminal extension. This binding domain lies about 25 Å from the active site. Here, we examined the binding of L^{pro} to eIF4G1 fragments generated by *in vitro* translation to narrow the binding site down to residues 645–657 of human eIF4G1. Comparison of these amino acids with those in human eIF4G1 as well as with sequences of eIF4G1 from other organisms allowed us to identify two conserved basic residues (K646 and R650). Mutation of these residues was severely detrimental to L^{pro} binding. Similarly, comparison of the sequence between residues 183 and 195 of L^{pro} with those of other FMDV serotypes and equine rhinitis A virus showed that acidic residues D184 and E186 were highly conserved. Substitution of these residues in L^{pro} significantly reduced eIF4G1 binding and cleavage without affecting self-processing. Thus, FMDV L^{pro} has evolved a domain that specifically recognizes a host cell protein.

Publication parameters

- Writing the manuscript - four months
- Number of versions - about seven
- Reviewer's comments - two sets (1st set: 3 pages of single-spaced comments)
- Time to publication - one year!

The scientific manuscript

- Title page
- Summary (Abstract)
- Introduction
- Material and Methods
- Results
- Discussion
- References
- Figures and figure legends
- Tables

The scientific manuscript

- Title page
- Summary (Abstract)
- Introduction
- Material and Methods
- Results
- Discussion
- References
- Figures and figure legends
- Tables

Figures and figure legends

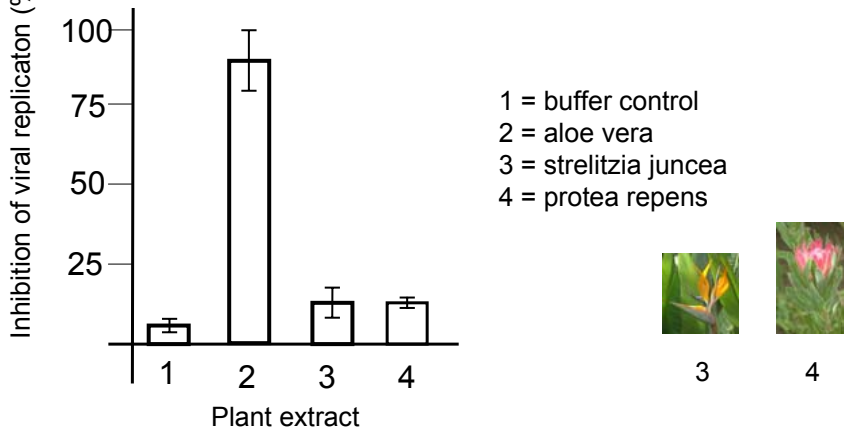


Figure 1. Inhibition of influenza virus replication by plant extracts.

Figures and figure legends

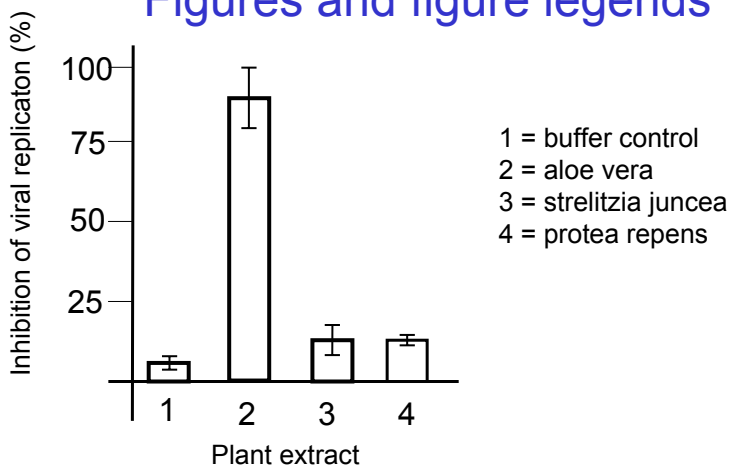


Figure 1. Inhibition of virus replication by plant extracts.
10 μ l of each extract were incubated with 10^6 virus particles for 1 hour. The number of active virus particles remaining was then assayed on HeLa cells.

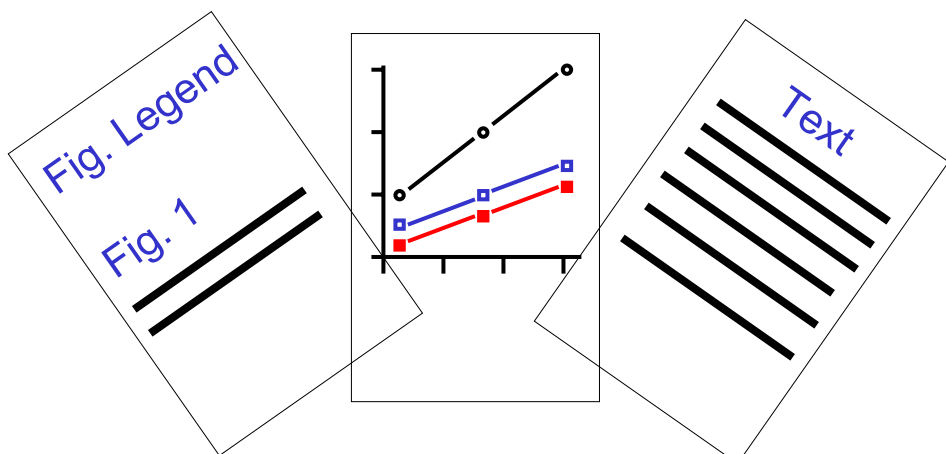
The scientific manuscript

- Once the figures are complete, write the results section. For example:

