How to Make a Poster

Summer Undergraduate Research 2016

Shelley Pressley

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Nuts and Bolts of getting it printed

- Create the poster in Power Point (templates available on the website)

  https://summerresearch.wsu.edu/poster-symposium/
- Have your poster reviewed by all co-authors
- Bring your poster on a thumb drive to ETRL 203 by Monday 4:00 pm

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Nuts and Bolts of getting it printed con't

- Open your poster on their computers and CHECK IT!
  - Look at images, do they show up?
  - Are all of your text boxes complete?
  - Any Greek Symbols? Check them
- Make sure you are either listed on an existing purchase request or bring one with you
- Pick up your poster by Monday Aug. 1 and check it

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Poster Symposium – August 2

- Arrive at 8:15 (with poster) at the CUE atrium (2nd floor)
- Pick up nametag, sign-in, hang your poster (we will provide push pins and poster boards)
- Group photos at 8:30
- Welcome remarks and keynote talk at 9:00 in CUE 203
- Poster Symposium open to the public 10:00-1:00
- Food (sandwich fixings and beverages) available to presenters
- Take poster down and help put away poster boards

Celebrate!

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Volunteers needed to help…

- Tear Down After the Event: Tuesday August 2 from 1:00 – 2:00 return poster boards…Ideally 10 students

- Please sign-up on the sheet passed around

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What to expect…

- You will talk and interact with many people including faculty, graduate students, undergraduates, parents, deans, chairs, upper administration, maybe even the president…
- Some people will understand a lot about what you did…others will have no idea what you did. Be prepared for both
- Practice giving your poster to students in your program and students NOT in your program
- Business casual dress is appropriate – so for the guys that means wear a tie if you've got one

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Importance of the Poster

- Final culmination of your summer work
- Provide a brief background (BIG picture), your methods or approach to doing the research, as well as results and conclusions
- Can lay the groundwork for presenting at a national conference or even at your home institution
- Will be posted on the website for future researchers

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Brainstorm….what should be on a poster?

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Contents of a Poster

Title	Your name
Introduction/Abstract	Co-author's names
Methods/Experimental Design/Procedures	Acknowledgements to Funding agency
Results	Affiliation (i.e. WSU)
Conclusions/Discussion	References
Figures/Pictures/Tables/ Graphs with captions	Future Work or next steps

Let's critique some posters….

- There are lots of examples of posters from previous years, available here http://reu.mme.wsu.edu/index.html
- Spend about 10 minutes looking at each poster and list the top three "positives" and top three "negatives" about this poster that you see
- As a group we will then discuss each poster

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Elucidating the Pharmacodynamics and Disposition of Oxyresveratrol

Rebecca M. Bertram[1,2] and Neal M. Davies [3,4,5]

[1]Summer Undergraduate Research Fellowship (SURF) Program, [2]Auvil Undergraduate Scholars Fellowship, [3]Pharmacology and Toxicology Graduate Program and [4]Department of Pharmaceutical Sciences, [5]College of Pharmacy, Washington State University, Pullman, Washington, USA

INTRODUCTION

- Oxyresveratrol is a stilbene found in mulberry, grapes, red wine, and peanuts [1].
- Oxyresveratrol is structurally analogous to resveratrol and comes in two distinct physicochemical forms: an anhydrous base and a dihydrate.[Fig.1]
- It has been suggested that oxyresveratrol and other hydroxystilbenes have anti-oxidant, anti-cancer, and COX inhibitory activity [2].

PURPOSE

- To develop and validate an analytical assay to reliably and accurately quantify oxyresveratrol in biological fluids.
- To evaluate the oral pharmacokinetics of oxyresveratrol anhydrous and oxyresveratrol dihydrate in a rodent model.
- To examine the pharmacological activity and mechanism of action of oxyresveratrol: including its cytotoxicity, histone deacetylase (HDAC), anti-oxidant, and sirutin-1 (SIRT-1) capacity, as well as cyclooxygenase (COX) inhibitory activity.

METHODS

Assay Development

- A method for quantifying oxyresveratrol was developed using high performance liquid chromatography (HPLC).
- Phenomenex C-18(2) column (250 x 4.60 mm) Flow rate: 0.60 mL/min
- Absorbance detection: 320 nm Internal standard: daidzein
- Mobile phase: acetonitrile : water : formic acid (30: 70: 0.04 v/v/v)

Sirtuin-1 activity

- A commercially available kit (Cayman Chemical) was used to measure the ability of oxyresveratrol to activate SIRT1. Activation of SIRT1 has been shown to prolong the lifespan of several species, and resveratrol has previously been identified as a potent SIRT1 activator [3].

