

Date: February 18, 2014

Board of Directors

To: Rep. Angus L.K. McKelvey, Chair
Rep. Karl Rhoads, Chair
Members, House Committee on Consumer Protection and Commerce
Members, House Committee on Judiciary

John Coefield
Montana

Re: Support for HB 2133: Relating to health

Mike Fenello
Idaho

Thank you for the opportunity to testify in support of HB 2133. I serve as the Hawaii director for the American Lung Association of the Mountain Pacific; our mission is to save lives by improving lung health and preventing lung disease.

Patty Ginsburg
Alaska
Chair Elect

Virginia Hall
Oregon

Tobacco use remains the leading cause of preventable death in the United States, killing more than 400,000 people each year. The American Lung Association released its annual State of Tobacco Control report this January; this report finds tobacco use kills 1,200 Hawaiians each year and has an economic price tag of \$686,772,000. We can and should do more.

Don Lojek
Idaho

Robert Merchant, MD
Montana

Tad Seder
Washington
Secretary

Data shows that 95% of adult smokers begin smoking before they turn 21, and a substantial number of smokers start even younger. This legislation would raise the age of sale for tobacco products in Hawaii to age 21. If our youth and young adults can make it to their 21st birthday without becoming addicted to tobacco, we are increasing their chances of living a tobacco-free life.

Sterling Yee
Hawaii
Treasurer

Ted Zurcher
Oregon
Chair

Thank you for the opportunity to provide testimony.

Renée Klein
President and CEO



Kim Nguyen, MSW
Hawaii Director
American Lung Association of the Mountain Pacific

Fighting for Air

February 18, 2014

TO: Chair Angus McKelvey and Members of the House Committee on
Consumer Protection and Commerce
Chair Karl Rhodes and Members of the House Committee on Judiciary

FROM: Cigar Association of America, Inc.
(William Goo)

RE: **HB 2133, HD1** - Relating to Health
Hearing Date: February 19, 2014
Time: 2:15 p.m.

My name is William Goo. I represent the Cigar Association of America, Inc. (CAA).

CAA opposes HB 2133, HD1. It would unfair to deny an 18 year old who can vote, enter into legally binding contracts and serve our country, the right to make a mature decision on whether or not he or she chooses to smoke a cigar. To the extent that the intent of this bill focuses on the use of cigars by youth, the 2014 Surgeon General Report concludes that there has been no increase in cigar use among youth between 1998-2010.

Thank you for considering this testimony.



American Cancer Society
Cancer Action Network
2370 Nu'uau Avenue
Honolulu, Hawai'i 96817
808.432.9149
www.acscan.org

House Committee on Consumer Protection and Commerce
Representative Angus McKelvey, Chair
Representative Derek Kawakami, Vice Chair

House Committee on Judiciary
Representative Karl Rhoads, Chair
Representative Sharon Har, Vice Chair

Hearing: February 19, 2014; 2:15 p.m.

HB 2133, HD1 – RELATING TO HEALTH

Cory Chun, Government Relations Director – Hawaii Pacific
American Cancer Society Cancer Action Network

Thank you for the opportunity to provide testimony in support of HB 2133, HD1, which increases the age to purchase tobacco products and electronic smoking devices to 21.

The American Cancer Society Cancer Action Network (ACS CAN) is the nation's leading cancer advocacy organization. ACS CAN works with federal, state, and local government bodies to support evidence-based policy and legislative solutions designed to eliminate cancer as a major health problem.

According to the U.S. Surgeon General's 2012 report, 99% of all first tobacco use occurs by age 26.¹ Raising the age on sale for tobacco products to 21 could prevent many young people ages 18-21 from trying tobacco, becoming addicted, and developing a tobacco-related illness.

Thank you for the opportunity to submit testimony on this matter.

¹ *Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General*. U.S. Department of Health and Human Services, Office of the Surgeon General. Executive Summary, 2012 at 2.



HPCA

HAWAII PRIMARY CARE ASSOCIATION

House Committee on Consumer Protection & Commerce

The Hon. Angus L.K. McKelvey, Chair

The Hon. Derek S.K. Kawakami, Vice Chair

House Committee on Judiciary

The Hon. Karl Rhoads, Chair

The Hon. Sharon E. Har, Vice Chair

Testimony in Support of House Bill 2133

Relating to Health

Submitted by Robert Hirokawa, Chief Executive Officer

February 19, 2014, 2:15 pm, Room 325

The Hawaii Primary Care Association (HPCA), which represents the federally qualified community health centers in Hawaii, supports House Bill 2133, which increases the age to purchase tobacco products from eighteen to twenty-one.

Research has shown that ninety percent of adult smokers began using tobacco products before the age of 21. On average, thirty percent of those will die early a smoking-related disease. Worldwide, tobacco use is the leading preventable cause of death, accounting for more than five million deaths a year. In the United States alone, more than \$289 billion is spent each year on direct medical care and lost productivity due to smoking related ailments.

The HPCA believes that making cigarettes tougher to obtain for the youth of Hawaii is a necessary step in bringing down these harrowing figures. For that reason, the HPCA supports this measure.

Thank you for the opportunity to testify.



THE QUEEN'S HEALTH SYSTEMS

1301 Punchbowl Street • Honolulu, Hawaii 96813 • Phone (808) 691-5900

H.B. 2133, H.D.1 RELATING TO HEALTH
House Committee on Consumer Protection and Commerce
House Committee on Judiciary
February 19, 2014; 2:15 p.m.

Mahalo for the opportunity to provide testimony in strong support of H.B. 2133, HD1 Relating to Health. This measure will increase the minimum age to purchase tobacco products, including electronic smoking devices, from eighteen to twenty-one.

Every year, 430,000 people die from tobacco use in the United States -- smoking kills more people than alcohol, AIDS, car accidents, illicit drug use, homicides, and suicides combined. More than 9 in 10 started smoking before they turned 21. Between the ages of 18 and 21 is when young adults transition from experimentation with tobacco to becoming regular, daily smokers.

According to the Coalition for a Tobacco-Free Hawaii, nearly 1,200 Hawaii residents die each year from diseases that can be attributed to smoking. Of those, more than 90 percent of them became daily tobacco users before the age of 18. Tobacco companies actively target young adults between 18 and 21, because they know it is a critical time period when they will transition from experimentation to addiction. If a person can make it to their 21st birthday without becoming addicted to tobacco, they are much more likely to live their entire lives tobacco-free.

In 2013, three states: New Jersey, New York, and Utah, introduced Tobacco 21 laws. In addition, seven Massachusetts towns and the county of Hawaii adopted Tobacco 21 laws. According to Massachusetts Health Commissioner Thomas A. Farley, raising the tobacco-purchasing age to 21 was to “protect teens and prevent many people from ever starting to smoke.” According to New York Mayor Bloomberg, “By increasing the smoking age to 21, we will help prevent another generation from the ill health and shorter life expectancy that comes with smoking.”

Hawaii Mayor Billy Keno signed Bill 135 into law saying, “I signed this bill for the benefit of our community, and most importantly, our kids. With all of the known harmful effects of tobacco use, this measure is in the best interest of public health and safety.” The ordinance will take effect on July 1, 2014 and result in a fine of up to \$2,000 for any person who distributes tobacco or electronic cigarette products to an underage customer.

According to a recent Gallup poll, nearly 90% of U.S. adults who smoke report that if they had it to do over again, they would not have started. Helping today's adolescents avoid that regret requires a comprehensive strategy that includes strong supply-side interventions, such as Tobacco 21 laws, which represents a critical opportunity for public health law to reduce one of the most important health risks facing the United States and Hawaii. . Therefore, the Queen's Health Systems seeks your strong support to do everything possible to prevent smoking and other tobacco or smoking simulated use among our young people – it saves lives. And, if that is not enough, please visit www.twentyonereasons.org.

The mission of The Queen's Health Systems is to fulfill the intent of Queen Emma and King Kamehameha IV to provide in perpetuity quality health care services to improve the well-being of Native Hawaiians and all of the people of Hawai'i.

kawakami3-Benigno

From: mailinglist@capitol.hawaii.gov
Sent: Friday, February 14, 2014 5:21 PM
To: CPCtestimony
Cc: lynhowe1946@yahoo.com
Subject: *Submitted testimony for HB2133 on Feb 19, 2014 14:15PM*

HB2133

Submitted on: 2/14/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Lyn Howe	Individual	Support	No

Comments:

Please note that testimony submitted less than 24 hours prior to the hearing, improperly identified, or directed to the incorrect office, may not be posted online or distributed to the committee prior to the convening of the public hearing.

