Pesticide Residues:

What to communicate to consumers
For diverse reasons many individuals eat fewer fruits and veggies than recommended.

- Lack of Availability
- Perceived High Cost
- Unfamiliar Taste
- Knowledge of health benefits
- Perceived Safety
New Research on Perceptions of Low-Income Consumers

Assessing issue awareness and messaging on purchasing behavior of fresh fruits and vegetables in low-income populations.

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Experimental Biology
Abstract Number: 8469
Program Number: 1065.21
About the Study

Study Question

▲ Is anti-conventional, pro-organic F/V messaging helping or hurting the mission to increase F/V intake in America; and specifically in low-income people?

Preliminary Conclusions:

▲ Cost is a major factor influencing F/V purchasing behavior

▲ Anti-conventional, pro-organic messaging decreases the likelihood to purchase conventionally grown F/V and increases the likelihood to purchase organic F/V.

▲ Organic over conventionally grown messages may be counter-productive to public health efforts to increase F/V intake in low income populations.
Facts Not Fear, Should Be Driving Consumer Actions
Misleading information is impacting consumption
Truism: Fruits and veggies are good for you and your family.
Key research areas include:

1. The investigation of the influence of maternal diet on the risk for pregnancy complications (maternal and conceptus);
   --Mars Chair in Developmental Nutrition

2. The identification and characterization of plant phytochemicals that can contribute to vascular health.
Why Are We Here Today?

- Widespread agreement that individuals should eat a diet rich in plant foods, including fruits and vegetables.
- Typical intakes of these foods in the U.S. are below government recommendations.
- Consumer research suggests that some of the most credible people to deliver health messages include physicians, nutritionists and dietitians.
- The popular media is increasingly where many get their nutritional facts.
- In addition to the positive messages put out by public health agencies, media and Internet can also be a source of negative messaging that can influence a consumer’s decision to purchase fruits and vegetables.
What are some KEY questions?

- How strong is the evidence that high plant food diets can reduce the risk for certain diseases?

- How strong is the evidence that the small amounts of pesticide residues reported to occur on some food sources represent harm to the U.S. consumer?

- Is there evidence that the benefits of eating fruits and vegetables outweigh the potential risks associated with the small amounts of pesticides that might be obtained through the ingestion of these foods?
Why is there “confusion’ among the public?

► The use of “good” and “bad” lists are popular when it comes to delivering information to consumers on health issues.

► This approach, while straight-forward and easy to understand, is often not based on science -- but rather perception.

► Regrettably, a significant portion of the public accepts the lists as factual.

► Unfortunately, incorrect messaging can have negative affects on public health instead of the positive impacts we all want.
Expert Panel Review

- Dr. Penny Fenner-Crisp, EPA, retired
- Dr. Carl L. Keen, University of California, Davis
- Dr. Jason Richardson, Robert Wood Johnson, Medical School
- Dr. Rudy Richardson, University of Michigan
- Dr. Karl Rozman, University of Kansas

Funding provided by the Agricultural Issues Forum, a group of commodity boards representing conventional and organic farmers.
Lists such as the “dirty dozen” can be an impediment to good health if they discourage consumption of produce, given that there is often minimal or no scientific evidence that the levels of pesticide residues found on fruits and vegetables available in the American market pose any human health risk.
Risk = Exposure x Toxicity

- The “Dirty Dozen” list considers exposure, but makes no attempt to address toxicity.
- There are reliable, well-established and accepted methods for assessing the risk of small doses of chemicals.
- The authors of the “Dirty Dozen” list acknowledge this and clearly state on their website that the list “is not built on a complex assessment of pesticide risks.”
Supporting Research by Dr. Carl Winter
Published in Journal of Toxicology, 2011.

*Dietary Exposure to Pesticide Residues from Commodities Alleged to Contain the Highest Contamination Levels*

Volume 2011; Article ID 589674

- Consumer risk from exposure to pesticides on “Dirty Dozen” list foods is negligible.
- Methodology used to create the Dirty Dozen list does not follow established scientific procedures.
- Substituting organic versions of “Dirty Dozen” commodities for conventional will not result in any measurable consumer health benefits.
It is Well-Accepted that Fruits and Vegetables are Good For You

► The Data on the **health benefits** of Fruits and vegetables are substantial and well defended.

