How to Write a Research Proposal

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MSSRP Program goals

Introduce/enhance medical students’ understanding of:
• basic science and/or clinical research principles
• ethical conduct
• critical evaluation of data (evidence-based medicine)

Develop faculty-student relationships
Application Instructions

• DEADLINE

• FORMAT

• DOCUMENTS: COMPLIANCE, CV,....

• APPLICANT (eligibility)

• RESEARCH PROPOSAL

• ENVIRONMENT/PRECEPTOR (eligibility)

• SCORED REVIEW CRITERIA
Scored Review Criteria : MSSRP

• Proposal is **concise** and **well-written**
• Goals and hypothesis are **clearly defined**
• **Methods** of data acquisition and analysis are satisfactory
• Project is **relevant** and **creatively** designed
• Project is **feasible** within 7 weeks
• Preceptor has positive track **record** working w/ students
• Appropriate **approvals** have been granted

All application components must be submitted including forms required of preceptor
Applicant (Eligibility)

- Be in good academic standing + eligible promotion 2nd yr.

- Not enrolled in coursework during MSSRP

- Attend the mandatory MSSRP sessions:
  - IRB/Human Data/IACUC/Safety Seminar
    February 6, 2019
    February 12, 2019
  - Orientation for All MSSRP Scholars
    May 20, 2019
    June 10, 2019
  - MSSRP Presentations (by MSSRP Scholars)
    June 24, 25, and 26, 2019

See web site for full eligibility criteria
MSSRP research proposal

1. Title of Project
2. Background
3. State the Hypothesis
4. State the Specific aim(s)
5. Methods, data collection and statistical analysis
6. Anticipated outcomes of your experiments
MSSRP research proposal: Background

- Problem and its scientific and/or clinical relevance/importance
- Current knowledge
- **Gap**
- Aspect of this problem will you solve (objective)
- Rationale for studying this aspect of the problem

Do not assume that the reader is an expert in the field (jargon, abbreviations,..)
MSSRP research proposal: Background

- **Melanoma** is the rarest of the skin cancers, it is the most **lethal**, leading to 10,000 **deaths** annually.
- Most common **driver mutations** for malignant melanoma: **BRAF** and **NRAS** + Ras signaling pathway
- A driver mutation **BRAF- V600E** led to the development of a small molecule inhibitor, **Vemurafenib**, as a **treatment** option
- However, treatment can also lead to **aggressive relapse** with limited prognosis
- **Recent** efforts have targeted **epigenetic modifiers as potential treatment options**, including **P300**, a histone acetyl transferase.....
- **Preliminary data** indicate that **P300 knockdown** is specifically correlated with reduced expression of microphthalmia-associated transcription factor (**MITF**), which is specific for melanocyte lineage and **melanoma progression** (Yajima et al., 2011)
- **Objective**: P300 regulates melanoma cell growth and survival via transcriptional regulation of MITF
MSSRP research proposal: hypothesis

Prediction based on a rationale

Logical (based on solid rationale)
Clear / Simple
Unambiguous
Testable (I can check my prediction)
Focused

We hypothesize that silencing P300 will inhibit the proliferation of melanomas expressing high MITF
Hypothesis/Project Goal

• Have one
  – Descriptive data alone is not good science
• State it clearly, succinctly
• Re-address in methods
• Be realistic!
  – Less is almost always better
  – Avoid overly ambitious projects
MSSRP research proposal: Specific Aim(s)

Research steps to test your hypothesis:

- Aim(s) should logically follow the hypothesis

- Aim should have a brief description of the experimental design (2-3 sentences)
MSSRP research proposal: Specific Aim(s)

We hypothesize that silencing P300 will inhibit the proliferation of melanomas expressing high MITF.

**Determine** the functional consequence of P300 silencing. For this, we will generate P300-depleted melanoma cell lines with high or low MITF expression via sequence-specific shRNAs, and we will assess proliferation via cell cycle profiling.
MSSRP research proposal: Specific Aim(s)

- **TEST** the hypothesis

- **Active**: “Determine, Assess, Define, Ascertain” not “Examine, describe, measure”

- Succinct summary of approach/strategy

- Clear and focused
MSSRP research proposal: Methods

- Strategy, methodology, and analyses used to accomplish the specific aim(s) of the project

- Data collection, analysis, and interpretation

- # samples/ cell lines/ animals/ patients / sections,...; statistical analysis and power analysis
The Cape Cod Health Study is a closed trans-generational retrospective cohort study of mothers who resided in the Cape Cod area of Massachusetts from 1969 – 1983 in one of eight towns. Women were enrolled in 2002-2003 and completed a self-administered questionnaire. A total of 831 female children completed the study questionnaire.

The survey administered to the mothers collected information on reproductive and developmental disorders, confounding variables, and the family’s residential history. In particular, data were collected on demographic characteristics, menstrual abnormalities in the mothers; delayed time to conception, all pregnancy outcomes among the parents; indicators of learning and attention problems among children; data on smoking, alcohol, and caffeine consumption, use of recreational drugs and medications, and medical conditions during the mother’s pregnancies; breast feeding practices among mothers; environmental and occupational exposures among parents; and a residential history since 1969 .........................(..........).