Anti-Cancer Activity

- Cancer cell lines used: HCT-116 (Colon cancer), MDA-MB-231 (Estrogen receptor negative breast cancer), and PC-3 (Prostrate cancer).
- Oxyresveratrol (0-250 µg/mL) was incubated with all cancer cell lines.
- Alamar Blue Assay used to measure cell viability.

Pharmacokinetics

- Male Sprague-Dawley rats (N = 3, 250 g) were cannulated and dosed either intravenously with oxyresveratrol in PEG 600 (10 mg/kg) or orally with oxyresveratrol in methyl cellulose (200 mg/kg).
- Urine samples taken at 2, 6, 12, 24, 48, 72, 96, and 120 hours post dose.
- Serum samples taken at 1 min., 0.25, 0.5, 1, 2, 4, 6, 12, 24, 48, 72, 96, and 120 hours post dose.

Antioxidant activity

- Measured ability of oxyresveratrol (0-250 µg/mL) to inhibit oxidation of ABTS to $ABTS^{\cdot+}$ by metmyoglobin.
- Amount of $ABTS^{\cdot+}$ produced measured by spectrophotometry at 750 nm.
- Antioxidant capacity compared to an equivalent amount of Trolox.

Histone Deactylase activity

- Commercially available kit (Cayman Chemical) was used to measure modulation of histone deacetylase activity when incubated with oxyresveratrol at 1, 10, 50, and 100 µg/mL.

Differential Scanning Calorimetry

- A Thermal Analyzer (STA 409PC Luxx®) Differential Scanning Calorimeter-Thermogravimetric Analyzer (NETZSCH, Inc., Selb, Germany) was used to monitor the thermal events as a function of temperature increase. Samples (2-4 mg) in closed aluminum pans were heated from 10 to 300 C at a heating rate of 10 C/min, with an oxygen purge of 100 mL/min.

Melting Point Determination

- Melting points measured using a Thomas Hoover Capillary Melting Point Apparatus®. The heat setting was set at 3.9 and the temperature was ramped at 1.0 °C/ minute.

COX Inhibition

- The COX Inhibitor Screening Assay (Cayman Chemical) was used to measure $PGF_2\alpha$ produced by $SnCl_2$ reduction of COX-derived PGH_2.

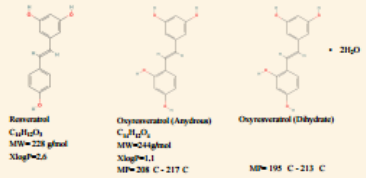
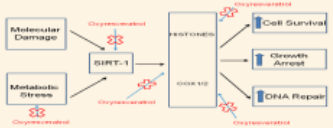


Figure 1: Physicohemical Properties of Oxyresveratrol and Resveratrol



Schematic: Possible Mechanistic Action of Oxyresveratrol

RESULTS

HPLC Analytical Method

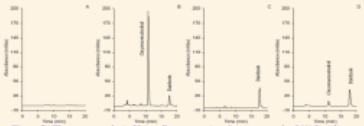


Figure 2. Chromatographs in Urine. Representative chromatograph of (A) baseline rat urine, (B) urine containing oxyresveratrol (100 µg/mL) and diadezin (100 µg/mL), and (C) Rat urine time zero urine sample (D) Rat urine 12 h post oral dose (230 mg/kg).

Differential Scanning Calorimetry

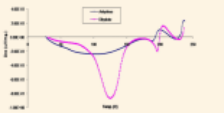


Figure 3: Differential Scanning Calorimetry of Oxyresveratrol forms

SIRT-1 Activity

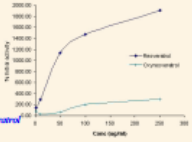


Figure 5: SIRT-1 activation of both resveratrol and oxyresveratrol in terms of % initial activity. Sirtinol is a known SIRT-1 inhibitor.

HDAC Activity

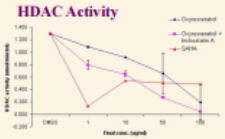


Figure 4: Concentration dependent HDAC activity of oxyresveratrol compared to positive controls.

Antioxidant capacity

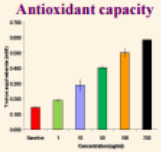


Figure 6: Concentration dependent antioxidant activity of oxyresveratrol in Trolox equivalents.

COX 1 Inhibition

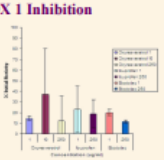


Figure 7: Inhibition of COX 1in terms of % initial activity.