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February 15, 2014

TO: House Committee on Health

Hearing: February 19, 2014, 2:15 p.m., Conference Room 325

FROM: Gabriele Chapman, University of Hawaii

RE: Support of HB 2133, Relating to tobacco; cigarettes; minors

Representative Della Au Belatti Chair, Representative Dee Morikawa Vice Chair, and members of the Committee on Health, I am Gabriele Chapman, an MSW student at the University of Hawaii. More importantly, I am the mom of six children between the ages of 7 and 20. I strongly support this bill for the following reasons:

- According to the U.S. Surgeon General's 2012 report, 95 percent of all smokers started smoking before they were 21. The American Lung Association reports that ninety percent of adults who smoke started by age 21 and half of them had become regular smokers by their eighteenth birthday.
- On Hawai'i Island, the rate of smoking among young adults aged 18-24 is more than double that of the rate of smoking among youth ages 12 to 17.
- E-cigarettes are a trendy way to deliver nicotine addiction to our young adults. Not only are they cheaper than cigarettes, they are a novelty -- available in flavors (including cherry, chocolate and bubble gum) that appeal to young people.
- According to CDC's 2011-2012 National Youth and Tobacco Survey, the percentage of high school students who reported using an e-cigarette rose from 4.7 percent in 2011 to 10.0 percent in 2012. Use also doubled among middle school students. Altogether, in 2012 more than 1.78 million middle and high school students nationwide had tried e-cigarettes.
- While there is currently no penalty for minor possession of tobacco or e-cigarettes on Oahu, raising the age of sale to 21 will make it harder for young adults to obtain them. Delaying the age in which they can begin smoking may reduce their chances of becoming smokers.

Proposed exemption for soldiers: As an Army veteran, who has served in Europe, Saudi Arabia and Kuwait, I believe soldiers should be exempt. While I have never smoked, nor do I condone smoking – I do believe those young people who serve in the military deserve the right to make their own decisions concerning tobacco usage. These soldiers are forced to grow up faster than their cohorts, and they endure significant trauma on behalf of our country. Therefore, I believe active duty soldiers should be allowed to purchase tobacco products regardless of their age.

Thank you for the opportunity to testify on this matter.

kawakami3-Benigno

From: mailinglist@capitol.hawaii.gov
Sent: Sunday, February 16, 2014 9:34 AM
To: CPCtestimony
Cc: mendezj@hawaii.edu
Subject: *Submitted testimony for HB2133 on Feb 19, 2014 14:15PM*

HB2133

Submitted on: 2/16/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Javier Mendez-Alvarez	Individual	Support	No

Comments:

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kawakami3-Benigno

From: mailinglist@capitol.hawaii.gov
Sent: Sunday, February 16, 2014 3:28 PM
To: CPCtestimony
Cc: jasmineramos808@yahoo.com
Subject: Submitted testimony for HB2133 on Feb 19, 2014 14:15PM

HB2133

Submitted on: 2/16/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Jasmine Ramos	Individual	Support	No

Comments: I support HB2133, HD1, because this measure will save thousands of lives and the state of Hawaii taxpayers about a half a billion dollars in health care costs related to smokers and cancer annually. This policy is not new to our state, as Hawaii County has already passed this measure into law.

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kawakami3-Benigno

From: mailinglist@capitol.hawaii.gov
Sent: Monday, February 17, 2014 6:43 PM
To: CPCtestimony
Cc: vinkim@gmail.com
Subject: *Submitted testimony for HB2133 on Feb 19, 2014 14:15PM*

HB2133

Submitted on: 2/17/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Vin Kim	Individual	Oppose	No

Comments:

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kawakami3-Benigno

From: mailinglist@capitol.hawaii.gov
Sent: Monday, February 17, 2014 9:03 PM
To: CPCtestimony
Cc: mauimoonflower@gmail.com
Subject: *Submitted testimony for HB2133 on Feb 19, 2014 14:15PM*

HB2133

Submitted on: 2/17/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Sabrina Spencer	Individual	Oppose	No

Comments:

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kawakami3-Benigno

From: mailinglist@capitol.hawaii.gov
Sent: Monday, February 17, 2014 9:12 PM
To: CPCtestimony
Cc: jchangworld@gmail.com
Subject: *Submitted testimony for HB2133 on Feb 19, 2014 14:15PM*

HB2133

Submitted on: 2/17/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Jessica Chang	Individual	Oppose	Yes

Comments:

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kawakami3-Benigno

From: Rebecca Williams <rjwillia@hawaii.edu>
Sent: Tuesday, February 18, 2014 11:17 AM
To: CPCtestimony
Subject: Strong Support HB2133

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
Members of House Committee on Judiciary

Re: Strong Support for HB2133, Relating to Health

Hrg: February 19, 2014 at 2:15 p.m. in Room 325

Thank you for the opportunity to submit testimony in support of HB2133. I strongly support raising the age of sale of tobacco products to 21.

Tobacco use is still the leading cause of preventable death in the United States and in Hawai`i, and costs our state over \$336 million in healthcare expenditures every year. The cost of tobacco is real for both the smoker and people exposed to secondhand smoke: in lives cut short by cancer, cardiovascular disease, COPD, and other chronic lung diseases. More than 1,000 people die in Hawai`i every year from tobacco use.

Nearly all smokers begin smoking regularly before they turn 21. According to the Surgeon General, 95 percent of adult smokers start smoking before they turn 21. Tobacco companies heavily target kids and young adults with marketing and advertising.

This policy will also reduce access to tobacco for youth under 18 by keeping tobacco out of our schools. Any effort to prevent tobacco use among young people is worthwhile.

This bill will save lives.

Mahalo.

Rebecca Williams
736 Hawaii St.
Honolulu, HI 96817

kawakami3-Benigno

From: Mandy Rock <rocka@hawaii.edu>
Sent: Tuesday, February 18, 2014 11:21 AM
To: CPCtestimony
Subject: Strong Support HB2133

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
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This bill will save lives. I made it to 21 and I'm smoke free, I want to see kids have the same chance.

Mahalo.

Mandy Rock
401 Waiama Way
Haiku, HI 96708

kawakami3-Benigno

From: Sally Jo Manea <keahimanea@gmail.com>
Sent: Tuesday, February 18, 2014 11:34 AM
To: CPCtestimony
Subject: Strong Support HB2133

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
Members of House Committee on Judiciary

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This bill will save lives.

Mahalo.

Sally Jo Manea
6415 Olohena Road
Kapaa, HI 96746

kawakami3-Benigno

From: Koa Robinson <koa.robinson@gmail.com>
Sent: Tuesday, February 18, 2014 11:37 AM
To: CPCtestimony
Subject: Strong Support HB2133

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
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This policy will also reduce access to tobacco for youth under 18 by keeping tobacco out of our schools. Any effort to prevent tobacco use among young people is worthwhile.

This bill will save lives.

Mahalo.

Koa Robinson
3059 Seaview Rise
Honolulu, HI 96822

kawakami3-Benigno

From: Harald Ebeling <haraldebeling@gmail.com>
Sent: Tuesday, February 18, 2014 11:25 AM
To: CPCtestimony
Subject: Strong Support HB2133

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
Members of House Committee on Judiciary

Re: Strong Support for HB2133, Relating to Health

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This bill will save lives.

Mahalo.

Harald Ebeling
2851 Lawa Pl
Honolulu, HI 96822

kawakami3-Benigno

From: Marilyn Gagen <mgagen@gmail.com>
Sent: Tuesday, February 18, 2014 11:45 AM
To: CPCtestimony
Subject: Strong Support HB2133

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
Members of House Committee on Judiciary

Re: Strong Support for HB2133, Relating to Health

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This bill will save lives.

Mahalo.

