



Strongarch Education

# Student Notes on Oral Slide Presentations

Prof Hans Zoellner  
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## Student Notes on Oral Slide Presentations

Prof Hans Zoellner,

### General Comments

This document is supplementary to the separate student notes outlining conventions for written scientific reports, and addresses key points on spoken as opposed to written presentations.

Unlike written reports, oral presentations involve direct interaction between the audience and the presenter, so that human dynamics become much more important. Accordingly, while written reports have numerous fairly strict conventions, conventions surrounding oral presentations are generally more flexible.

There are, however, some general rules that are helpful to be aware of, and I hope this is helpful for those students who trouble to read it. Much of what is recommended below may strike the student as 'common sense', but it is surprising how often both students and more experienced colleagues present talks which to my mind, would have been greatly improved by following some of the below advice.

The advice provided in this document reflects my own personal observations and experience, but as will become clear from reading below, because of the very personal nature of oral presentations, each person eventually develops their own personal style. Students are encouraged to use this document as a starting point from which to carefully watch others presenting, and think through what might work best for them.

The general structure of most scientific oral presentations, is as follows:

- The chairperson introduces the speaker, citing their name and the title of the presentation
- The speaker presents, usually with the support of a series of powerpoint slides or overhead projections
- The chairperson then leads and monitors questions for the speaker

### The Importance of Speaking with Your Own Voice

#### *The Mistake of Excessive Formality*

It is normal to feel exposed and vulnerable when addressing a crowd, and most people find public speaking stressful. A common response is for presenters to try and protect themselves behind starchy formality, either speaking from carefully prepared notes, or alternatively using words and phrases they would normally confine to the written page. This is a terrible mistake.

For a presenter who is already uncomfortable talking to a group, forcing themselves to speak in an unnatural way inevitably entrenches the discomfort, and makes them feel worse still. Further, the audience detects this discomfort and itself, becomes uncomfortable. At best, audience members try to stare fixedly at something on the screen in an attempt to ignore the speaker's discomfort. At worst, some audience members physically wince, as they find themselves in empathy and sympathy with the unhappy speaker. This creates a miserable positive feedback loop, from which both audience and presenter emerge distressed and glad the talk is over.

#### *Speak Casually as if at a Social Event*

Instead, it is far better for the presenter to speak with their own voice, whatever that might be.

The audience should be addressed in the same manner that the speaker would normally address an intelligent friend at a social event, who may or may not know something about the



topic, and is enquiring about the speaker's work. I stress, the speaker should present in as natural a way as possible.

Natural speech is inherently casual, so that it is in the speaker's own casual voice, that the oral presentation should be made.

This may seem particularly difficult for those who have English as a second language, because there is often a desire to make a perfect English presentation, as opposed to simply talking about the work. However, my strong experience has been, that the audience does not care if the speaker has an accent, or if there are any grammatical mistakes. Instead, the audience is interested in seeing a real person, with all their natural, normal, spoken disfluencies, colloquialisms, and errors, speaking openly and honestly about what they have done, and what they think.

The natural human dynamic is for an audience to warm to someone who speaks in a natural and human way, including natural human errors, while audiences become frosty towards speakers who seem unnatural or who pretend to be someone they are not.

By speaking with your own voice you bring the audience on-side, in a way that the most perfectly prepared formal presentation could never do.

### ***Persuasion***

While, as outlined in the separate document on written presentations, there is an intention to persuade the audience that the work described was well done and has purpose, it is also important for the audience to not feel the speaker is trying to 'sell something', because the immediate response is distrust and rejection of the work. This is normally avoided by presenting in the speaker's natural voice.

Clearly, speakers who win the trust of the audience through their natural demeanour, have less trouble persuading the audience of the value of their work, than speakers the audience feels are not honestly presenting themselves.

### ***Don't Bother Trying to Act***

Fortunately, no acting is required to 'act yourself', but trying to be anything other than oneself is almost bound to fail, because it requires 'an act'. Acting is a difficult art, hard learnt through hard training and experience. Few scientific presenters have any special talent or training in acting, and it is generally sensible not to try. The audience will warm more easily to a speaker who is simply themself.