► The risk for numerous diseases including:
  - High blood pressure
  - Stroke
  - Heart disease
  - Certain Cancers
  - Digestive problems

is thought to be reduced with diets rich in fruits and vegetables.

► In contrast, there is **no clear evidence that the amount of pesticide residues reported on fruits and vegetables available in the American marketplace pose a risk.**

► It is perhaps ironic that people with high fruit and vegetable consumption may **have higher pesticide residue exposures than individuals with a low intake!**
Current Uncertainties About Fruit and Vegetable Health Benefits

- The mechanisms that underlie the health effects of fruits and vegetables are poorly understood and represent an area of significant research.

- Limiting one’s diet to certain fruits and vegetables, and excluding others, due to fears over pesticide residues, may be risky if it results in consumers turning away from health-promoting fruits and vegetables.
Recent Study on this Topic

*Estimation of cancer risks and benefits associated with a potential increased consumption of fruits and vegetables*

--Richard Reiss, Jason Johnston, Kevin Tucker, John M. DeSesso, Carl L. Keen, *Food and Chemical Toxicology*, volume 50:4421, 2012
Study Design and Main Finding

• Analysis of the potential number of cancer cases that might be prevented if half the U.S. population increased its fruit and vegetable consumption by one serving each per day.

• Contrasted with upper-bound estimate of cancer cases that might be attributed to added pesticide consumption.

• 20,000 cancer cases prevented vs. 10 cancer cases caused by increased fruit and vegetable consumption.
Overwhelming Conclusion

Diets rich in plant foods are associated with an overall positive health status and a decreased risk for certain diseases (e.g. select cancers, vascular disease)
The Mediterranean Diet

- 2011 Meta Analysis
- 50 studies, 535,000 people
- Research supports the idea that diets rich in plant foods and healthy fats protects against the development of: cardiovascular disease, type 2 diabetes, hyperlipidemia, metabolic syndrome, certain cancers and Alzheimer’s disease.
- Overall, eating a Mediterranean diet leads to a longer life span.
New Study Finds Fruit and Vegetable Consumption Leads to Longer Lives

*Fruit and vegetable consumption and all-cause mortality: a dose-response analysis.*

-- Andrea Bellavia et al, Am J Clin Nutr August 2013

▶ Swedish study just published on-line
▶ Over 71,000 people studied over 13 years
▶ Lower fruit and vegetable consumption associated with shorter survival & higher mortality.
▶ Those who consumed more than 5 servings per day lived an average of 3 years longer than those who ate less than 5 servings of fruits and veggies.
Fruits and vegetables and coronary heart disease; outstanding issues

*Evidence of fruits and vegetable consumption reduces the risk of cardiovascular disease remains scarce thus far.* -- Dauchet et al., Nat. Rev Cardio, 2009

- Consumption of fruits and vegetables is weakly associated with the risk of CHD in cohort studies
- Prevention trials have failed to show clear effects of fruit and vegetable consumption on the occurrence of CHD
- Consumption of fruits and vegetables is associated with decreases in the risk for high blood pressure, but effects on other CHD risk factors has not been clearly established
Prevention trials have failed to confirm the hypothesis that vitamins and other individual nutrients in fruits and vegetables prevent CHD.

A bottom line, given that we do not know the specific compounds in fruits and vegetables that are providing their health benefits, it’s prudent that we recommend the consumption of a variety of these foods.
Another major issue for consumers:

The Potential Differences in Nutritional Quality of Conventional and Organically-Grown

Several groups have addressed this issue:

- Winters and Davis review for Institute of Food Technologists, 2006.
“The published literature lacks strong evidence that organic foods are significantly more nutritious than conventional foods. Consumption of organic foods may reduce exposure to pesticide residues and antibiotic-resistant bacteria.”

Some differences are expected

- Conventional crops have more nitrogen available, often leading to more growth.
- Organic crops are often under more stress which can result in an increased production of defensive phytochemicals in plants.
- The nutritional value of these compounds for humans is poorly understood.

Currently, available evidence in scientific literature suggest there are no significant differences in the nutritional/health values of conventional and organically-grown foods.
Additional Areas of Recent Public Concern

- Pesticides and the potential risk for pregnancy complications.

