Nontraditional Careers for Scientists: Thinking Outside the Lab

EPSCoR Symposium - Lincoln NE
2010 October 08

Lisa M. Balbes, Ph.D.
Balbes Consultants
lisa@balbes.com
Research Paper

Stability, Dose Uniformity, and Palatability of Three Counterterrorism Drugs—Human Subject and Electronic Tongue Studies

Nakissa Sadrieh,1 James Brower,2 Lawrence Yu,3 William Doub,2 Arthur Straughn,4 Stella Machado,5 Frank Pelsor,6 Emmanuelle Saint Martin,7 Terry Moore,2 John Reepmeyer,2 Duckhee Toler,2 Agnes Nguyenpho,8 Rosemary Roberts,3 Donald J. Schuirmann,5 Moheb Nasr,6 and Lucinda Buhse2

Received March 4, 2005; accepted June 8, 2005

Purpose. These studies evaluated the ability of common household food and drink products to mask the bitter taste of three selected anti-terrorism drugs.

Methods. Three anti-terrorism drugs (doxycycline, ciprofloxacin hydrochloride, and potassium iodide) were mixed with a variety of common household food and drinks, and healthy adult volunteers evaluated the resulting taste and aftertaste. In parallel, the ASTREE Electronic Tongue was used to evaluate taste combinations. Stability of the mixtures over time was monitored, as was the dosage uniformity across preparations.

Results. Foods and drinks were identified that satisfactorily masked the bitter flavor of each drug. Dose uniformity and stability were also acceptable over the range studied, although some combinations were significantly less stable than others. The electronic tongue was able to differentiate between tastes, but ranked masking agents in a different order than human volunteers.

Conclusions. Doxycycline, potassium iodide, and ciprofloxacin, which are stockpiled in solid tablet form, can conveniently be prepared into more palatable formulations, using common household foods and drinks. The electronic tongue can be used to perform an initial screening for palatability.

KEY WORDS: analytical chemistry, chromatographic; drug delivery, oral; formulation, solution; in vitro/in vivo correlations; stability, chemical; stability, solution; stability, suspension.

INTRODUCTION

As a result of the terrorist attacks on the USA on September 11, 2001 and the subsequent anthrax incidents across the USA, the need for enhanced national security was reinforced. The US Food and Drug Administration (FDA) is actively involved in this effort and has taken a number of actions to help ensure adequate response to future incidents of both bio- and nuclear terrorism. One such action involves working with other federal agencies to make sure sufficient supplies of medicine and vaccines will be available in a timely manner.

When preparing for disasters and terrorist events, it is essential to ensure that the needs of children are met. Pediatric treatment needs are unique in a number of ways. Children require different dosage forms and dosing charts, and they can have higher susceptibility than adults to the effects of radiation or infectious agents. Additionally, many of the drugs that are stockpiled by the government are only available in solid dosage forms, which are not readily swallowed by infants and children. Furthermore, these drugs may be either too salty or bitter to be acceptable for oral delivery to a child. Because many dosage regimens may need to be followed for several weeks, it is essential that children and infants be dosed with palatable preparations of the medicines to ensure patient compliance. For these reasons, the FDA has undertaken the task of developing appropriate procedures so that parents or other caregivers can convert the solid tablets into a form that can be administered to infants and small children. As a result of these studies, the FDA currently provides parents with instructions on how to mix several counterterrorism drugs with common household foods and drinks, using evidence-based methods, to disguise the unpleasant taste of the medications.
Government

1320=Chemist
Entrepreneurship

ACS Entrepreneurial Resources Center

Creating jobs through chemical innovation

American Chemical Society wants to make its resources more accessible and affordable to ACS member entrepreneurs. The ACS ERC is looking to advance chemical entrepreneurs and provide resources to members with a practical business plan and/or start-ups. The Entrepreneurial Resources Center will offer access to the following:

1. ACS Publications Journals and CAS SciFinder®
2. Technical expertise from ACS’s membership base of more than 164,000
3. Key services provided by ACS professional vendors
4. Mentorship services by successful ACS member chemical entrepreneurs
5. Introductions to sources of private capital
6. Introductions to large innovators as potential commercial partners

These resources will be available to participants only during the six month time period for which they are enrolled in the ERC.

This opportunity is exclusive for ACS members. In your application, you’ll need to present a feasible entrepreneurial plan that creates new innovative products and services and new jobs for American chemical professionals.
ACS Chemists by Sector

- Manufacturing: 44%
- Academic: 35%
- Government: 13%
- Self-Employed: 7%
- Nonmanufacturing: 2%
Recent PhDs

* Full-time permanent  32.7%
* Full-time temporary   4.9%
* Postdoc/grad         46.9%
* Part-time permanent  0.4%
* Part-time temporary  3.5%
* Not employed and seeking 8.8%
* Not employed and NOT seeking 2.7%
Recent PhDs

* 80% were US Native, US Naturalized, or Permanent Residents
* 70% of full-time employed in Industry
* Post-docs
  * 66% in Academia
  * 15% in Industry
  * 19% in Government
While in graduate school, students consider a range of career options.

92% of students are strongly considering careers in scientific research.
72% of students are strongly considering becoming a Principle Investigator in academia.
92% of students are strongly considering careers outside of academic research.
71% of students are strongly considering non-research careers.

Communication - Technical Writer, Technical Editor, Science Writer, Publisher, video producer, journalist

Chemical Information - Science Librarian, Technical Information Manager, Information Scientist, Abstracting, Indexing, Database Development

- Sales and Marketing
  Technical Support/Service
  Inside or Outside Sales
  Technical Buyer, Account Manager
  Product Manager, Sales Manager
  Technical Consultant

- Business Development
  Business Officer, Director
  Technology Officer

- Technology Transfer
Health and Safety - Lab Safety Officer, inspector, radiation safety officer, environmental remediation

Regulatory Affairs - Documentation, Testing, Disposal, compliance

Public Policy - Advisor, program officer
...and Everything Else

* People - Human Resources, Recruiter

* Software Development, UI design

* Project management

Education - Teaching (high school, community college, adjunct), administration, corporate training

* Science photographer, art restoratist, materials scientist, weaver, nanotech, ......
Is It Time for a Change?

* Do you have to work, or do you get to work?
* What do you tell your family/friends about your work?
Skills
What Can You Do?
What Can You Do?

- Physical lab skills - titration, weighing....
- Create and organize information
- Teach and mentor others
- Build relationships with or between other people
- Implement existing policies, or develop new ones
What Do You Know?
What Do You Know?

* Chemistry, biology, physics, engineering...
* Organic synthesis, HPLC, ab initio.....
* Problem Analysis
* Experimental Design
* Communication - Oral, Written
Where Do You Want To Be?
Skills

Passion

Organizational Need
Skills

Passion

Organization

Need

Hobby

Chore

Rookie
Find a Way to Try It

* I hear and I forget.
* I see and I remember.
* I do, and I understand.

Ancient Chinese Proverb
You can do anything......
...but the reward has to be great enough.
Acknowledgements

* Miles, the office rabbit
* Dana Lipp, Dana Lipp Imaging
Resources

* Nontraditional Careers For Chemists
* balbes.com/Careers
* sciencecareers.org and myIDP
* Career Opportunities in Biotechnology and Drug Development (Freedman)
* What Color is Your Parachute? (Bolles)