### ***Don't Plan to Tell Jokes***

Similar to acting, comedy is a difficult art that people pay good money to see. It is generally wise to avoid planned jokes in scientific presentations, because poorly executed jokes have the effect of raising discomfort in the audience and speaker alike. Separately, a scientific presentation is meant to be serious work, and it undermines the status of the speaker if they do not treat it as such.

This is not to say that there is no place for humour. The point, however, is that that humour should only be exercised when it comes naturally to the speaker, perhaps as an unplanned aside during explanation, or in response to a question. Attempts to force humour will likely be recognized as unnatural, and have the opposite effect to that intended.



### ***Practicing Talks and Moving From Slide to Slide***

While the actual slide content provides a convenient reminder for the presenter as to what they had planned to say, a common problem for inexperienced presenters is what to say as they move to the next slide. Sometimes, a presenter brings up the next slide, and initially wears an expression of surprise at what flashes before them.

This reflects inadequate practice prior to the presentation, and particularly failure to think through and practice whatever little phrase is helpful and appropriate, to introduce the next slide.

A helpful practice strategy, is to prepare a print out of the slides, where the slides are shown in a single column of miniature images on the left hand side of the page, and there is blank space on the right hand side for the presenter to make hand-written notes. Particularly helpful, is to write the planned 'joining sentences' between each of the slide images. Practicing the presentation using such hard-copy notes reinforces the structure of the presentation, and clarifies in the mind of the presenter how they plan to step from slide to slide.

It is always helpful to arrive early before the presentations begin, and spend time checking all of the slides using the audiovisual equipment available. Sometimes, minor formatting changes are required between computer platforms, and it is good to have these corrected before the actual presentation, rather than being surprised and distracted by formatting problems in the actual talk.

### ***Show the Audience Respect***

As mentioned above, much of what is written here would seem self evident. However, I am forever astonished how often presenters, perhaps unwittingly, show contempt for the audience to whom they present.

At all times, the audience must be treated as intelligent, but perhaps not especially familiar with the background or details of the presenter's work.

It is sometimes a good idea to thank the organizers for the opportunity to present.

Things that can be interpreted as disrespectful by an audience are:

- Arriving after others have presented, but in time for your own talk. This indicates contempt for other speakers.
- Leaving before others have completed their presentations. This similarly shows contempt for the work of others. If it really is necessary to leave before other speakers have presented, it is important to take the opportunity to apologise for having to leave early, at some stage during one's own talk.
- While personal appearance shouldn't be important, the fact remains that in human affairs, it is. If the speaker wishes the audience to pay attention to what they are saying, as opposed to how they are dressed, it makes most sense to simply conform to whatever the social norm for the forum in question happens to be. Personal appearance is of course, an entirely personal matter. But there is something off putting about a presenter who turns up in board-shorts and sandals at a forum where others have troubled to wear a jacket.
- Remaining seated whilst presenting not only projects a sense that the audience is not worth standing for, but also reduces the extent to which the audience focuses on the speaker.
- Not addressing the audience directly, but speaking only to the chairperson or perhaps to one or two 'important people' in the audience, quite simply ignores most of the people being addressed, and results in a poor reception.
- Speaking longer than the time allotted for the presentation, firstly reduces question time, which is the only opportunity for the audience to participate, and also cuts into



the presentation time of those who follow. While running slightly over is common and understandable, it is considered very rude to speak well beyond the time available.

- Excessive use of jargon and or abbreviations, excludes that part of the audience unfamiliar with the specific area of research. Briefly mentioning an acronym or explaining an abbreviation early in the talk, is rarely enough to ensure that everyone listening knows the new term. The effect is that many people simply can't keep track of what is being said, and become turned off from the speaker and their presentation.
- Not explaining unusual methods or graphical displays can leave the audience mystified and feeling a little foolish. It is far better to spend a few moments clearly explaining how methods work, and what the figures show.
- It is appropriate to thank the audience for their attention at the conclusion of the actual presentation, because this is not only polite, but also gives a clear signal that question time has begun.
- Smirking, laughing or disregarding questions raised by the audience is clearly unacceptable, but is occasionally seen.
- If a question seems foolish, it should nonetheless be answered with clarity and without any suggestion that the person asking the question has in any way been silly.