Marilyn Gagen
59-398 Ka Nani Drive
N/A
Kamuela, HI 96743

kawakami3-Benigno

From: aimee rice <dh1lighthouse@aol.com>
Sent: Tuesday, February 18, 2014 11:18 AM
To: CPCtestimony
Subject: Strong Support HB2133

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
Members of House Committee on Judiciary

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This bill will save lives.

Mahalo.

aimee rice
1166a 20th ave
honolulu, HI 96816

kawakami3-Benigno

From: Patricia Fleck <pat.fleckconsulting@hawaiiantel.net>
Sent: Tuesday, February 18, 2014 12:08 PM
To: CPCtestimony
Subject: Strong Support HB2133

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
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This bill will save lives.

Respectfully,

Patricia Fleck

Patricia Fleck
75-5660 Kopico Street, Ste. C7-330
Kailua Kona, HI 96740

kawakami3-Benigno

From: mailinglist@capitol.hawaii.gov
Sent: Tuesday, February 18, 2014 12:41 PM
To: CPCtestimony
Cc: dmiyahira@hawaii.rr.com
Subject: Submitted testimony for HB2133 on Feb 19, 2014 14:15PM

HB2133

Submitted on: 2/18/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Dan Miyahira	Individual	Comments Only	No

Comments: While this bill is well intended, it does not effectively reduce youth smoking but makes it difficult for adults of legal age to acquire tobacco products. Raising age limits does not prevent tobacco use and tobacco can still be easily obtained from anyone willing to provide tobacco to underage users. There are already laws in place to limit the age of tobacco purchase. Early education is still the best preventative measure and Hawaii already ranks among the highest in the US in anti-tobacco campaigns. This bill does not make any sense as Hawaii does not have a smoking problem and already has low smoking rates which continue to fall. This bill also places an unfair burden on retailers who will be required to provide additional signage and suffer lost revenue. It also does not address the responsibility of the buyer and enforcement will be difficult. The laws currently in place are adequate, we already have good anti-tobacco education and do not need to place added attention and costs on senseless legislation about something that is not a wide spread problem. This bill also begs the question: If an 18 year old adult has the maturity to make the decision whether to join the military and go off to war and has the maturity to decide who to vote for the president of the United States will be, should they not also have decision if they want to smoke or not?

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kawakami3-Benigno

From: Beau Lani Barker <beau.barker@cancer.org>
Sent: Tuesday, February 18, 2014 1:03 PM
To: CPCtestimony
Subject: Strong Support HB2133

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

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Nearly all smokers begin smoking regularly before they turn 21. According to the Surgeon General, 95 percent of adult smokers start smoking before they turn 21. Tobacco companies heavily target kids and young adults with marketing and advertising.

This policy will also reduce access to tobacco for youth under 18 by keeping tobacco out of our schools. Any effort to prevent tobacco use among young people is worthwhile.

This bill will save lives.

Mahalo.

Beau Lani Barker
613 Iliaina St
Kailua, HI 96734

kawakami3-Benigno

From: Katherine Freer Moyer <kbfreer@gmail.com>
Sent: Tuesday, February 18, 2014 12:54 PM
To: CPCtestimony
Subject: Strong Support HB2133

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
Members of House Committee on Judiciary

Re: Strong Support for HB2133, Relating to Health

Hrg: February 19, 2014 at 2:15 p.m. in Room 325

Thank you for the opportunity to submit testimony in support of HB2133. I strongly support raising the age of sale of tobacco products to 21.

Tobacco use is still the leading cause of preventable death in the United States and in Hawai`i, and costs our state over \$336 million in healthcare expenditures every year. The cost of tobacco is real for both the smoker and people exposed to secondhand smoke: in lives cut short by cancer, cardiovascular disease, COPD, and other chronic lung diseases. More than 1,000 people die in Hawai`i every year from tobacco use.

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This bill will save lives.

Mahalo.

Katherine Freer Moyer

Honolulu, HI 96822

kawakami3-Benigno

From: Karli Smallwood <karli@pacificcancerfoundation.org>
Sent: Tuesday, February 18, 2014 1:33 PM
To: CPCtestimony
Subject: Strong Support HB2133

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
Members of House Committee on Judiciary

Re: Strong Support for HB2133, Relating to Health

Hrg: February 19, 2014 at 2:15 p.m. in Room 325

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Tobacco use is still the leading cause of preventable death in the United States and in Hawai`i, and costs our state over \$336 million in healthcare expenditures every year. The cost of tobacco is real for both the smoker and people exposed to secondhand smoke: in lives cut short by cancer, cardiovascular disease, COPD, and other chronic lung diseases. More than 1,000 people die in Hawai`i every year from tobacco use.

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This bill will save lives.

Mahalo.

Karli Smallwood
227 Mahalani Street, Suite 99
Wailuku, HI 96793

Testimony of Professor Mark A. Levin *in strong support* for HB 2133 HD1

**RELATING TO HEALTH
House Committees on Consumer Protection & Commerce and Judiciary
February 19, 2014**

Chair McKelvey, Vice-Chair Kawakami, and members of the Committee on Consumer Protection & Commerce:

Chair Rhoads, Vice-Chair Har, and members of the Committee on Judiciary:

Aloha. The dangers from tobacco products -- both incendiary and vapor devices -- are supremely compounded by the addictiveness of nicotine. Medical doctors would explain that the process is the construction of nicotine receptors in our brains. And younger brains, still the most "under construction," are where receptors will develop fastest and most securely. A recent National Cancer Institute report on this is [here](#).

This science is what lies at the base of the Big Tobacco's money machine. But the industry also knows that it is the poor judgments of youth and young adults that make them the full-on designed targets of product marketing. Nearly all people who smoke begin smoking regularly before they turn 21, when they are the most susceptible to the industry's devastating art.

By barring sales in Hawai'i to youth and young adults before age 21, we'll have fewer in our state becoming addicted. Fewer fighting the battle to quit. Fewer losing the battle to cancer and the other diseases caused by smoking. Just as we are seeing other communities such as New York City taking action, we will be getting ahead of the game for the 21st century.

Thank you for the opportunity to submit testimony in support of HB 2133 HD1. I strongly support raising the age of sale of tobacco products to 21.

Mahalo.

Professor Mark A. Levin
The William S. Richardson School of Law
The University of Hawai'i at Mānoa
2515 Dole St., Honolulu, HI 96822
Tel: 1-808-956-3302

Affiliations are given for identification purposes only. Opinions presented here are personal views and not the official views of the University of Hawai'i or any other organization or entity.

kawakami3-Benigno

From: Maile Goo <goomaile@yahoo.com>
Sent: Tuesday, February 18, 2014 2:05 PM
To: CPCtestimony
Subject: Strong Support HB2133

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
Members of House Committee on Judiciary

Re: Strong Support for HB2133, Relating to Health

Hrg: February 19, 2014 at 2:15 p.m. in Room 325

Thank you for the opportunity to submit testimony in support of HB2133. I strongly support raising the age of sale of tobacco products to 21.

Tobacco use is still the leading cause of preventable death in the United States and in Hawai`i, and costs our state over \$336 million in healthcare expenditures every year. The cost of tobacco is real for both the smoker and people exposed to secondhand smoke: in lives cut short by cancer, cardiovascular disease, COPD, and other chronic lung diseases. More than 1,000 people die in Hawai`i every year from tobacco use.

Nearly all smokers begin smoking regularly before they turn 21. According to the Surgeon General, 95 percent of adult smokers start smoking before they turn 21. Tobacco companies heavily target kids and young adults with marketing and advertising.

This policy will also reduce access to tobacco for youth under 18 by keeping tobacco out of our schools. Any effort to prevent tobacco use among young people is worthwhile.

This bill will save lives.

Mahalo.

Maile Goo
3683 Woodlawn Terrace Place
Honolulu, HI 96822

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
Members of House Committee on Judiciary

Re: Strong Support for HB2133, Relating to Health

Hrg: February 19, 2014 at 2:15 p.m. in Room 325

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This bill will save lives.

Mahalo.

Barbara Nosaka
2216 Hoonanea Street
Honolulu, HI 96822

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
Members of House Committee on Judiciary

Re: Strong Support for HB2133, Relating to Health

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This bill will save lives.

Mahalo!

.

