

Defining your message

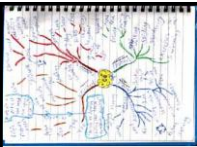
Writing the Introduction & Discussion

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Planning publications

- Before you start to write, establish:
 - Key message(s)
 - Target audience
 - Target journal
 - Authors
 - Ideal timelines / deadlines
 - Review process (boss / sponsor)



- What do I want to say?
- Who am I writing for?
- What do I want readers to do?



How would you describe your findings:

- to a friend in a bar?
- as a newspaper headline?
- in a Tweet (140 characters)?
- *"in 30 seconds, standing on one leg"*



*"Words are, of course,
the most powerful drug
used by mankind"*

Rudyard Kipling (1865-1936)



Be specific

- The efficacy of wunderdrug on osteoarthritis (*no verb – not a message*)
- Effects of wunderdrug on pain in OA (*states outcome but no verb*)
- Wunderdrug reduces OA pain significantly more than placebo (*message!*)



Know your audience (1)

Who are you writing for?

- All physicists / chemists / doctors
- Broad group (beyond your own field)
- Specialist group (within your own field)
- Theoretical scientists / applied scientists
- Other researchers / practitioners / policy makers



Know your audience (2)

Who are you writing for?

- Global audience
- Regional audience
- Local audience
- *How 'big' is your message?*



Keep your readers in mind

- What will interest them?
- What do they know already?
- What do you need to explain?

Remember, your first readers are:

- the journal editor
- the peer reviewer(s)



Writing the Introduction & Discussion

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Function

- The **Introduction** should answer the question: 'WHY did you do this study?'
- The **Discussion** should answer the question: 'WHAT do the results mean?'

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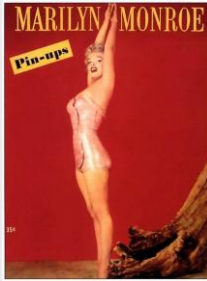
Your paper should be like an hour-glass



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or like Marilyn Monroe!



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Wide at the top and bottom, narrow in the middle!

Introduction

general

State the problem
Put into context
Define disease area
Why did you do this study?
Our hypothesis was ...

focused

Methods &
Results

Discussion

focused

Our study suggests ...
State limitations
Others have shown
What does it mean?
What should you do?

general

Conclusion

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The introduction

- State aims / objectives
- 'Why did you do what you did?'
- Why might the reader be interested?
- 'Who cares?'
- 'So what?' test
- Avoid teaching / clichés

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Don't take readers back to the school room!

- The history lesson
 - *Poxithingamazole was first synthesized in 1958*
- The chemistry lesson
 - *Poxithingamazole is a substituted dibenzene ribonucleic muton of the class gobbledegook ...*

Who cares?



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Remember your audience

- Give enough information to put your question in context
- and explain why it is important
- Do NOT tell readers what they already know

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Say something interesting

- Alzheimer's disease is a serious, degenerative condition
- An estimated 4.5 million Americans have Alzheimer's disease
- The number of Americans with Alzheimer's has more than doubled since 1980

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First sentences: who are these written for?

- "Type 2 diabetes mellitus (T2DM) is a common disease reflecting metabolic disorders characterized with hyperglycemia, which may lead to specific long-term complications affecting heart, brain, eyes, kidneys and nervous system" (13:44)
- "Diabetes, a disorder of metabolism results in substantial morbidity and mortality" (13:40)
- "Diabetes mellitus (DM) is a complex disease with many metabolic disorders characterized by hyperglycemia and defects in insulin secretion or insulin action." (13:32)
- "Diabetes is a systemic disorder resulting in abnormally high blood glucose levels." (9:13)



Intro: suggested structure

- Interesting opening sentence
- Statement of the problem
(why this study needed to be done)
- State your hypothesis



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If you can't be funny, be interesting

Harold Ross (founder, *New Yorker*)
(1892-1951)



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Discussion: suggested format

- Summarise results with respect to original question in the introduction
- Acknowledge shortcomings
- Describe other related work
- Explain why opposing evidence may be discounted
- Summarise with conclusions



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The discussion

- Remember your message
- Be honest / realistic
- Don't include anything not in the results
- Face up to shortcomings in study design
- Cite relevant references
- Suggest future work
- Avoid clichés



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Discussion: what do journals say?

- The Discussion section should not merely restate the experimental results and immediate conclusions. It should be constructive, interpretive, analytical, and it should establish the relationship between the results obtained and previously published work.

Archives of Virology



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How long?

Editors often say:

- Introduction is too long
- Discussion is too short!

What should you do?