### **Enthusiasm**

Enthusiasm is not only highly engaging, it is also high infectious, so that speakers seen to be enthusiastic about their work, find themselves facing audiences similarly enthused and engaged with whatever the speaker is talking about.

It is to be hoped that the speaker has a genuine interest and excitement for the content they present. In light of the difficulty most people have acting, speakers can only rarely manufacture an artificial but convincing appearance of enthusiasm for their work. Students are encouraged to find projects for which they have a real interest, or if they at first don't have one, to invest effort enough to find fascination with whatever project is to hand.

### **Body Language and Movement During the Presentation**

Much of oral communication is not oral at all, but is instead non-verbal. Posture, hand movements, the way the stage is used, all communicate with the audience in ways either helpful, or unhelpful, for the speaker to convey their message. Below is a list of some aspects of body language I have found helpful.

- Do not hide behind the lectern. Exposing yourself to the audience is more engaging
- Use of a lapel microphone in preference to a hand held microphone or lectern microphone. Lapel microphones permit free movement. Also, the closed posture forced by a hand-held microphone, and stooped posture forced by a lectern microphone, can make the speaker uncomfortable.
- Walking about the available stage space is visually more interesting and provides more opportunity for expressive movement.
- Do not cross arms, but use open hand movements, palms forward and outwards
- Look at the audience. It is possible to sweep eyes across the audience, stopping to rest on occasional faces or parts of the audience, in such a way that most people will feel the speaker has at some stage of the presentation, addressed them personally.
- Although it is necessary to look at the screen, this should be reduced to glances while the eyes engage the audience as much as possible.
- Only look at the screen for longer periods when it is necessary to use a stick or laser pointer to draw the audience's attention to specific features of interest. Explain carefully what the audience is looking at, and why it is important.
- When pointing to features on the screen, do not turn your back to the audience. Instead, turn the shoulder to the screen, with the feet pointing at right angles to the



screen. Frequently turn your head to the audience while leaving the pointer or stick on the screen.

- Avoid staring at the computer screen behind the lectern, because it is not where the audience is looking. Look at the audience, the projection screen, and only at the computer screen when needed.

## Slide Preparation

### *Planning Slides for the Time Available*

Plan to show no more than one slide per minute, and preferably fewer. On this basis, a five minute talk should have no more than five slides with content. The only exception to this general rule of thumb is if it is planned to quickly flash an image before the audience, to make a very brief point.

In addition, most slide presentations have one 'title slide', showing the title of the presentation, with the authors names and affiliations. There may also be a final slide listing contributors and collaborators. The first slide requires no time to describe, because the Chairperson has the role of introducing the presenter and there is no need for the presenter to read the title and name out again. If there is time at the end of the presentation, it is often nice for the presenter to speak to the final slide, listing individual contributions by colleagues to the work, but if there is no time, this can be reduced to '*It remains for me to recognize the contributions of my colleagues*'.

### *Structure of a Slide Presentation*

#### Title Slide

As mentioned above, a title slide with the name of the project, and names and affiliations of authors should be prepared. This should, however, be simply shown as the talk begins, and the presenter should not waste any time actually talking about it. Instead, the speaker should move straight to the first Introductory slide and start to explain the project

#### Introduction

An introduction is required, for the same reasons it is required in a written report. This should provide a very brief outline of, what is known, and what is unknown. There is little point, however, saying very much about what the current study has found, because that will soon be addressed in following slides.

What is important, is for the audience to understand what the scientific question addressed by the work is.

Some students and supervisors like to list the aims of the study. This does, however, take time away from presentation of actual data, which when presented, clearly demonstrate what the aims of the study were. For this reason, I feel it is more helpful to move immediately to the Results.

#### Results and Methods

Unlike written reports, it is not expected that anybody will use an oral presentation as the basis for trying to reproduce data. As such, there is no need to specify the origin of materials used, unless it has unusual bearing on the work.

Also, it is often, but not always, convenient to incorporate the methods together with the results, so that the method used to obtain a given result is described, as the result graph, table or image is shown.



Further, it is helpful to interpret the data as it is shown in an oral presentation, unlike in a written report, where interpretation is reserved for the Discussion.