Results

Plants have provided many useful drugs. To investigate whether plant extracts might inhibit viral growth, we incubated virus X with the extracts shown in figure 1. Of the three extracts tested, only the aloe vera extract was active.

The text and figures must **read** as a whole!



The rest writes itself.....

The scientific manuscript

- The results might continue like this:

Virus x is an enveloped virus. We therefore investigated whether the aloe vera extract would inhibit other enveloped viruses from different viral families. To investigate this, we incubated the extract with viruses y, z, q and j. Figure 2 shows the results.....

The scientific manuscript

- Writing the results can be summarised:
- The authors did something
- Something measurable happened (or did not happen, or happened in an unexpected way)
- As a consequence, the authors did the next experiment

The scientific manuscript

- Writing the discussion can be summarised:
- Start with a summary
- Relate your work to that in the literature
- Finish with an outlook, but not too concrete

The scientific manuscript

- The discussion could be:

We show here that an extract of aloe vera can inhibit several viruses which cause disease in humans. Other plant extracts which could inhibit a particular virus have been described. However, none of them have been shown to inhibit a spectrum of viruses. Future work will concentrate on investigating the clinical potential of this extract.

The scientific manuscript

- The Introduction could be:

Infectious agents cause many human diseases. For instance, HIV and other communicable diseases caused 50% of all deaths in South Africa in 2000.

Plant extracts are the basis for the treatment of many human diseases. For instance, artemesin from the xxx is being used to treat malaria.

We set out to discover whether plant extracts might be found which could inactivate the agents of other infectious diseases.

The scientific manuscript

- The methods - write down what you did! For example

Plants were obtained from A. Gardener. Extracts were prepared by crushing the leaves of each plant in liquid nitrogen as described by Smith and Jones.....

Viruses were assayed on HeLa cells as described by Joklik et al (1956).

- If you use a published method, then cite it!

The scientific manuscript

- The summary - write down the take-home message! For example,

We have investigated the anti-viral properties of extracts from aloe vera, strelitzia juncea and protea repens. Of the three extracts, only that from aloe vera showed any anti-viral activity. Furthermore, this extract was active against the viruses j, y and z, but not against q. The extract of aloe vera may prove useful in the treatment of diseases caused by these viruses.

Specific tips for writing

- PARAGRAPHS
- SENTENCES
 - complete
 - simple
- OMIT NEEDLESS WORDS

Source: Elements of Style(1918) W. Strunk, jr.

Scientific writing is formal

- No shortened forms (wasn't, didn't, isn't)
- Avoid „get“. Alternatives include: have, obtain, receive or just omit!
- Use brackets, avoid dashes!

Vocabulary for scientific writing:

- Verbs for example:
- investigate, determine, examine, look into, illuminate, discover, change, substitute,, prove, disprove, test, probe, evidence, vary
- variable, variation, variety, variant

The English Language

- Contains about 615,000 words
(excluding technical terms)
- 300 million native speakers
(5% world population)

Ref: Bill Bryson, Mother tongue – The English Language

Speaking the English Language

- Plus: relatively simple grammar
- Minus: pronunciation perverse!
- Consider: mint vs pint
nature vs mature
food vs flood

Speaking scientific English:

- Best possible suggestion:

Practise

=

Make mistakes!!!

Quote: Sir Peter Medawar, Scientist, Writer and Nobel Laureate
in "Advice to a Young Scientist" (1979)

What are the worst mistakes?

- **Going over the allotted time**
- **Failing to set priorities**
("to prioritise")
- See Nature (2005) 434, 416-417

What are the most frequent mistakes?

- too fast, slow, quiet
- too much detail
- Illegible or overcooked visual aids

More frequent mistakes?

- back to the audience
- no eye contact
- talking to just one person

Further frequent mistakes?

- no use of pointer
- abuse of pointer

The list is not comprehensive...

Sorry, almost forgot:

- English grammar
- English pronunciation
- English problems are really at the end of the list!

Evidence to support this statement?

- **Observation**
Native English speakers can give terrible talks
- **Conclusion**
English proficiency is not the most vital skill
- In a well-prepared and coherent talk, language becomes secondary!

One further tip for speaking:

- Try to speak without notes!
- Make your visual aids your notes
- As points on small cards
- Make a script (Drehbuch)

What did I tell you?

- Communicating science is :
- as important as doing the experiments
- a skill which can be acquired
- enjoyable and fun