- Introduction should be short
- Discussion may be longer



©Sidreview

- Introduction is too long
- Discussion is too short!
- Introduction should be short
- Discussion may be longer



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Start with thunder ...
end with lightning

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Mistakes to avoid

- Don't put a literature review in the Introduction (save for the Discussion)
- Don't put any findings in the Discussion that are not in the Results
- Don't repeat all your findings in the Discussion (e.g. state in words only)
- Remember to address study limitations (nothing is perfect!)



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Key sentences

Sertraline or mirtazapine for depression in dementia (HTA-SADD): a randomised, multicentre, double-blind, placebo-controlled trial

Sukh Devnagar, Jennifer Holmes, Michael Dewey, Karen Ransen, Chris Ballard, Robert Ballard, Peter Smithers, Chie Ima, Christopher, Geraldine Adams, Martin Irving, Chris Lawton, James Crichton, Gill Langlands, Khalid Khan, Lisa Haines, Jack, James Murray, Billy Murray, Martin Small, John O'Brien, Michaela Pappa, Alan Thomas, Rebecca Whynes, Kenneth Wilson, Alastair Burns

Lancet 2011;378:403-11



®

Sudea Banerjee, Jennifer Ballus, Michael Dray, Ramesh Kumar, Clive Ballard, Robert Baldwin, Peter Bentham, Chris Fox, Christalinen, Cornelius Kattana, Martin Knapp, Claire Lawton, James Lindsay, Gill Livingston, Niall McCree, Esme Morris-Cook, Joanna Murray, Shirley Nurod, Martin O'Neill, John O'Brien, Michael Poppe, Alan Thomas, Rebecca Walsby, Kenneth Wilson, Alistair Burns

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A research worker assessed participants using National Institute of Mental Health and Communicative Disorders and Statistics Canada (NIMH-CDS) criteria for probable or possible Alzheimer's Disease (AD) based on the criteria for probable or possible Alzheimer's Disease (ascertained by referring physician) and co-existing depression (at weeks' duration) that was assessed as potentially needing antidepressant treatment. A research worker assessed depression severity with the Hamilton Depression Rating Scale (HAM-D) and the Beck Depression Inventory (BDI). Research workers were trained in the assessments, including the CDS, in group sessions at seven meetings throughout the trial and individual training sessions with the trial manager (NMCC). All research workers received feedback the meetings were trained by the trial manager (NMCC) and the trial manager (NMCC) was available whenever necessary. In addition to initial CDS training sessions, meetings featured informal courses with scoring exercises showing good reliability between raters. Participants were ineligible for inclusion if they

same as in clinical settings. Simulations efforts were made to follow up and obtain outcome data for all participants who were randomly allocated to treatment and who defaulted from either the trial drug or service. The results showed that the number of target sample size during the trial. However, the new target size with the same parameters as the previously calculated and we recruited 326 (98%) of a target of 330. Misconducting our study is the largest ever randomised trial of depression in dementia with unequivocal findings showing no effect of mirtazapine or sertraline compared with placebo. Had the pattern of change noted in recruited participants been continued, the extra precision in estimates from another 33 participants (or even achievement of the original 567) would not have generated a statistically significant positive result for either antidepressant.

The practical implications of this study are that should reform the way we think about the treatment of people with dementia who are depressed, and reconsider the routine prescription of antidepressants. We practitioners are encouraged to provide mental health services in local specialist services. On the basis of our data sustained depression in depression (in 13 weeks), the use of antidepressants might be reserved for individuals whose depression has not resolved within 1 month of referral, apart from those in whom drug treatment indicated by risk or extreme severity.

- Giant carbon solubility in Au nanoparticles
- Sutter & Sutter. *Journal of Materials Science* 2011;**46**:7090-7



- **Study question:** “Here, we use in situ high-resolution transmission electron microscopy (TEM) to investigate the interaction of transition metal nanoparticles with carbon at elevated temperatures.”
- **Findings:** In the presence of C from an amorphous C support, 5 nm Au nanoparticles grow to about twice their original volume on annealing from room temperature to 440 °C.
- **Interpretation:** The observed dramatic increase in carbon solubility is important since nanoparticles containing such large amounts of carbon will likely have properties—electronic, optical, catalytic, etc.—that differ significantly from those of their pure metallic counterparts.



The high surface-to-volume ratio of nanoparticles has been predicted to cause a significant increase of the solubility [26–33]. However, lattice relaxation in very small particles

can also reduce the stable interstitial carbon concentration [16]. There is a growing consensus that solid solution as well as the phase behavior of alloys at the nanoscale remain poorly understood [16, 35].