### Summary of Observations and Conclusions

An oral presentation does not afford the audience opportunity to go back, look at results again, and reflect on their significance. Because of this, it is helpful to have a single slide that lists the observations.

The final conclusions are based on the observations made, and it is often helpful to stress this by saying something to the effect of *'Based on these observations, we make the following conclusions'*.

Final conclusions can then be made for the work, often on the same slide. This conclusion is the real point of the study, and it is worth pausing and stressing precisely what the significance and conclusion of the work was.

### Final Slide Listing Contributors and Collaborators

Also as mentioned above, the final slide lists the people who have contributed to the work discussed. Depending on the time available, the speaker has opportunity to detail individual contributions, but can also just thank and acknowledge his or her colleagues for their contribution, and thank the audience for their attention.

## **The Appearance of Slides**

### Colours

Many people find bright white lights uncomfortable to look at, and this is why it is usually kinder to the audience for slides to have a background colour that is either dark blue, or a deep aqua shade. Writing should stand out clearly against the background, while white, yellow and black text stand out well, depending on the background colour. Red and green tend not to read well on projection slides.

### Font

The sans serif Arial font in Bold is usually very clear, and there is some evidence to suggest that sans serif fonts are most easily understood on signage.

### Sentences, Paragraphs and Bullet Points

Paragraphs are indigestible, take up a lot of slide space, and compel the speaker and audience to trudge through the text in a way that is stiff and time wasting.

Complete sentences can also often be too long for convenient slide presentation.

Instead, very brief point form statements are most appropriate. These should be limited in number per slide, because the slide becomes too visually busy and confusing to look at.

Note, that the speaker can use the points shown on the slide to remind themselves of what they wanted to say, but because the points are not written in complete sentences, the speaker is free to engage the audience directly as they explain in their own words, what the point means.

Bullet point formatting, with a stepping hierarchy is often helpful.





### Images

Care must be taken inserting graphs and photographs into slides, in such a way that they do not become too busy, and the significance of the image shown is retained. A heading or small text box stating the significance of the image shown is helpful for both the speaker and audience.

Movies can be inserted similar to images, but care must be taken to ensure they open and run properly across different presentation platforms.

Please note that it is always sensible to arrive early before presenting, to check that the slides, images and movies open properly on the computer and projector used for the talk.

### Backgrounds, Animations and Complex Font Effects

Powerpoint permits a range of complex backgrounds to be used, as well as numerous interesting looking animation and font effects. My strong advice is to avoid these as much as possible.

The attention of the audience should be focused on what the speaker is saying, and what they particularly wish to show in their data. Anything in the background which is not data or relevant text, has no place in the talk, and can only distract from the core function of the presentation.

Similarly, animated images, fonts or other effects only distract, and add nothing to the talk.

While there is sometimes institutional pressure to insert an institutional logo on each slide, this can waste slide space and make slides more busy and difficult for the audience to follow. It is desirable to minimise such branding to occupy as little slide space as reasonably possible whilst also hopefully satisfying corporate institutional requirements. In general, only put onto the slide what is useful for the audience to see.

The more extraneous visual noise a slide presentation has, the more likely the audience is to wonder why the speaker is seeking to distract their attention from their data, and the less likely the audience is to trust the speaker.

The best policy, is to keep things as simple as possible, and to allow the content of the presentation to impress, as opposed to any glitzy ornament.

### Slide Composition

Slides should on the one hand be as self-explanatory as possible, but on the other not overcrowded or visually busy.

The entire slide area should be used. A common error is to have very small font text occupy only a small part of the slide, whilst leaving much of the slide area unused. Such slides are difficult for the audience to read, and create a visual impression that the talk was carelessly prepared.

It is often helpful to have a title for each slide, unless the purpose of the slide is self-evident.





## Question Time

Novice presenters sometimes find it a shock to have to answer questions, after having just expended enormous emotional energy just delivering their slide presentation. The questions are, however, the whole point and reward of the exercise.

Question time affords rare opportunity for the researcher to not only have a sizable audience devote time to thinking about the researcher's work, but also to get helpful feedback and criticism from that audience.

As briefly mentioned above, it is important for questions to be answered in a respectful way.