Cell Culture

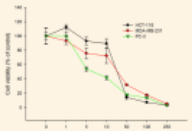


Figure 8: Oxyresveratrol anti-cancer activity in various cancer cell lines

COX 2 Inhibition

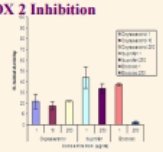


Figure 9: Inhibition of COX 2 in terms of % initial activity.

Pharmacokinetics

Table 1: Pharmacokinetic disposition of Oxyresveratrol in rats (N=3-6) +/- SEM.

Pharmacokinetic Parameter	IV	Anhydrous	Dihydrate
AUC_{inf} (ug.h/mL)	9.44 (+/- 2.44)	26.10 (+/- 4.29)	5.25 (+/- 2.41)
V_d (L/kg)	77.73 (+/- 21.90)	-	-
CL_t (L/h/kg)	1.16 (+/- 0.25)	0.01 (+/- 0.00)	0.13 (+/- 0.07)
CL_r (L/h/kg)	0.033 (+/- 0.01)	2.0×10^{-5} (+/- 0.00)	2.4×10^{-5} (+/- 0.01)
CL_{nr} (L/h/kg)	1.19 (+/- 0.26)	8.17×10^{-3} (+/- 0.28)	0.12 (+/- 0.07)
Extraction ratio	0.67 (+/- 0.14)	-	-
$t_{1/2}$ (h) serum	45.92 (+/- 7.62)	6.36 (+/- 0.66)	23.43 (+/- 12.49)
Fe	2.49 (+/- 0.84)	0.23 (+/- 5.88)	0.058 (+/- 0.04)

IV Administration:

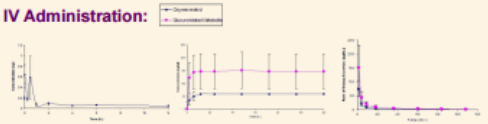


Figure 10: Oxyresveratrol disposition in serum.

Figure 11: Total amount of oxyresveratrol excreted in urine.

Figure 12: Rate of oxyresveratrol excretion in urine.

Oral Administration: Anhydrous

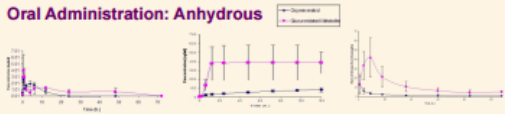


Figure 13: Oxyresveratrol disposition in serum.

Figure 14: Total amount of oxyresveratrol excreted in urine.

Figure 15: Rate of oxyresveratrol excretion in urine.

Oral Administration: Dihydrous

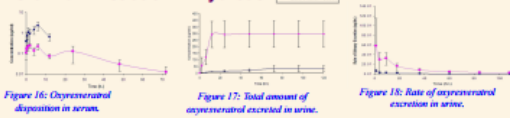


Figure 16: Oxyresveratrol disposition in serum.

Figure 17: Total amount of oxyresveratrol excreted in urine.

Figure 18: Rate of oxyresveratrol excretion in urine.

CONCLUSIONS

- Oxyresveratrol exists in two distinct crystalline forms.
- The HPLC assay is accurate, reproducible, reliable, and sensitive.
- Oxyresveratrol demonstrates dose-dependent anticancer activity.
- Oxyresveratrol is an anti-oxidant that activates SIRT-1 and inhibits HDAC, COX 1, and COX 2.
- Formation of a glucuronidated metabolite indicates Phase II metabolism.
- Pharmacokinetic data indicates that oxyresveratrol has formulation dependent pharmacokinetics and is orally bioavailable, rapidly glucuronidated, and excreted in urine and via non-renal routes.

ACKNOWLEDGEMENTS

- A Summer Undergraduate Research Fellowship (SURF) from WSUCOP to RMB.
- An Auvil Undergraduate Scholars Fellowship to RMB.
- An Unrestricted Grant from Sabinsa to NMD.
- Connie M. Remsberg, Jody K. Takemoto, Karina-Vega-Villa, Dr.Yusuke Obgami, Dr. Vamsi Balla, Dr. Susmita Bose, Dr. Rob Ronald

REFERENCES

- [1] Mouhate et al. (2006) Am J Physiol Regul Integr Comp Physiol. 291: 1215-1221
- [2] Chung et al. (2003) J. Pharmacy and Pharmacology. 55: 1695-1700
- [3] Cao et al. (2008) J Cell Mol Med. Aug. 4 [Epub ahead of print]

This work was supported by the National Science Foundation's REU program.