Debbie Apolo
95-045 Waikalani Drive
#G104
Mililani, HI 96789

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
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Re: Strong Support for HB2133, Relating to Health

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This bill will save lives.

Respectfully,

Patricia Fleck

Patricia Fleck
75-5660 Kopiko Street, Ste. C7-330
Kailua Kona, HI 96740



LATE

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. Box 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
File:

**HOUSE COMMITTEE ON CONSUMER PROTECTION & COMMERCE
HOUSE COMMITTEE ON JUDICIARY**

HB2133,HD1, RELATING TO HEALTH

**Testimony of David Sakamoto, MD, MBA
Deputy Director, Health Resources Administration**

**February 19, 2014
2:15 PM, Room 325**

1 **Department's Position:** The Hawaii State Department of Health (DOH) supports the passage of
2 HB2133,HD1 with amendments as a measure to reduce youth tobacco use and help users quit.

3 **Fiscal Implications:** None.

4 **Purpose and Justification:** HB2133,HD1 amends Chapter 709-908, Hawaii Revised Statutes (HRS) to
5 make it unlawful to sell or furnish tobacco products to any person under twenty-one years of age, and
6 for persons under 21 years of age to purchase any tobacco product.

7 The Department supports the amendments in House Draft 1 which includes electronic smoking
8 devices (ESDs), using the definition recommended by the Office of the Attorney General, and making
9 ESDs part of the point of sale signage. We also appreciate the revised effective dates that transition the
10 introduction of the sales restriction to age 21.

11 The Department recommends also addressing existing language in Chapter 328J, Sections 16,
12 17, and 18 for consistency on the sale, distribution, and placement of tobacco products by amending the
13 current age from from eighteen to twenty-one (see suggested language attached).

1 Tobacco use remains the leading cause of preventable disease, disability, and death in Hawaii
2 and in the United States. Nationally, nearly 1,000 youth under the age of 18 become regular smokers
3 daily, and almost one-third of them will die from it. The 2011 Hawaii Youth Tobacco Survey reports
4 that in the state of Hawaii, 5,600 youth experiment with smoking for the first time each year; another
5 1,400 become regular smokers. In Hawaii, 23% of young adults (18-24 years) and 9% of high school
6 youth currently smoke.

7 National data from the 2012 United States Surgeon General's Report show that 95% of adult
8 smokers begin smoking before the age of 21 years and 80% try their first cigarette before age 18.
9 Nearly half of adult smokers become regular, daily smokers before age 18, more than 75%; become
10 regular, daily smokers before they turn 21. This means the 18 to 21 year age group is a time when many
11 smokers transition to regular use of cigarettes. Tobacco companies heavily target young adults through
12 a variety of marketing activities because they know it is a critical time period for solidifying nicotine
13 addiction. As cited in the American Journal of Public Health, the tobacco industry has admitted in their
14 own internal documents the importance of increasing consumption within this target group in order to
15 maintain a profitable business.

16 In addition to high tobacco taxes, comprehensive smoke-free laws, and comprehensive tobacco
17 prevention and control programs, increasing the minimum legal sale age for tobacco products, from 18
18 to 21 years, has emerged as a policy strategy, supported by the Campaign for Tobacco Free Kids, the
19 American Cancer Society, the American Heart Association, and the American Lung Association, to
20 reduce youth tobacco use and help users quit. The August issue of the Annals of Internal Medicine cited
21 a "hypothetical health policy model in which the tobacco age of sale is increased to 21 years projected
22 that youth smoking prevalence could be expected to drop from 22% to less than 9% among persons aged
23 15 to 17 years within seven years."

1 The DOH commends the Hawaii County for leading the state in enacting similar legislation in
2 December 2013. Hawaii County now joins four states and a number of municipalities, including New
3 York City, in raising the age of sale of tobacco products. This measure could reduce the risk of young
4 people transitioning to regular or daily use. Adolescents would find it more difficult to pass themselves
5 off as 21-year olds than 18-year olds, and it would simplify identification checks for tobacco and alcohol
6 sales.

7 Thank you for the opportunity to testify.

LATE

1 Attachment

2 **[\$328J-16] Cigarette sales from vending machines and by lunch wagons**

3 **prohibited.** (a) The sale or distribution at no charge of cigarettes

4 by the following methods is prohibited:

5 (1) From cigarette vending machines unless the vending machine is
6 located in a bar, cabaret, or any establishment for which the minimum
7 age for admission is ~~eighteen~~ twenty-one; or

8 (2) From a lunch wagon engaging in any sales activity within one
9 thousand feet of any public or private elementary or secondary school
10 grounds.

11 (b) Violations of subsection (a), including placement of a cigarette
12 vending machine in a location other than a bar, cabaret, or any
13 establishment for which the minimum age for admission is ~~eighteen~~
14 twenty-one, are subject to a fine of up to \$1,000 per day for each
15 violation.

16 (c) As used in this section:

17 "Cigarette vending machine" means a self-service device that
18 dispenses cigarettes, cigars, tobacco, or any other product
19 containing tobacco.

20 "Lunch wagon" means a mobile vehicle designed and constructed to
21 transport food and from which food is sold to the general public and
22 includes but is not limited to manapua trucks.

23 "Sell" or "sale" means to solicit and receive an order for; to have,
24 keep, offer, or expose for sale; to deliver for value or in any other

1 manner than purely gratuitously; to peddle; to keep with intent to
2 sell; or to traffic in. [L 2006, c 295, pt of §2]

3 **[\$328J-17] Distribution of sample cigarette or tobacco products,**
4 **cigarette or tobacco promotional materials, and coupons redeemable**
5 **for cigarette or tobacco products or promotional materials.** (a) It is
6 unlawful for any person to distribute samples of cigarette or tobacco
7 products, or coupons redeemable for cigarette or tobacco products, in
8 or on any public street, sidewalk, or park, or within one thousand
9 feet of any elementary, middle or intermediate, or high school.

10 (b) It is unlawful for any person to distribute cigarette or tobacco
11 promotional materials, or coupons redeemable for cigarette or tobacco
12 promotional materials, within one thousand feet of any elementary,
13 middle or intermediate, or high school.

14 (c) This section shall not apply:

15 (1) Within private commercial establishments, such as stores and
16 restaurants, where tobacco products are sold, as long as distribution
17 is not visible to the public from outside the establishment; or

18 (2) To commercial establishments where access to the premises by
19 persons under ~~eighteen~~ twenty-one years of age is prohibited by law.

20 (d) Any person convicted of violating this section shall be fined not
21 more than \$1,000.

22 (e) As used in this section:

23 "Distribute" means to pass out to members of the general public free
24 of charge for the exclusive purpose of promoting a product. [L 2006,
25 c 295, pt of §2]

1 **[\$328J-18] Placement of cigarettes and tobacco products.** *[Section*

2 *effective July 1, 2014.]* (a) Except as otherwise provided under this

3 section, a retailer may sell cigarettes, smokeless tobacco, and all

4 other tobacco products only in a direct, face-to-face exchange

5 between the retailer and the consumer. Examples of methods of sale

6 that are not permitted include vending machines and self-service

7 displays.

8 (b) This section shall not apply to:

9 (1) A duty-free sales enterprise selling duty-free merchandise in

10 accordance with the provisions of title 19 United States Code section

11 1555(b), and any implementing regulations; and

12 (2) Retail tobacco stores, bars, or any other establishment for which

13 the minimum age for admission is ~~eighteen~~ twenty-one. [L 2013, c 227,

14 §3]



Hawaii Chapter

LATE

AAP - Hawaii Chapter
5414 Kirkwood Place
Honolulu, HI 96821

February 7, 2014

Hawaii Chapter Board

President
R. Michael Hamilton, MD, MS, FAAP
Department of Pediatrics,
Hawaii Permanente Medical Group
2828 Paa Street
Mapunapuna Clinic, 2nd Floor
Honolulu, HI 96819
Phone : 808/432-5604
Fax : 808/432-5601
Email: Michael.R.Hamilton@kp.org

TO: Representative Della Au Belatti, Chair
Representative Dee Morikawa, Vice Chair
Members of House Committee on Health

Re: Support for HB2133

Vice President
Mae S. I. Kyono, MD, FAAP
1319 Punahou Street, 7th Floor
Honolulu, HI 96826
Phone: 808/780-5286
Fax: 808/983-6109
Email: mkyono@hawaii.edu

Dear House Committee on Health:

On behalf of the keiki and young adults of our state, the American Academy of Pediatrics, Hawai`i Chapter, strongly supports HB2133, which raises the age of sale of tobacco products to 21.