Frequently, questions are asked that raise difficulties with the methodology, possibly different interpretations of the data, or even suggest quite different experiments to those performed. Occasionally, questions are asked that are completely confusing for the speaker.

In all instances, the question should be answered in an open, honest and forthright manner.

If a difficulty with the data or interpretation is suggested in a question, it should be taken seriously, and not brushed off. It is always preferable to be able to explain how the concern expressed in the question is not justified or mistaken, but at times, the question will be quite reasonable and identify a real problem. In such instances, the proper response should be something similar to: *'That is an interesting suggestion that we have not as yet considered, and something that we will now have to think about. Thank you for your question.'*

It is only through helpful feedback from colleagues, that we can overcome our own blind spots, and it is generally better to get that feedback at an oral presentation, than in the reviewer's comments for a paper submitted for publication but rejected, or from an examiner disappointed with a student's thesis.

## Example Slides for an Actual 25 Minute Presentation

A series of slides that I recently prepared for an actual 25 minute presentation is shown below.

I have printed the slides out in the way I do when I am practicing to give the talk, so that I can make notes of any little phrases or sentences I wish to use to help join slides together as I move from slide to slide.

Also, please note that this presentation contained several movies, so that the relevant slides took more than one minute to show, and this is why this 25 minute talk only has only 20 slides.

Also please note that the 'Title Slide' and final 'Colleagues and Collaborators' Slides do not counted towards the 'one slide per minute' rule, and that the last slide can be very quickly introduced and covered by saying *'It remains for me to recognize my colleagues who contributed to this work, and I thank you for your attention'*.

I do hope that you find these note together with the separate notes on scientific writing, helpful.

Prof Hans Zoellner

2024

**Cell-Projection Pumping:**  
*A novel mechanism for cytoplasmic transfer between mammalian cells that changes phenotype*

**'Phenotypic Merging'**

Hans Zoellner

- Strongarch Academic Services
- Biomedical Engineering, The University of Sydney
- Graduate School of Biomedical Engineering, NSW University

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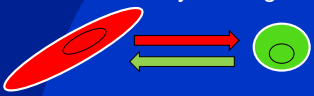
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Traditionally – Think of Mammalian Cells:  
 Discrete – Independent  
 Communicate with Each Other  
 Chemical / Physical Signals



BUT  
 More Recently – 'Communication'  
 by Transfer of Cytoplasmic Contents  
 .... 'Phenotypic Merging'




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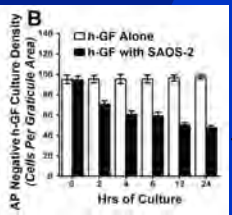
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Minh Huynh 2003 – 2007  
 Earliest observations

Testing if:  
 SAOS-2 Osteosarcoma Cells  
 Kill Fibroblasts by Apoptosis

Did See Expected Reduction  
 in Fibroblast Culture Density

BUT – No Cell Death

David et al. 2012, J Pathol 228:495-505

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SAOS-2 h-GF

Transfer of Alkaline Phosphatase From SAOS-2 to h-GF

SAOS-2 h-GF

**A**

h-GF Alone

h-GF + SAOS-2

David et al. 2012, J Pathol 228:495-505

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**Manu David 2008 – 2011**

- Further Developed Methodology
- Extended Study to Wider Range of Cells
- Showed Changed Morphology

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**Mechanism?? Others Had Reported:**

- Tunneling Nanotubes
- Shed Membrane Vesicles – Exosomes

**But These Seemed Inconsistent With:**

- Gross Transfer
- Highly Localized Transfer

Fibroblast – Green DiO PEO1 – Red DiD

David et al. 2012, J Pathol 228:495-505

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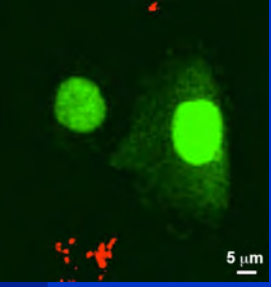
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2013 July – 2015 Jan  
**MAS Moore – MSKCC in NYC**

- Related but different observations
- Interested in collaborative exploration of exchange