Nez Perce Tribe Formaldehyde Study 2011

Kayla Warden and Etta Axtell- Northwest Indian College

Coauthor Tom Jobson, Shelly Pressley-Laboratory for Atmospheric Research - Washington State University

Abstract

We measured formaldehyde on the Nez Perce Reservation in the Lapwai Valley during the summer 2011. Formaldehyde (HCHO) and other volatile organic compounds (VOC) were measured using a Proton Transfer Reaction Mass Spectrometer (PTR-MS). A 2006 study in the Lewiston-Clarkston valley revealed high levels of formaldehyde during the summer months throughout the valley, including Nez Perce Tribal lands. Formaldehyde is an air toxic. Elevated summertime formaldehyde in the region is a concern to the local population. The PTR-MS data was analyzed along with meteorological data to determine if elevated formaldehyde is due to the emissions from the paper mill in Lewiston. Formaldehyde mixing ratios were detected as high as 5 parts per billion (ppb), displaying a consistent daily pattern of an afternoon maximum and morning minimum just before sunrise. The time of day behavior suggests a photochemical origin for formaldehyde. Formaldehyde mixing ratios displayed a strong positive correlation with surface air temperature with the highest formaldehyde mixing ratios occurring on the warmest day of the study (6/29/11).

Introduction

The past study quantified formaldehyde and acetaldehyde from 24 hour composite samples using EPA Compendium Method TO-11a. High performance liquid chromatography (HPLC) was used for the analysis of the carbonyl 2, 4-dinitrophenylhydrazone (DNPH) derivative collected on an absorption tube. Formaldehyde concentration was validated with hourly DOAS measurements. The current study will provide a rigorous quantification of carbonyls by using PTR-MS and comparing results we samples measured by TO-11a.

Figure 1: Photograph of the PTR-MS and water trap inside the air quality lab at the Herman J. Reuben building in Lapwai.

Figure 2. Photograph of the PTR-MS sampling inlet protruding from the wall of the Herman J. Reuben building. In the foreground is the liquid nitrogen that supplied dry gas for the water trap.

Equipment

HCHO and 25 other volatile organic compounds (VOC) were continuously measured with a PTR-MS ran in full scan mode. Water trap was used to remove water from the sample intake. The PTR-MS instrument allows for high time resolution measurements (data point every minute) allowing for statistical relationships between trace gases concentrations and meteorological variables to be developed to aid in source identification. Measurements were collected in Lapwai, Idaho from June 10 to July 5, 2011. These were made at the Herman J. Ruben Building. Carbonyls were also measured from 24 hour composite samples using EPA method T011-A.

Results

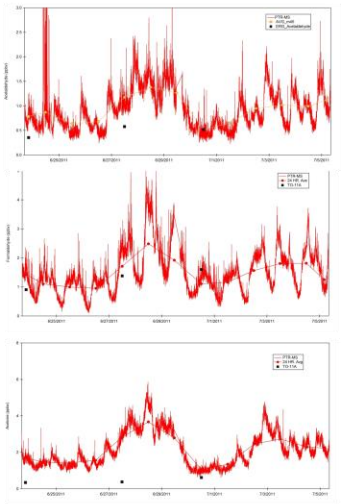


Figure 3: Top panel shows acetaldehyde mixing ratios (ppbv), middle panel shows formaldehyde mixing ratios (ppbv) and bottom panel shows acetone mixing ratios (ppbv) from June 24 through July 5. For all panels, the PTR-MS mixing ratios are shown in red compared to the TO-15.

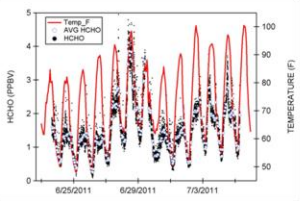


Figure 4: Plot of HCHO mixing ratios and air temperature over the sampling period.

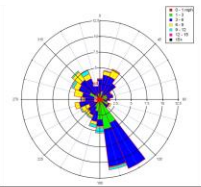


Figure 5:Wind Rose of 1-hr average wind speeds from June 1st to July 5 in Lapwai. Predominant winds during the measurement period were from the S-SE with speeds ranging from 3-6 miles per hour. Data collected from the Nez Perce Meteorological site in Lapwai, Idaho.

