Writing a Student Research Proposal

February 28, 2019
Overview of SRG Process

- Proposal
- Defend proposal
- Conduct research
- Write Abstract
- Submit Abstract
Table 4 – Lesion depths of teeth exposed to similar United Kingdom and United States beverages for 24 h.

<table>
<thead>
<tr>
<th>Beverage</th>
<th>United Kingdom (μm)</th>
<th>United States (μm)</th>
<th>p-Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple juice</td>
<td>139 ± 11</td>
<td>105 ± 19</td>
<td>0.010</td>
</tr>
<tr>
<td>Orange juice</td>
<td>102 ± 22</td>
<td>69 ± 14</td>
<td>0.023</td>
</tr>
<tr>
<td>Coke</td>
<td>148 ± 28</td>
<td>179 ± 22</td>
<td>0.090</td>
</tr>
<tr>
<td>Diet Coke</td>
<td>152 ± 21</td>
<td>91 ± 12</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Orange soda</td>
<td>112 ± 20</td>
<td>127 ± 23</td>
<td>0.278</td>
</tr>
<tr>
<td>Diet orange soda</td>
<td>216 ± 42</td>
<td>184 ± 38</td>
<td>0.250</td>
</tr>
<tr>
<td>Pepsi</td>
<td>147 ± 39</td>
<td>140 ± 30</td>
<td>0.763</td>
</tr>
<tr>
<td>Diet Pepsi</td>
<td>211 ± 89</td>
<td>137 ± 33</td>
<td>0.115</td>
</tr>
<tr>
<td>Sprite</td>
<td>143 ± 38</td>
<td>88 ± 30</td>
<td>0.033</td>
</tr>
<tr>
<td>Sprite Zero</td>
<td>225 ± 29</td>
<td>132 ± 20</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Sunny D</td>
<td>189 ± 28</td>
<td>170 ± 16</td>
<td>0.216</td>
</tr>
</tbody>
</table>

* Two sample t-test.

United Kingdom: Tango*; United States: Fanta*.

Fig. 1 – Lesion depths by pH for country of origin.

The results supported a linear regression that shows a significant correlation effect. The results show that there was no relationship between pH and enamel lesion depth for both 120 s exposure to citric acid solution between 2.3 and 6.0.24 Jepsdottir et al. released during a 24 h beverage exposure of initial pH, while enamel weight loss was pH and titratable acidity.14 The study reported that the immediate erosion with pH and not titratable acidity.17 The study found that stannous fluoride and hydroxyapatite were more effective against in vivo erosion associated with acid exposure.20 Rios et al. reported that concentrated HCl solution induced a linear increase of bovine enamel from a cola erosive diet.21

Lesion depths were greater in both orange juices and processed (i.e., Diet Zero) beverages from the UK compared to similar beverages from the USA. Lower titratable acidity in the UK orange juice measured in this lab compared to that for orange juice from Denmark,24 and other studies. The pHs reported for the orange juice are consistent with those of apple (3.28–3.83; n = 11) and orange juice.21 The titratable acidity reported for apple juice was higher than reported for orange juice (4.450 μM),21 comparable titratable acid was not available. Data on pHs and titratable acid in popular brands of US apple and orange juice were available; thus, we do not know if the results of this study are representative of US beverage formulas.43 It is unclear if pH and titratable acidity exist.43

Beverage fluoride concentrations were compared to the concentration of water used in their production.44 The study aimed to estimate the fluoride concentrations of water used in the production of US beverages selected for this study and to compare formulas, and it is unclear if these concentrations were bioavailable or not.44

Lesion depths were associated with pH (p = 0.010) and country of origin (p = 0.002) as shown in Fig. 1. Lesion depths were not associated with either the beverage fluoride concentration or titratable acidity.

**Discussion**

The results supported a linear regression that shows a significant correlation effect. The results show that there was no relationship between pH and enamel lesion depth for both 120 s exposure to citric acid solution between 2.3 and 6.0.24 Jepsdottir et al. released during a 24 h beverage exposure of initial pH, while enamel weight loss was pH and titratable acidity.14 The study reported that the immediate erosion with pH and not titratable acidity.17 The study found that stannous fluoride and hydroxyapatite were more effective against in vivo erosion associated with acid exposure.20 Rios et al. reported that concentrated HCl solution induced a linear increase of bovine enamel from a cola erosive diet.21

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Proposal Timeline

- **Now:** Should be meeting (regularly) with mentor soon, if you haven’t already done so.
- **April 1:** Written proposals due in our office.
- **Early April:** Two reviewers will be assigned to review each proposal.
- **April:** One of the reviewers will meet with the student & mentor.
- **Early May:** Committee ranks proposals and decides funding.
Proposal Requirements

- Limit = Face page + six single spaced pages
- Signed Face Page
- Aims, Objectives & Significance (1/2 page +)
- Background & Rationale (2 pages)
  - Preliminary studies/Progress to date
- Materials & Methods (3 pages)
- Future Directions (a paragraph)
- References
- Budget (if supplies, expenses needed – $250 limit)
Experts in the Ostrus Prosthodontic Lab designing implants, crowns, bridges, complete dentures, and partial dentures.
Guidelines for Student Research Proposals

Deborah Yu tells a student about her research at Iowa AADR Local Research Day

Documents:
- Face Page
- Writing a Student Research Proposal - by Dr. Teresa Marshall

The entire proposal should be no more than 6 pages (single spaced) in length, plus the face page. Be sure to follow these directions and format carefully.
Writing A Proposal

Preliminaries

- Talk to your mentor – have regular meetings
- Develop a project that you will complete
- Pick a project that is worthwhile
  - Review the literature
  - Something that really contributes to science is most likely to be funded
- Pick a project that is feasible (i.e., ~6-8 weeks), but not too “easy” (i.e., that you can complete in one day).
Review of Proposals