Secretary
Josephine Quensell, MD, FAAP
1319 Punahou Street, Suite 1050
Honolulu, HI 96826
Phone: 808/942-8144
Fax: 808/955-3827
Email: quensell@hawaii.edu

According to the 2012 Surgeon General's report, over 90% of adult smokers start smoking before age 21. Raising the age for purchasing tobacco products is an effective barrier in helping reduce the numbers of young people who start smoking.

Treasurer
Milette Oliveros, MD, FAAP
1319 Punahou Street
Honolulu, HI 96826
Email:
Milette.Oliveros@kapiolani.org

Tobacco use is the leading cause of preventable death and illness in the United States and in Hawai`i. It costs our state over \$336 million in healthcare expenditures every year. More than 1,000 people die in Hawai`i every year from tobacco use.

Chapter Executive Director
Kathryn Sithay
5414 Kirkwood Place
Honolulu, HI 96821
Phone: 808/377-5738
Fax: 808/377-3683
E-mail: ksthay@aap.net

In addition, the reduction in smoking among the people of Hawaii will result in the improved health for our keiki and decreased medical costs caused by tobacco use. Nicotine is one of the most addictive substances, and any measure that helps reduce or delay young people's access to tobacco will be beneficial for the health and well-being of many in Hawai`i.

Immediate Past President
Kenneth T. Nakamura, MD, FAAP
1319 Punahou Street, Room 743
Honolulu, HI 96826
Phone: 808/983-8020
Fax: 808/983-6343
E-mail: kennethn@kapiolani.org

Thank you for caring for the keiki and young adults of Hawai`i and for taking the time to consider our testimony in support of this measure.

Chapter Web site
www.hawaii.aap.org

Sincerely,

AAP Headquarters
141 Northwest Point Blvd
Elk Grove Village, IL 60007-1098
Phone: 847/434-4000
Fax: 847/434-8000
E-mail: kidsdocs@aap.org
www.aap.org

R. Michael Hamilton, MD, FAAP
President

LATE



To: The Honorable Agnus L.K. McKelvey, Chair, Committee on Consumer Protection & Commerce
The Honorable Derek SK Kawakami, Vice Chair, Committee on Consumer Protection & Commerce
Members, House Committee on Consumer Protection & Commerce

The Honorable Karl Rhoads, Chair, Committee on Judiciary
The Honorable Sharon E. Har, Vice Chair, Committee on Judiciary
Members, House Committee on Judiciary

From: Jessica Yamauchi, Executive Director

Date: February 18, 2014

Hrg: House Committee on Consumer Protection & Commerce and House Committee on Judiciary; Wednesday, February 19, 2014 at 2:15 p.m. in Rm 325

Re: **Support with Recommendations for HB 2133, HD1, Relating to Health**

Thank you for the opportunity to offer testimony in **support of and to offer recommendations** on HB 2133, which raises the age of sale of tobacco products and electronic smoking devices to 21.

The Coalition for a Tobacco Free Hawaii (Coalition) is a program of the Hawaii Public Health Institute working to reduce tobacco use through education, policy and advocacy. Our program consists of over 100 member organizations and 2,000 advocates that work to create a healthy Hawaii through comprehensive tobacco prevention and control efforts.

The Coalition supports raising the age of sale of tobacco products to 21 to help prevent the initiation of tobacco use among youth.

5,600 kids in Hawaii try smoking for the first time each year and 1,400 kids in Hawaii become regular smokers each year.¹ According to the US Surgeon General's report in 2012, 95% of all adult smokers start smoking before the age of 21.² 1,100 people die from tobacco use or exposure in Hawaii each year.³

¹ Hawaii State Department of Health, Tobacco Prevention and Education Program. (2011). *Data Highlights from the 2011 Hawaii Youth Tobacco Survey (YTS) and Comparisons with Prior Years*. Available at http://health.hawaii.gov/about/files/2013/06/2011_HYTS.pdf

² U.S. Department of Health and Human Services. Preventing Tobacco Use Among Youth and
320 Ward Avenue, Ste. 212 • Honolulu, HI 96814 • (808) 591-6508 • www.tobaccofreehawaii.org

**The Coalition for a Tobacco-Free Hawaii is a program of the Hawaii Public Health Institute*



According to the Tobacco Control Legal Consortium, raising the minimum legal sale age of tobacco is an effective policy in reducing or delaying smoking initiation among youth. Delaying the age that youth begin using tobacco will reduce the risk that they will become regular smokers as they get older, leading to lower prevalence rates and saving millions of dollars in health care costs.⁴

Most recently, Hawaii County and New York City passed laws that raise the minimum legal age of sale of tobacco to 21. In a recent poll conducted by Qmark for the Coalition, 72% of Hawaii residents would support a law raising the age of sale of tobacco to 21. This measure will continue to place Hawaii at the forefront of tobacco prevention and control.

The Coalition recommends amending Hawaii Revised Statutes (HRS) sections 328J-16(a)(1) and 328J-16(c)(2), which concerns vending machines, and HRS section 328J-18(b)(2), which concerns retail tobacco stores, bars, and other establishments.

To provide continuity and avoid disparities, the Coalition recommends adding in language from SB 2029 SD 1:

The sale or distribution at no charge of cigarettes by the following methods is prohibited from cigarette vending machines unless the vending machine is located in a bar, cabaret, or any establishment for which the minimum age for admission is [~~eighteen~~] twenty-one; provided that this paragraph shall not apply to such sales or distribution of individuals born on or before June 30, 1996. HRS § 328J(a)(1).

Young Adults: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2012.

³ Campaign for Tobacco-Free Kids, *The Toll of Tobacco in Hawaii*.

http://www.tobaccofreekids.org/facts_issues/toll_us/hawaii

⁴ <http://publichealthlawcenter.org/sites/default/files/resources/tclc-guide-minimumlegal-saleage-2013.pdf>

320 Ward Avenue, Ste. 212 • Honolulu, HI 96814 • (808) 591-6508 • www.tobaccofreehawaii.org

**The Coalition for a Tobacco-Free Hawaii is a program of the Hawaii Public Health Institute*



This section shall not apply to commercial establishments where access to the premises ~~[by]~~ is prohibited by law for persons under ~~[eighteen]~~ twenty-one years of age; provided that this paragraph shall not apply to such access to individuals born on or before June 30, 1996. HRS § 328J-16(c)(2).

This section shall not apply to retail tobacco stores, bars, or any other establishment for which the minimum age for admission is ~~[eighteen]~~ twenty-one. HRS § 328J-18(b)(2).

Thank you for the opportunity to testify on this matter.

A handwritten signature in black ink that reads "Jessica Yamauchi". The signature is written in a cursive, flowing style.

Jessica Yamauchi, MA
Executive Director

kawakami3-Benigno

From: mailinglist@capitol.hawaii.gov
Sent: Tuesday, February 18, 2014 7:48 PM
To: CPCtestimony
Cc: mz9995@hotmail.com
Subject: Submitted testimony for HB2133 on Feb 19, 2014 14:15PM



HB2133

Submitted on: 2/18/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Michael Zehner	Hawaii Smokers Alliance	Oppose	Yes

Comments: The Hawaii Smokers Alliance Strongly Opposes HB2133 for several reasons. 1. The bill would make it illegal for military personnel who already smoke that transfer to Hawaii to buy tobacco products. Please keep in mind that junior military personnel often do not have choice of duty stations. 2. HB2133 would prohibit tourists from obtaining tobacco to smoke while in Hawaii. They then would have two options, buy the tobacco outside Hawaii were our retailers don't get the sales, or buy it illegally off of someone. Is this the message we want to send to our visitors? 3. This bill does not have the need that the 21 year old drinking age had. That age was pushed only because of the high numbers of DUI car crashes caused by 18-21 year olds. It was NOT intended to prevent someone from one day drinking to much as an older adult. It was not intended as a sumptuary law. 4. The e-cigarette ban is not justified by any proven fact or science. It is just another bill to help the big drug companies that market nicotine replacement products (NRTs) such as gum, patches, and the dangerous drug Chantrix limit or destroy their e-cig competition. Please keep in mind that Tobacco Free Hawaii lists Pfizer, which markets NRT's such as Chantrix as a "Major Funder". As a lawmaker, opposing this bill DOESN'T make you "pro-smoking", only saying that certain issues make it problematic to enforce on people. Please do not let this bill advance and mahalo for your time.