Conclusions:

1. Maximum HCHO levels (5ppbv) lower than 2006 study (15ppbv).
2. Wind flow pattern similar to 2006 study.
3. Clear correlation between HCHO & temperature.
4. HCHO displayed a diurnal pattern expected from a photochemical product – suggests HCHO is secondary in origin.
5. The mean daily concentration represented by the TO-11a measurement is within the range found with PTR-MS for formaldehyde and acetaldehyde, but not for acetone.
6. Methanol (CH_3OH) is emitted from the mill. Its ambient concentration was high (5-50 ppbv) and it could be source of HCHO via:

$HO + CH_3OH \rightarrow CH_2OH + H_2O$
$CH_2OH + O_2 \rightarrow HO_2 + HCHO$

Figure 6 Red is the where the Meteorological Data was collected. Yellow is where the PTR-MS Data collected.

Figure 7 Orange is Paper Pulp Mill, Lewiston. Yellow is City of Lapwai.

Acknowledgements:

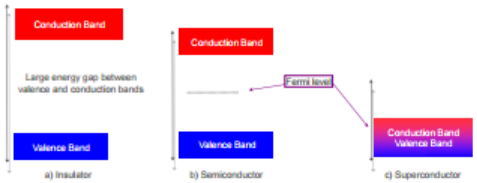
This research was funded by EPA/FaST DOE and NSF Research Experience for Undergraduates (REU). I would like to thank all of the professors and advisors for assistance in understanding the scope of the study and for the excellent research experience.

Temperature dependent Raman spectroscopy of ZnO nanowires

Rodolfo López Jr and Yi Gu
Department of Physics and Astronomy, Washington State University, Pullman, WA 99164

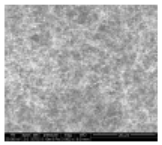
Introduction

Energy of Electrons



Promising Applications

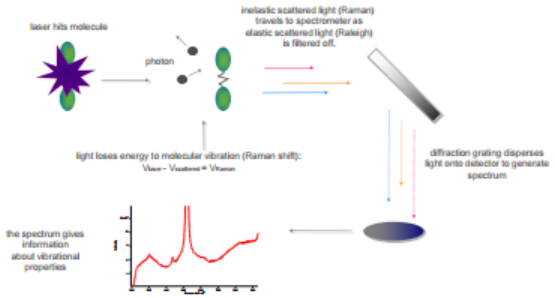
■ZnO nanowires have regained popularity due to their potential in areas such as (a) LED lighting (b) transparent electronics and (c) UV optoelectronics.

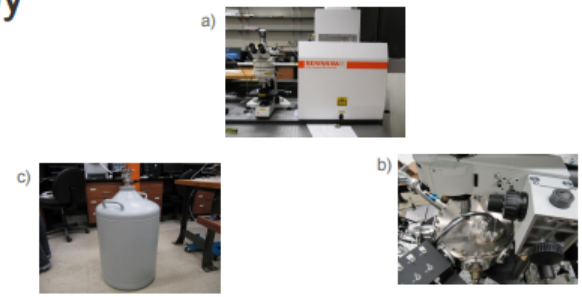


■ZnO nanowires grown on silicon oxide/silicon substrate

■80nm single ZnO wires on gold/silicon substrate

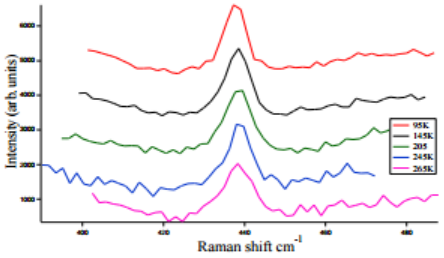
Raman Spectroscopy

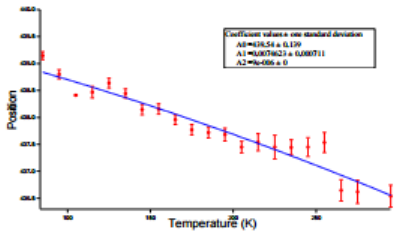




■Raman spectroscopy was conducted by (a) a Raman microscope in (b) a vacuumed chamber cooled via (c) a liquid nitrogen dewar.

Experimental Results





Curve fitting was done using the formula:

$$\omega = \omega_0 - \alpha_1 T - \alpha_2 T^2$$

Future Work

■ Single wire Raman spectroscopy of ZnO.

■ Thermal characteristics and its effects on molecular vibrations.

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Other suggestions and ideas

- Look at previous examples on the website
- Note that you may not have all your results and conclusions yet. This is fine. Do your best with what you have, and bring more results to the poster symposium.
- Don’t forget to acknowledge your funding source.
- Don’t forget to acknowledge your funding source.
- Don’t forget to acknowledge your funding source.
- Remember – this was a 9-week research experience. Hiccups were bound to happen. If it was easy – anyone could do it!

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Questions?

Have Fun!

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