**Fibroblast organelle injected into a malignant cell**

Zoellner et al. 2020  
 Biophys J, 118:1248-60

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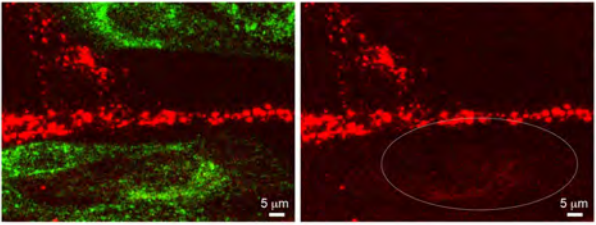
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**Fibroblast Organelles Injected Into a Malignant Cell**



Zoellner et al. 2020 Biophys J, 118:1248-60

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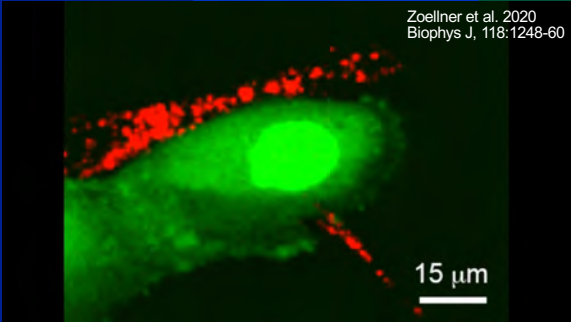
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**Why Most Transfers from Fibroblasts to Cancer Cells?**  
 Malignant Cells Are Less Stiff Compared with Fibroblasts



Zoellner et al. 2020  
 Biophys J, 118:1248-60

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**Cell Projection Retraction:**  
 Transient Increase in Cytoplasmic Hydrodynamic Pressure

Malignant Cell Deeply Probed By Fibroblast Cell Processes      Fibroblast Cytoplasm Injected During Fibroblast Cell Processes Retraction

**ai**      **aii**

*We Proposed "Cell-Projection Pumping"*  
 Where Transient Intercellular Cytoplasmic Connections Coincide with Cell-Projection Retraction to Drive Cytoplasmic Exchange

Zoellner et al. 2020 Biophys J, 118:1248-60

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**Glynn Rogers – Mathematical Model**  
 Hagen-Poiseuille Relationships

**di**      **di**      **di**      **e**

$$Q_B = \frac{Z \cdot (S_A - S_B)}{\rho \cdot (L_0 - U \cdot t)} + \frac{Ca \cdot U}{2}$$

$\rho$  = Resistance per unit length       $Q_B$  = Flow rate B  
 $L_0$  = Length at time zero       $Z$  = Cell stiffness correction constant  
 $U$  = Rate of contraction       $S_{AB}$  = Median cell stiffness by AFM  
 $t$  = Time  
 $Ca$  = Cross-sectional area      Integration of these curves = Total flow volume

Zoellner et al. 2020 Biophys J, 118:1248-60

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**Predictions from Mathematical Model**

- Overall exchange is preferential from more-stiff to less-stiff cell populations
- Within each population, there should be a negative correlation between cell-stiffness and CPP uptake

**Could Test This by Experiment**

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### Both Predictions Satisfied by Experiment

- 1) Preferential Transfer from Fibroblasts (high stiffness) to Tumour Cells (low stiffness)
- 2) Tumour Cells With High Fibroblast Labelling Had Lower Stiffness

*Co-Culture of Fibroblasts with SAOS-2 Osteosarcoma Cells*  
*Fluorescence Profile Atomic Force Microscopy Stiffness Fingerprint*

Median Stiffness (kPa):  
 Fibroblasts: 19.00 - 52.20  
 15.00 - 18.99  
 13.00 - 14.99  
 11.00 - 12.99  
 8.00 - 10.99  
 4.70 - 7.99  
 Tumour Cells: 4.70 - 11.00

Zoellner et al. 2020 Biophys J, 118:1248-60

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### Computer Simulation to Further Test Idea

Experimental distributions in Co-Cultured Cells for:  
 Red & Green Fluorescence  
 Cell Stiffness by AFM

Used to Simulate in a Computer Model  
 5000 Fibroblasts Co-Cultured with 5000 SAOS-2