**Statistical Analysis:** Prevalence estimates for PCOS with MBS will be generated. Additionally, risk ratios and 95% confidence intervals (CI) for PCOS with MBS comparing with women with PCOS-MBS to women with PCOS only will be calculated using multivariable regression models. Stratified analyses of generalized estimating equations will be used to calculate risk ratios and 95%CI’s to evaluate associations of PCOS with MBS by behavioral factors in the CCHS. As mentioned above, this is an exploratory aim to understand whether associations by behavioral factors may impact PCOS-MBS prevalence.

*Polycystic ovary syndrome ; metabolic syndrome*
MSSRP research proposal: Anticipated outcomes

- Derived from your hypothesis and rationale

Therefore, P300 silencing, by reducing MITF expression, is expected to increase the number of cells maintained at the G1 phase
MSSRP research proposal: Timeline

- Derived from your hypothesis and specific aims

**Timeline of Project** *(Briefly outline your responsibilities and tasks that you will perform on a weekly basis.)*

- **Week 1**: Transfections to harvest shP300.1, shP300.2, and shp300.4 lentivirus
- **Week 2**: Transduction of Mel 9 cells with shP300.1, shP300.2, and shp300.4 lentivirus; cell fixation and cell-cycle analysis
- **Week 3**: Transduction of Mel 13 cells with shP300.1, shP300.2, and shp300.4 lentivirus; cell fixation and cell-cycle analysis
- **Week 4**: Transduction of SKMel5 cells with shP300.1, shP300.2, and shp300.4 lentivirus; cell fixation and cell-cycle analysis
- **Week 5**: Transduction of Mel 10 cells with shP300.1, shP300.2, and shp300.4 lentivirus; cell fixation and cell-cycle analysis
- **Week 6**: Transduction of Mel 14 cells with shP300.1, shP300.2, and shp300.4 lentivirus; cell fixation and cell-cycle analysis
- **Week 7**: Transduction of AK375 cells with shP300.1, shP300.2, and shp300.4 lentivirus; cell fixation and cell-cycle analysis
Timeline of Project

Week 1: I will create a metastatic breast cancer data set using specific exclusion criteria.
Week 2: I will organize the data into groups and choose which variables to include in my analysis.
Week 3: I will apply descriptive statistics to analyze patient characteristics.
Week 4: I will conduct a statistical analysis on survival for the different groups.
Week 5: I will continue to analyze survival for the different groups.
Week 6: I will finish up the statistical analysis and start working on the abstract and poster.
Week 7: I will finalize the abstract and poster.

Week 1: Communicate with each Community Health Center to hear their initial perspectives on the seizure screen. Look at the preliminary data and make sure it is being collected and recorded in an effective manner.

Week 2: Determine the types of medical professionals that are administering the screen at each center, and compare the efficacy of each. Continue data collection and administration of Part 2 of the seizure screen when appropriate.

Week 3: Write up a progress report to submit for the MSSRP. Work to identify any disparities in the data collection, keeping in mind the diverse populations of each CHC. Continue data collection and administration of Part 2 of the seizure screen when appropriate.

Week 4: Begin comparison of data for children with developmental delay to preliminary data. Administer surveys to the CHC medical professionals regarding their opinions on the seizure screen. Continue data collection and administration of Part 2 of the seizure screen when appropriate.

Week 5: Continue data collection and analysis. Collect survey responses from each CHC, and interpret how medical professionals’ opinions relate to the efficacy of the survey, if at all.

Week 6: Begin writing summary report on the research, and identify any follow-up questions that arise. Continue data collection and administration of Part 2 of the seizure screen when appropriate.

Week 7: Wrap up data analysis and create an abstract/summary report of the research.
Application Selection

Not following directions:
- Missing the deadline
- Not eligible
- Missing documents/parts of application
- Improper formatting
- Forgetting to proofread, sloppiness
- Lack of signatures, approvals

REVIEW CRITERIA (MSSRP):
- Proposal is concise and well-written
- Goals and hypothesis are clearly defined
- Methods and analysis satisfactory
- Project relevant and creatively designed
- Project is feasible within 7 weeks
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- Appropriate approvals granted

Application

ADMINISTRATIVE REVIEW

NOT REVIEWED

SCIENTIFIC REVIEW

NOT FUNDED

Unscored, streamlined Low score

FUNDED
NIH Resources

If you would like to explore/look at PI grants submitted to the NIH, here are some resources:

- Summaries of grants: Research Portfolio Online Reporting Tool (RePORT)
  - Epidemiology: https://epi.grants.cancer.gov/funding/grantmanship/sample-grants.html
  - Allergy/Infectious diseases: https://www.niaid.nih.gov/grants-contracts/sample-applications
- Child Health: https://www.nichd.nih.gov/grants-funding/grants-process/application-samples/Pages/default.aspx
- Integrative health: https://nccih.nih.gov/grants/resources/grantwrite-advice.htm
  - Center ofr scientific review; https://public.csr.nih.gov/ApplicantResources/PlanningWritingSubmitting/Pages/Advice-to-Investigators-Submitting-Clinical-Research-Applications.aspx
Recap!

Deadlines are not suggestions

Follow Instructions

Proofreading is critical

Clarity, clarity, clarity

Be enthusiastic