- By a committee
- Similar to the process for NIH – proposals receive a score based on merit
- Competitive – We will have many proposals; possibly more proposals than we can fund or fully fund
- Individual reviewers assigned to review a small number (3 or 4) of proposals – others only read a little (if any) of those grants assigned to other reviewers
Review of Proposals

- No one will read all of the proposals carefully (too time-consuming)
- **Limited expertise of reviewers** — they may not be familiar with your line of research
  - That is, **don’t assume** your reviewers know much about your topic
Review of Proposals

- So, the student/mentor must gain the genuine confidence and enthusiasm of the assigned reviewers.
- The student/mentor must be sure that the reviewers also understand the science and the importance of the research AND…..
- Impress committee members not assigned to review their proposal.

Thus, one has to **sell** their idea to the reviewers and **educate** them!
“You have only one chance to make a good first impression”

Thus, it is wise to spend the most time working on the portions of the grant that reviewers read first........

The Aims, Objectives & Significance Section
Specific Aims/Hypotheses

- Begin writing these first, and take time to refine them
- Be very careful with wording
- Should set the stage for the rest of your proposal and gain the attention of the reviewers
- A “blueprint” for your project
Aims, Objectives & Significance Section

- Suggested Elements:
  - Introductory Paragraph – broad (public health) significance of the research
    - Ideally, written so your mom or little brother could understand
    - Why is this research meaningful and important?
  - Long-term research goal (of this line of research)
  - Overall objective/hypothesis of this project
Suggested Elements:

- Rationale for this project (brief)
- Specific Aims/Objectives or Hypotheses to be tested
- Expected outcomes & why they’re important/contribute to science
- Future opportunities – next steps
- [Why you and your mentor are especially qualified to do this research]
Specific Aims/Hypotheses

While the prevalence of dental caries has declined for the majority of U.S. children in recent decades, there are profound disparities in dental caries experience where children from low-income or minority families suffer a disproportionate share of the disease burden. ….

The **rationale** for this study is that …

Thus, the **goals** for the proposed study are to …..the main **objectives** are to……

We plan to accomplish our objectives by addressing the following **specific aims**:

1. To determine the prevalence of cavitated and non-cavitated carious lesions as well as visible plaque in a sample of 1-year-old children enrolled in southeastern Iowa WIC programs.

2. To determine the prevalence of *Streptococcus mutans* (SM) carriage and salivary SM levels in children and their mothers among southeastern Iowa WIC-enrollees.

The results will be **significant** because……
Specific Aims/Hypotheses

- Brief and specific
- Generally, not too many – no more than 2-3 aims (and maybe only 1)
- Carefully worded
- In order, but should not be dependent on preceding aim(s)
- May be helpful to have a working hypothesis for each aim
Specific Aims/Hypotheses

An example:

- **Specific Aim:**
  - To compare micro-tensile bond strength obtained by using two different adhesive systems – A & B

- **Hypothesis:**
  - Our hypothesis is that system A, which relies on displacing water with ethanol, will produce stronger short- and long-term bond strengths than system B.
Background & Rationale

- Literature Review (Background)
  - Not meant to be exhaustive – just enough so you can demonstrate that you know what you’re talking about and enough to support your research
  - Meant to provide background for your research
  - Be sure references are up-to-date

- Rationale
  - How does your research fill a gap in or contribute to the literature?
  - Why is it important?
Methods

- Describe what will be done – how data will be acquired and what materials to be used
- How many subjects/samples to be included & why this number was chosen
- Describe any measurements to be made:
  - Instruments used
  - Who is doing the measuring
  - Training (if student to do measurements)
- Very Important – Make sure student’s role is clearly described
Methods

- Helpful to have summary description of overall protocol – A list of steps, a flow chart or diagram may also be helpful
- Should have a timeline
- Include data management and analyses plan
  - Statistical tests
  - Power calculations (i.e., justification for sample size)
  - Ideally, work with statistician in advance
    - Drs. Jin Xie & Fang Qian
- Again, be sure to make clear what your (the student’s) specific role will be in the project
Future Directions

- Describe what this research will lead to for you in future years, or how it will help your mentor develop further research – what’s the next step?
- What related projects/area of research could possibly stem from the proposed project?
- This section can be very brief – a couple of sentences
Bibliography & Budget

- No more than about ½ page each
- Bibliography should reflect relatively brief background section – use a standard reference format as found in a scientific journal
- Budget limited to $250 for supplies, expenses, such as chemicals, reagents, specimens, expendable lab supplies. Also can include things such as copy costs, postage necessary for project. Poster costs OK, too.
- Itemize and justify expenses
Other Issues

- Be kind to your reviewers – use reasonable type size and margins; shouldn’t have to squeeze everything in to meet page limits
  - Formal English, not texting lingo
  - Read out loud for logic
  - Don’t rely on spell check

- Appendices are allowable, but not to circumvent page limits
  - Survey
Other Issues

- After submission, you will need to arrange a meeting or meetings with one of your reviewers, you and your mentor
  - We’ll send out available times that reviewers have set aside for meetings
  - Check email – respond promptly!

ASAP
Other Issues

- Human Subjects & Institutional Review Board (IRB-1) approval:
  - If research involves human subjects or identifiable human tissue, you need training:
    - CITI course on IRB website:
      - [CITI course on IRB website](http://research.uiowa.edu/hso/index.php?get=edu)
  - Need to complete IRB application and have it approved prior to conducting human research
  - Thus, it may be prudent to do training and submit IRB application concurrently with developing proposal
http://www.dentistry.uiowa.edu/student-research-proposals
Questions??