Metal nanoparticles could give rise to pathways of carbon incorporation that have not been explored. A key difference to bulk metal-implanted is the possibility of facile mass transport between the interior and the surface, enabling the transfer of host atoms by diffusion to surface sites [36]. At elevated temperatures, this exchange may allow for the formation of stable metal-metal-carbon nanoparticles that have a reduced density of host metal atoms but still retain the bulk crystal structure of the host. For example, a drastic reduction in the vacancy formation energy and in the activation energy of diffusion, shown consistently in calculations for small particles [36–42], could give rise to a new combination of host atoms and host to large concentrations of vacancies, which in combination with a solute, such as carbon, could form vacancy-interstitial complexes that may be stable at the nanoscale. If such effects indeed occur they may be quite prevalent in transition metal particles used for the synthesis of nanostructured carbon allotropes or as catalytic chemistry. However, direct microscopic observations of the carbon uptake of individual metal nanoparticles during annealing, necessary to establish the existence of such phenomena, have been elusive to date.

Here, we use in situ high-resolution transmission electron microscopy (HRTEM) to investigate the interaction of transition metal nanoparticles with carbon at elevated temperatures. Our experiments show qualitatively improved

at high temperatures [14, 43]—and the high pressures induced by such shells [14, 44]—also as an experimental tool to study the origins of this swelling of the Au particles.

A quantitative analysis relates the volume increase to a competitive effect involving the redistribution of Au atoms to the surface, formation of vacancies, and a consequent uptake of C to concentrations exceeding the bulk solubility by several orders of magnitude. Our results demonstrate that such competitive effects, which can be all but neglected in bulk solids, may cause unexpected phenomena such as very high carbon solubilities in nanoparticles.

HRTEM images characteristic of the Au nanoparticles in the temperature range between room temperature and 500 °C are shown in Fig. 1. The images are representative of an entire ensemble of nanoparticles, i.e., obtained on different groups of particles, and were taken before and after heating without electron beam exposure during heating. Images of the annealing-induced transformation in significantly larger nanoparticles and associated explanations are given in the Supplementary online material, Fig. S1. Spatial scan was taken to produce square

composites with well-separated particles to limit their interaction in well-known phenomena, such as Ostwald ripening [45] or thermally driven sintering or coalescence [46, 47]. Figure 1 shows a representative group of nanoparticles at room temperature. The majority of the particles

had diameters between 4.5 and 6.5 nm; the mean diameter is 5.4 ± 1.4 (1.3) nm. The particle size distribution shifts significantly toward larger sizes on heating to 400 °C (see Fig. 2). The majority of the nanoparticles now have diameters between 6.0 and 8.5 nm; the mean diameter is 7.1 ± 1.2 nm.

To explain if the observed size increase can be due to nanoparticle interactions such as ripening or coalescence, or instead result from the exchange of material between individual, isolated particles and the C support, we have tracked and imaged a large number of complexes using HRTEM observations at a millisecond timescale in the case of Au nanoparticles—a non-diffusing of their volume—on raising their temperature from room temperature to 400–500 °C in the presence of C. We use the assembly of carbon graphene shells on the surface of the nanoparticles



Before discussing possible mechanisms of the large C solubility in nanoscale Au particles, we briefly summarize our main experimental findings.

by the carbon causes a continuous reduction of the particle volume, implying the diffusion of Au atoms from the carbon back into bulk sites. Simultaneously, the number of Au atoms in the bulk increases by the same amount, implying a net zero migration of C atoms from bulk sites to the surface, followed by incorporation into the C shell. From the non-zero correspondence between the influx of the atoms and loss of C atoms in the particle interior, shown in Fig. 6, we can draw a surprising conclusion about the Au particles in this “vacuum” state. Clearly, treating the “rapid” state involves the creation of a large population of accepted Au sites (i.e., vacancies). Applying high pressure decreases these vacancies, and hence the incorporation of these sites by C atoms. In addition, our measurements demonstrate that the rate of these vacancies is on average much slower than the C atoms. Hence, as a transient species of C nanoparticles, the initial volume increase of the particles during annealing, and applied pressure, shows the perspective and surface migration of this “vacuum” C.

Before discussing possible mechanisms of the large C solubility in nanoscale Au particles, we briefly summarize our main experimental findings. In the presence of C from an amorphous C support, 5 nm Au nanoparticles grown in dense form from their original solution on annealing from room temperature to 400 °C, this expansion occurs without

change of the lattice structure, but no corresponding increase in the lattice parameter by about 10%. Unlike expectations of high pressure, the expansion is observed in Au particles of the particle surface. The uptake of C during for volume expansion of the nanoparticles corresponds to the number of atoms created by displacing Au atoms from the interior to the surface. From these experimental findings, we can draw a likely scenario for the incorporation of C in Au nanoparticles. To build the shells, the temperature of C from 0.1 to 0.2 nm² crystalline sites is limited by lattice strain due to the size of the carbon atoms.