Please note that testimony submitted less than 24 hours prior to the hearing, improperly identified, or directed to the incorrect office, may not be posted online or distributed to the committee prior to the convening of the public hearing.

Do not reply to this email. This inbox is not monitored. For assistance please email webmaster@capitol.hawaii.gov



February 18, 2014

To: The Honorable Angus L. K. McKelvey, Chair
Members, House Committee on Consumer Protection and Commerce
The Honorable Karl Rhodes, Chair
Members, House Committee on Judiciary

From: Cory Smith, VOLCANO Fine Electronic Cigarettes®
President and Owner

RE: HB2133 – oppose.

Thank you for the opportunity to submit testimony.

VOLCANO Fine Electronic Cigarettes® is the largest manufacturer and retailer of vapor products and vaping accessories here in the State of Hawaii and is widely considered one of the fastest growing companies in the state. We currently own and operate 11 locations statewide and employ over 100 full-time workers to support sales of our products not only here in Hawaii, but to all 50 states as well as Japan and the UK. We stand in opposition to HB2133 for the following:

- HB2133 unfairly restricts sales of vapor products to young adults between the ages of 18 and 21. This prohibition even extends to vapor products that do not contain nicotine, yet it does not apply to tobacco-free and nicotine-free products like herbal cigarettes or imitation snuff.
- While we agree with Hawaii's existing prohibition on the sale of nicotine-containing and non-nicotine electronic cigarettes to those under the age of 18, we feel that this bill reaches too far. It is widely accepted across the US that 18 is the year at which a person becomes an adult and is able to make decisions in regards to their own health and well-being. We agree with this standard. By arbitrarily forcing this restriction on young adults -- including those young adults who can legally purchase tobacco products or electronic cigarettes today -- it could have the unintended consequence of encouraging them to engage in what could be perceived as 'dangerous behavior.' This feeds into the same prohibition mentality that has been proven to not work time and time again over many decades of well-intentioned legislative sessions.
- HB2133 does not include bans on nicotine containing cessation products such as lozenges, patches, inhalers and other nicotine containing products. Evidence indicates that these products have risk profiles similar to electronic cigarettes.



- The Food and Drug Administration (FDA) has wisely taken its time on developing regulations for the vapor product industry and has not determined that these products are in fact tobacco products . At this time, with the exception of youth access laws targeted at keeping electronic cigarettes out of the hands of those below the age of 18, we feel that any action by state legislatures with regard to electronic cigarettes is premature.

Thank you for your time and consideration. If you have any questions, please feel free to contact me or Volcano's representative Celeste Nip at nipfire@me.com.

Sincerely,
Cory Smith
President and Owner
Volcano Fine Electronic Cigarettes

1003 Sand Island Access Rd. Suite #1260, Honolulu, HI 96813

LATE

kawakami3-Benigno

From: mailinglist@capitol.hawaii.gov
Sent: Tuesday, February 18, 2014 2:25 PM
To: CPCtestimony
Cc: jchangworld@gmail.com
Subject: Submitted testimony for HB2133 on Feb 19, 2014 14:15PM

HB2133

Submitted on: 2/18/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Jessica Chang	Individual	Oppose	No

Comments: This bill is disrespectful to young adult constituents.

Please note that testimony submitted less than 24 hours prior to the hearing, improperly identified, or directed to the incorrect office, may not be posted online or distributed to the committee prior to the convening of the public hearing.

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LATE

Dear Chairs McKelvey and Rhoads, Vice-Chairs Kawakami and Har, and Members of the Committees,

Thank you for the opportunity to speak out AGAINST HB2133, which would raise the legal age for tobacco use to 21 and also include e-liquid vaporizing (AKA e-cigarette use or vaping) in the law. My primary opposition is to including vaping in this bill, which is not justified in any way.

Although reduction in smoking-related health costs is a positive goal, it should be balanced with the positive goal of maintaining the freedom to make personal choices. In the case of vaping, there are no smoking-related health costs. Vaping health costs as far as we know today are negligible, and if used as smoking cessation, there may actually be benefits.

Vaping is not smoking. There is a large and growing body of science showing that vaping produces little to none of the exposure to harmful substances found in tobacco smoke. Studies have also shown that “secondhand vapor” is effectively nonexistent – no dangerous substances are detectable in room air, and even nicotine ranges from very low to undetectable.

I have attached a recent independent, peer-reviewed study that outlines the current science-based policy prescriptions for vaping. The conclusion is:

(A)ny regulatory decisions should not compromise the variability of choices for consumers and should make sure that ECs are more easily accessible compared with their main competitor, the tobacco cigarette. Consumers deserve, and should make, informed decisions and research will definitely promote this. In particular, current data on safety evaluation and risk assessment of ECs is sufficient enough to avert restrictive regulatory measures as a consequence of an irrational application of the precautionary principle [Saitta et al. 2014].

ECs are a revolutionary product in tobacco harm reduction. Although they emit vapor, which resembles smoke, there is literally no fire (combustion) and no ‘fire’ (suspicion or evidence that they may be the cause for disease in a similar way to tobacco cigarettes). Due to their unique characteristics, **ECs represent a historical opportunity to save millions of lives and significantly reduce the burden of smoking-related diseases worldwide.**

Tobacco and/or nicotine use is legal. We as a society have decided that certain substances may be used recreationally. Eighteen is the age of majority in Hawaii and that is the age at which a person should by default be allowed to make their own decisions about recreational substance use. The way to address use is not to take responsibility for the decision away from the individual; that will just continuously delay the age of responsibility.

It is hypocritical to take away certain choices at 18. We allow adults to enter into contracts at 18, notably, a person can contract to do military service. Saying that a person is responsible enough to understand the implications of that agreement -- with the possibility of exposure to dangerous situations and toxic environments, plus the high incidence of long-term mental health issues -- is not compatible with the assertion that they are too irresponsible to understand the implications of nicotine use.

P. Kuromoto, Honolulu, HI

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Safety evaluation and risk assessment of electronic cigarettes as tobacco cigarette substitutes: a systematic review

Konstantinos E. Farsalinos and Riccardo Polosa

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Safety evaluation and risk assessment of electronic cigarettes as tobacco cigarette substitutes: a systematic review

Konstantinos E. Farsalinos and Riccardo Polosa

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Abstract: Electronic cigarettes are a recent development in tobacco harm reduction. They are marketed as less harmful alternatives to smoking. Awareness and use of these devices has grown exponentially in recent years, with millions of people currently using them. This systematic review appraises existing laboratory and clinical research on the potential risks from electronic cigarette use, compared with the well-established devastating effects of smoking tobacco cigarettes. Currently available evidence indicates that electronic cigarettes are by far a less harmful alternative to smoking and significant health benefits are expected in smokers who switch from tobacco to electronic cigarettes. Research will help make electronic cigarettes more effective as smoking substitutes and will better define and further reduce residual risks from use to as low as possible, by establishing appropriate quality control and standards.

Keywords: electronic cigarettes, e-liquid, e-vapor, harm reduction, nicotine, safety, tobacco

Introduction

Complete tobacco cessation is the best outcome for smokers. However, the powerful addictive properties of nicotine and the ritualistic behavior of smoking create a huge hurdle, even for those with a strong desire to quit. Until recently, smokers were left with just two alternatives: either quit or suffer the harmful consequences of continued smoking. This gloomy scenario has allowed the smoking pandemic to escalate, with nearly 6 million deaths annually and a predicted death toll of 1 billion within the 21st century [World Health Organization, 2013]. But a third choice, involving the use of alternative and much safer sources of nicotine with the goal to reduce smoking-related diseases is now available: tobacco harm reduction (THR) [Rodu and Godshall, 2006].