- Exposure to pesticides and the potential risk for autism spectrum disorders.
The risk for pregnancy complications is low in women who consume “good” diets.

“Good” versus “Bad” diets:

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<tr>
<th>Study</th>
<th>Year</th>
<th>Study Type</th>
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<tr>
<td>Ebbs et al.</td>
<td>’41</td>
<td>Intervention</td>
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<td>Burke et al.</td>
<td>’43</td>
<td>Observational</td>
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<td>Jeans et al.</td>
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<td>Primrose &amp; Higgins</td>
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<td>Laurence et al.</td>
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<td>Friel et al.</td>
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<td>Wright</td>
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<td>Torfs et al.</td>
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Maternal Diet and Pregnancy Outcome:
Case Controls:

Torfs CP et al. ’98  gastroschisis; low glutathione & carotene
Gordon TE et al. ’03  gastroschisis; low folate
Lam PK & Torfs ’06  gastroschisis; low Zn
Siega-Riz et al. ’06  gastroschisis; high sat fat
The NS et al. ’07  biliary atresia; low Cu, vit E
Yang W et al. ’08  diaphragmatic hernia; lower risk with supplement use
Paranjothy S et al. ’12  gastroschisis; low fruit & vegetable intakes
Carmichael S et al. ’12  preterm birth; diet quality
In this case-controlled study the incidence of hypospadias was reported to be higher in the offspring of women who elect not consume organic alternatives (eggs, fruit, vegetables, meat, dairy products) compared to those that did, but it is unclear if this finding was due to other lifestyle differences, or some unknown chemical contamination of high fat dairy products.

--Christensen JS  et al. J Urol 2013; 189: 1077
Might “Diet” Play a Role in Autism?

Pesticides and pesticide residues
Low folate
Abnormalities in the metabolism of certain amino acids
Low intake of essential fatty acids
Alterations in the gut microbiome
Tipping the Balance of Autism Risk: Potential Mechanisms Linking Pesticides and Autism

--Shelton et al, EHP, 120:944, 2012
Associations versus Causality: Risk Factors for Autism and Related Disorders

Autism-specific maternal autoantibodies recognize critical proteins in developing brain

D Braunschweig, P Krakowiak, P Duncanson, R Boyce, RL Hansen, P Ashwood, I Hertz-Picciotto, IN Pessah, and J Van de Water

Maternal antibodies from mothers of children with autism alter brain growth and social behavior development in the rhesus monkey

MD Bauman, A-M Iosif4, P Ashwood, D Braunschweig, A Lee, CM Schumann, J Van de Water and DG Amaral
With respect to pesticides, more research and education is clearly needed.

We need educational programs that address the risks associated with excessive exposure to pesticides during pregnancy.

The influence of diverse environmental challenges, including pesticides, is still poorly understood, and research in this area needs to be increased, but based on the data we have to date, when it comes to fruits and vegetables available in the American marketplace, the weight of the evidence suggests . . .
Your mother and grandmother were right!

Enjoy an abundant variety of fruits and vegetables on a daily basis.

They’re good for you!
More Information

- Represents both organic and conventional farmers.
- Information is science-based, peer reviewed and easy to understand.
- The science-based information has not been disputed.
User Friendly Science: The Pesticide Residue Calculator

1. Choose who you are:
   - Male
   - Female
   - Teenager
   - Child

2. Select your produce:
   - Apples
   - Bell Peppers
   - Blueberries
   - Carrots

Result:
A child could consume 56,117 servings of carrots in one day without any effect even if the carrots have the highest pesticide residue recorded for carrots by USDA.
More Information?

• Sign up for Newsletter.
• Like our Facebook page. www.facebook/safefruitsandveggies
• Follow us on Twitter @safeproduce

www.safefruitsandveggies.com
60% of consumers express a high concern about pesticide residues, much of which is based on misleading information.

PESTICIDE RESIDUE CALCULATOR

Scientists and health experts overwhelmingly agree that the mere presence of pesticide residues on food does not mean they are harmful.

When considering the safety of any substance, it is important to understand what is known as a "dose-response relationship." This means that almost every substance — even water or oxygen — can be toxic at some level. For every product there is a point, or a dose level, that will not produce a response in a living organism. In the world of pesticide regulation, that point is called the No Observed Adverse Effect Level.