In a nanoparticle, such constraints may be lifted to some extent because the proximity of the free surface allows for a more relaxed and isotropic relaxation. Hence, a larger solubility of interstitial C might be expected. Our observation, however, suggests a different mechanism accounting only for high amounts of C. During annealing, the migration of high amounts of Au from the particle interior to the surface, accompanied by the migration of C atoms against the formation of a vacancy-carbon complex, pushing away C atoms with the Au atoms.

The C atoms on either occupy in interstitial sites, or move to the external surface. Both types of migration would be consistent with the lattice expansion observed by electron diffraction. The extremely high concentration of these complexes is used by C on the nanoparticles against a very low formation energy. In fact, the assumption is

approaching the limit 0.01 eV per complex for an uptake driven purely by configurational entropy for the free energy of formation of the vacancy-carbon complex. For the same conditions, the release of Au atoms from the particles is measured by only about 10%, and the lattice contraction is on a larger scale. This suggests a prominent role for the loss of Au atoms from the particles.

The observed kinetic behavior in carbon solubility in nanoparticles is consistent with the high level of carbon solubility in Au particles. The observed kinetic behavior is consistent with the high level of carbon solubility in Au particles. The observed kinetic behavior is consistent with the high level of carbon solubility in Au particles.

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Acupressure using Ondansetron versus Metoclopramide on Reduction of Postoperative Nausea and Vomiting after Strabismus Surgery

Conclusion: Acupressure at the P6 point causes a significant reduction in the incidence and severity of PONV 24 hours after strabismus surgery as well as metoclopramide (0.2 mg/kg) and ondansetron (0.15 mg/kg) intravenous for patients aged 10 or older. (RCT138807152556N1)



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Abstract: design

- Randomised, placebo-controlled
- Gp 1=control
- Gp 2=metoclopramide
- Gp 3=ondansetron
- Gp 4=acupressure

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Abstract:

- Results: The incidence of PONV was not significantly different among acupressure, metoclopramide and ondansetron groups
- Question: was this a non-inferiority trial?
- What about the placebo group?

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Abstract

- Conclusion:
Acupressure causes a significant reduction in the incidence of PONV 24 hours after strabismus surgery as well as metoclopramide and ondansetron
- Language problem: “as well as”

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Main paper

- Primary end point not defined
- 200 patients (50 in each group) ?power
- Discussion: “the incidence of PONV in the acupressure group showed a significant decrease compared with the placebo group in both the recovery room and the ward”

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Table 2. Comparison of incidence of PONV between acupressure and study groups

	Metoclopramide (n=50)	Ondansetron (n=50)	Acupressure (n=50)	Placebo (n=50)	P-value ap	P-value ao	P-value am
Retching *	0 (0%)	0 (0%)	2 (4%)	0 (0%)	0.153	0.153	0.153
Nausea *	3 (6%)	2 (4%)	0 (0%)	4 (8%)	0.041	0.153	0.079
Vomiting *	3 (6%)	0 (0%)	0 (0%)	8 (16%)	0.003	—	0.079
Retching **	5 (10%)	1 (2%)	4 (8%)	10 (20%)	0.084	0.401	0.727
Nausea **	7 (14%)	9 (18%)	6 (12%)	19 (38%)	0.003	0.169	0.766
Vomiting **	5 (10%)	9 (18%)	10 (20%)	23 (46%)	0.006	0.799	0.161

P-value of ap-acupressure to placebo; P-value of ao-acupressure to ondansetron; P-value of am-acupressure to metoclopramide; *During recovery phase; **In the ward

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Discussion

The present study was designed to determine the effects of acupressure as well as metoclopramide and ondansetron on reducing PONV in both the recovery room and ward. The incidence of PONV in the acupressure group has shown a significant decrease when compared with the placebo group in both the recovery room and ward. These findings were in agreement with a number of previous studies. Other

Conclusion

PONV is an unpleasant symptom. It seems that prophylactic antiemetic agents tend not to eliminate PONV, but significantly reduce this postoperative side effect. Using the correct selection process of patients and improving techniques in order to control PONV, would enable physicians to successfully prevent this side effect. Over all, there is not a definite clinical recommendation based on non-pharmacological methods; however, it could be suggested that in order to achieve the useful effect of acupressure against PONV, thus P6 stimulation must be applied prior to the onset of nausea and vomiting.

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Conclusion

- “Overall there is not a definite clinical recommendation based on non-pharmacological methods [to reduce PONV].
- However, it could be suggested that ... P6 stimulation must be applied prior to the onset of nausea and vomiting”

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