Electronic cigarettes (ECs) are the newest and most promising products for THR [Polosa *et al.* 2013b]. They are electrically-driven devices consisting of the battery part (usually a lithium battery), and an atomizer where liquid is stored and is aerosolized by applying energy and generating heat to a resistance encircling a wick. The liquid used mainly consists of propylene glycol, glycerol,

distilled water, flavorings (that may or may not be approved for food use) and nicotine. Consumers (commonly called ‘vapers’) may choose from several nicotine strengths, including non-nicotine liquids, and a countless list of flavors; this assortment is a characteristic feature that distinguishes ECs from any other THR products. Since their invention in 2003, there has been constant innovation and development of more efficient and appealing products. Currently, there are mainly three types of devices available [Dawkins, 2013], depicted in Figure 1. (1) First-generation devices, generally mimicking the size and look of regular cigarettes and consisting of small lithium batteries and cartomizers (i.e. cartridges, which are usually prefilled with a liquid that bathes the atomizer). Batteries may be disposable (to be used once only) or rechargeable. (2) Second-generation devices, consisting mainly of higher-capacity lithium batteries and atomizers with the ability to refill them with liquid (sold in separate bottles). In the most recent atomizers you can simply change the atomizer head (resistance and wick) while keeping the body of the atomizer, thus reducing the operating costs. (3) Third-generation devices (also called ‘Mods’, from modifications),

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Figure 1. Examples of electronic cigarette devices currently available on the market.

consisting of very large-capacity lithium batteries with integrated circuits that allow vapors to change the voltage or power (wattage) delivered to the atomizer. These devices can be combined with either second-generation atomizers or with rebuildable atomizers, where the consumers have the ability to prepare their own setup of resistance and wick.

Awareness and use (vaping) of ECs has increased exponentially in recent years. Data obtained from the HealthStyles survey showed that, in the US, awareness of ECs rose from 40.9–57.9% from 2010 to 2011, with EC use rising from 3.3–6.2% over the same time period [King *et al.* 2013]. In the United Kingdom, EC use in regular smokers increased from 2.7% in 2010 to 6.7% in 2012 [Dockrell *et al.* 2013]. Similar findings were obtained from the International Tobacco Control Four-Country Survey [Adkison *et al.* 2013]. A recent prospective study in Swiss army recruits showed that 12% of smokers who tried ECs progressed to daily use [Dauptcheva *et al.* 2013]. It must be noted that this increase in EC use has occurred despite the concerns raised by public health authorities about the safety and appropriateness of using these products as alternatives to smoking [National Association of Attorneys General, 2013; Food and Drug Administration, 2009; Mayers, 2009].

The popularity of ECs may be due to their ability to deal both with the physical (i.e. nicotine) and the behavioral component of smoking addiction. In particular, sensory stimulation [Rose and Levin, 1991] and simulation of smoking behavior and cigarette manipulation [Hajek *et al.* 1989] are important determinants of a product's effectiveness in reducing or completely substituting smoking. These features are generally absent in nicotine replacement therapies (NRTs) and oral

medications for nicotine dependence, whereas ECs are unique in that they provide rituals associated with smoking behavior (e.g. hand-to-mouth movement, visible 'smoke' exhaled) and sensory stimulation associated with it [Farsalinos *et al.* 2013b]. This explains why these products can be effective in reducing consumption of tobacco smoking [Bullen *et al.* 2013; Caponnetto *et al.* 2013b; Polosa *et al.* 2011] and are efficient as long-term substitutes of conventional cigarettes [Farsalinos *et al.* 2013b].

Methods

For this systematic review (Figure 2), we searched the PubMed electronic database by using keywords related to ECs and/or their combination (e-cigarette, electronic cigarette, electronic nicotine delivery systems). We obtained a total of 354 results, and selected 41 studies we judged relevant to research on EC safety/risk profile. Reference lists from these studies were also examined to identify relevant articles. We searched additional information in abstracts presented at scientific congresses (respiratory, cardiovascular, tobacco control, toxicology), and in reports of chemical analyses on EC samples that were available online. We also looked for selected studies on chemicals related to EC ingredients (e.g. nicotine, propylene glycol, glycerol, cinnamaldehyde, microparticles emission, etc.), but not specifically evaluated in EC research. In total, 97 publications were found, from which 15 chemical analyses of single or a limited number of EC samples were excluded because they were discussed in a review paper [Cahn and Siegel, 2011]. In total, 114 studies are cited in this paper.

Risk differences compared with conventional cigarettes and the issue of nicotine

Conventional cigarettes are the most common form of nicotine intake. Smoking-related diseases are pathophysiologically attributed to oxidative stress, activation of inflammatory pathways and the toxic effect of more than 4000 chemicals and carcinogens present in tobacco smoke [Environmental Protection Agency, 1992]. In addition, each puff contains $>1 \times 10^{15}$ free radicals [Pryor and Stone, 1993]. All of these chemicals are emitted mostly during the combustion process, which is absent in ECs. Although the addictive potential of nicotine and related compounds is largely documented [Guillem *et al.*

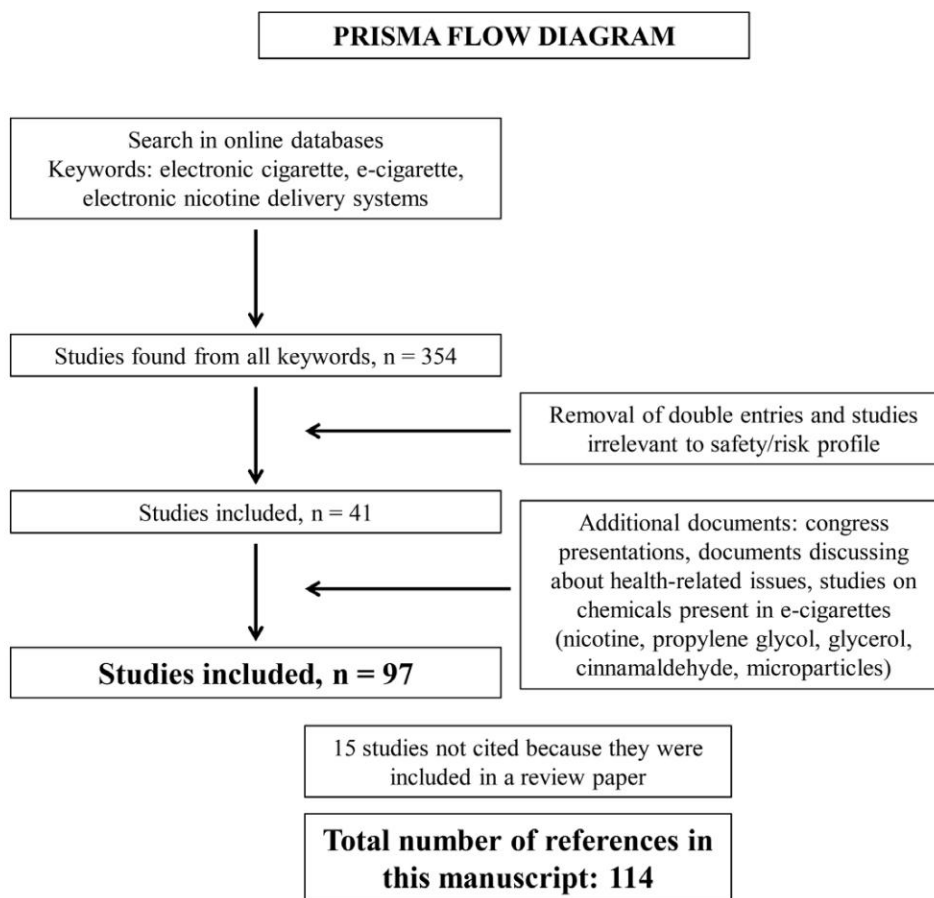


Figure 2. Methodology for literature research and selection of studies.