Reasonable Assumptions for Distributions for All  
 Variables in the Mathematical Model

Compared Simulation Outcomes with Experimental  
 Results

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### Experimental Vs Simulation Fluorescence Data

- Agreement between experimental and simulated fluorescence profiles
- Predicted inverse relationship seen (Recipient Stiffness Vs Fluorescence received)

Zoellner et al. 2020 Biophys J, 118:1248-60

Simulation Conditions for Fibroblasts to SAOS-2; & (SAOS-2 to Fibroblasts)

- Cell A per Cell B: 1 to 3; (1 to 3)
- Exchanges per pairing: 0 to 2; (3 to 8)
- Rate of Retraction: 0.5 to 1.4  $\mu\text{m/s}$ ; (1 to 5  $\mu\text{m/s}$ )
- Proportion of Possible Time (L/U) : 0 to 0.9; (0.6 to 0.9)
- Length: 5 to 120  $\mu\text{m}$ ; (40 to 90  $\mu\text{m}$ )
- Radius: 0.55 to 1.75  $\mu\text{m}$ ; (0.7 to 2.5  $\mu\text{m}$ )
- Viscosity: 1 to 3.5 mPa.s; (1.5 to 4.0 mPa.s)

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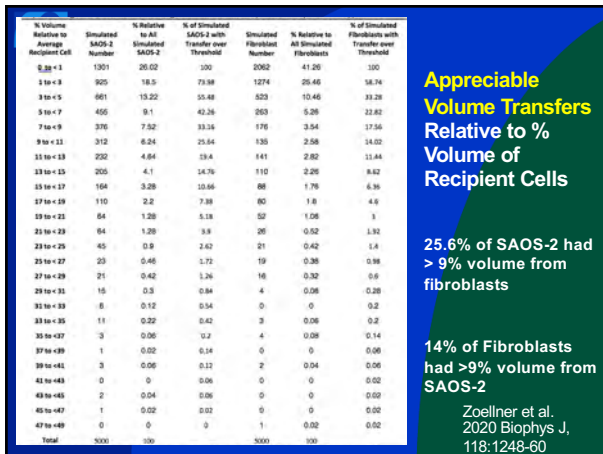
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**Uptake of Fibroblast Cytoplasm by SAOS-2:**


- Increases Cancer Cell Division  
*Cancer Growth*
- Increases Cancer Cell Migration  
*Cancer Spread*
- Increases Cancer Cell Morphological Diversity  
*Cancer Diagnosis*
- Increases Resistance to Chemotherapy  
*Worse Outcomes*

Zoellner et al. 2019 PLoS ONE 14(11): e0224800

Mahadevan et al. 2021 Biomolecules 11:1875



Swarna Mahadevan  
2017 – 2021



James Cornwell  
2017 - 2010

- FACS Separated Cells
- Single Cell Tracking
- Cartesian Plot Analysis

17

**Summary**

- **Cell-Projection Pumping**
  - Novel Mechanism for Appreciable Cytoplasmic Transfer
- **Evidenced By:**
  - Microscopy; Mathematical Modelling; Computer Simulation
- **Phenotypic Changes in Cancer Relevant to Cancer**
  - Growth; Spread; Diagnosis; Treatment

**Potential New Therapeutic Target**

18





### Current & Future Work

- Clarify Structures and Mechanism for Exchange
- Explore Basis for Phenotypic Effects
- Explore Role of Exchange in
  - Cancer
  - Stem Cell Differentiation
- Explore Therapeutic Potential
- In-Vivo

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19



### Colleagues:

**CMPRU, University of Sydney**  
E Kelly, M David, M Huynh, E Erguven,  
KCL Kwong, M Lu, B Sarrafpour, J  
Cornwell, S Mahadewan, R Zafar, B  
Chamri, G Rogers

**Vet. Science, University of Sydney**  
G Lynch

**Millennium Institute, Sydney**  
H Rizos

**MSKCC, New York**  
M Moore, K Hsu, J Boudreau, N  
Paknejad, Y Romin, K Manova, M Goll,  
S Ambati, E Caldas, N Lecomte, A  
Saxena, HJ Shieh, B Pera, F Corea, L  
Shen, E Peguero



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