2005], much less dissemination has been given to the notion that nicotine does not contribute to smoking-related diseases. It is not classified as a carcinogen by the International Agency for Research on Cancer [WHO-IARC, 2004] and does not promote obstructive lung disease. A major misconception, commonly supported even by physicians, is that nicotine promotes cardiovascular disease. However, it has been established that nicotine itself has minimal effect in initiating and promoting atherosclerotic heart disease [Ambrose and Barua, 2004]. It does not promote platelet aggregation [Zevin *et al.* 1998], does not affect coronary circulation [Nitenberg and Antony, 1999] and does not adversely alter the lipid profile [Ludviksdottir *et al.* 1999]. An observational study of more than 33,000 smokers found no evidence of increased risk for myocardial infarction or acute stroke after NRT subscription, although follow up was only 56 days [Hubbard *et al.* 2005]. Up to 5 years of nicotine gum use in the Lung Health Study was unrelated

to cardiovascular diseases or other serious side effects [Murray *et al.* 1996]. A meta-analysis of 35 clinical trials found no evidence of cardiovascular or other life-threatening adverse effects caused by nicotine intake [Greenland *et al.* 1998]. Even in patients with established cardiovascular disease, nicotine use in the form of NRTs does not increase cardiovascular risk [Woolf *et al.* 2012; Benowitz and Gourlay, 1997]. It is anticipated that any product delivering nicotine without involving combustion, such as the EC, would confer a significantly lower risk compared with conventional cigarettes and to other nicotine containing combustible products.

The importance of using nicotine in the long-term was recognized several years ago by Russell, indicating that the potential of nicotine delivery systems as long-term alternatives to tobacco should be explored in order to make the elimination of tobacco a realistic future target [Russell, 1991]. However, current regulations restrict the

long-term use of pharmaceutical or recreational nicotine products (such as snus) [Le Houezec *et al.* 2011]. In other words, nicotine intake has been demonized, although evidence suggests that, besides being useful in smoking cessation, it may even have beneficial effects in a variety of disorders such as Parkinson's disease [Nielsen *et al.* 2013], depression [McClernon *et al.* 2006], dementia [Sahakian *et al.* 1989] and ulcerative colitis [Guslandi, 1999]. Obviously, the addictive potential is an important factor in any decision to endorse nicotine administration; however, it should be considered as slight 'collateral damage' with minimal impact to vapers' health compared with the tremendous benefit of eliminating all disease-related substances coming from tobacco smoking. In fact, smokers are already addicted to nicotine; therefore the use of a 'cleaner' form of nicotine delivery would not represent any additional risk of addiction. Surveys have shown that ECs are used as long-term substitutes to smoking [Dawkins *et al.* 2013; Etter and Bullen, 2012]. Although consumers try to reduce nicotine use with ECs, many are unable to completely stop its intake, indicating an important role for nicotine in the ECs' effectiveness as a smoking substitute [Farsalinos *et al.* 2013b].

Nicotine overdose or intoxication is unlikely to occur with vaping, since the amount consumed [Farsalinos *et al.* 2013c] and absorbed [Nides *et al.* 2014; Dawkins and Corcoran, 2013] is quite low. Moreover, although not yet proven, it is expected that vapers will self-titrate their nicotine intake in a similar way to tobacco cigarettes [Benowitz *et al.* 1998]. Last, but not least, there is evidence suggesting that nicotine cannot be delivered as fast and effectively from ECs compared to tobacco cigarettes [Farsalinos *et al.* 2014]. Therefore, it seems that ECs have a huge theoretical advantage in terms of health risks compared with conventional cigarettes due to the absence of toxic chemicals that are generated in vast quantities by combustion. Furthermore, nicotine delivery by ECs is unlikely to represent a significant safety issue, particularly when considering they are intended to replace tobacco cigarettes, the most efficient nicotine delivery product.

Studies on the safety/risk profile of ECs

Findings on the safety/risk profile of ECs have just started to accumulate. However, this research must be considered work in progress given that the safety/risk of any product reflects an evolving

body of knowledge and also because the product itself is undergoing constant development.

Existing studies about the safety/risk profile of ECs can be divided into chemical, toxicological and clinical studies (Table 1). Obviously, clinical studies are the most informative, but also the most demanding because of several methodological, logistical, ethical and financial challenges. In particular, exploring safety/risk profile in cohorts of well-characterized users in the long-term is required to address the potential of future disease development, but it would take hundreds of users to be followed for a substantial number of years before any conclusions are made. Therefore, most research is currently focused on *in vitro* effects, with clinical studies confined into evaluation of short-term use or pathophysiological mechanisms of smoking-related diseases.

Chemical studies

Chemical studies are relatively simple and cheap to perform and provide quick results. However, there are several disadvantages with this approach. Research is usually focused on the known specific chemicals (generally those known to be toxic from studies of cigarette smoke) and fails to address unknown, potentially toxic contaminants that could be detected in the liquid or the emitted aerosol. Problems may also arise from the detection of the chemicals in flavors. Such substances, although approved for use in the food industry, have largely unknown effects when heated and inhaled; thus, information on the presence of such substances is difficult to interpret in terms of *in vivo* effects. In fact, chemical studies do not provide any objective information about the effects of use; they can only be used to calculate the risk based on theoretical models and on already established safety levels determined by health authorities. An overview of the chemical studies performed on ECs is displayed in Table 2.

Laugesen performed the first studies evaluating the chemical composition of EC aerosols [Laugesen, 2008, 2009]. The temperature of the resistance of the tested EC was 54°C during activation, which is approximately 5–10% of the temperature of a burning tobacco cigarette. Toxic chemicals such as heavy metals, carcinogenic polycyclic aromatic hydrocarbons and phenols were not detected, with the exception of trivial amounts of mercury (0.17 ng per EC) and traces of formaldehyde and acetaldehyde. Laugesen

Table 1. Types of studies performed to determine safety and to estimate risk from EC use.

Type of studies	Research subject	Advantages	Disadvantages
Chemical studies	Evaluate the chemical composition of liquids and/or aerosol. Examine environmental exposure (passive 'vaping').	Easier and faster to perform. Less expensive. Could realistically be implemented for regulatory purposes.	Usually targeted on specific chemicals. Unknown effects of flavorings when inhaled. No validated protocols for vapor production. Provide no objective evidence about the end results (effects) of use (besides by applying theoretical models).
Toxicological studies	Evaluate the effects on cell cultures or experimental animals.	Provide some information about the effects from use.	Difficult to interpret the results in terms of human <i>in vivo</i> effects. More expensive than chemical studies. Need to test aerosol and not liquid. Standards for exposure protocols have not been clearly defined.
Clinical studies	Studies on human <i>in vivo</i> effects.	Provide definite and objective evidence about the effects of use.	Difficult and expensive to perform. Long-term follow up is needed due to the expected lag from initiation of use to possible development of any clinically evident disease. For now, limited to acute effects from use.

evaluated emissions based on a toxicant emissions score and reported a score of 0 in ECs compared with a score of 100–134 for tobacco cigarettes (Figure 3). The US Food and Drug Administration (FDA) also performed chemical analyses on 18 commercially available products in 2009 [Westenberger, 2009]. They detected the presence of tobacco-specific nitrosamines (TSNAs) but did not declare the levels found. Small amounts of diethylene glycol were also found in one sample, which was unlikely to cause any harm from normal use. Another study identified small amounts of amino-tandafil and rimonabant in EC liquids [Hadwiger *et al.* 2010]. Subsequently, several laboratories performed similar tests, mostly on liquids, with Cahn and Siegel publishing a review on the chemical analyses of ECs and comparing the findings with tobacco cigarettes and other tobacco products [Cahn and Siegel, 2011]. They reported that TSNA levels were similar to those measured in pharmaceutical NRTs. The authors concluded that, based on chemical analysis, ECs are far less harmful compared with tobacco cigarettes. The most comprehensive study on TSNAs has been performed recently by a South Korean group, evaluating 105 liquids obtained from local retailers [Kim and Shin, 2013]. On average, they found 12.99 ng TSNAs per ml of liquid, with the amount of daily exposure to the users estimated to be similar to users of NRTs [Farsalinos *et al.* 2013d]. The estimated daily exposure to nitrosamines from tobacco cigarettes (average consumption of 15 cigarettes per day) is estimated to be up to 1800 times higher

compared with EC use (Table 3). Etter and colleagues evaluated the accuracy of nicotine labeling and the presence of nicotine impurities and degradation products in 20 EC liquid samples [Etter *et al.* 2013]. They found that nicotine levels were 85–121% of what was labeled, while nicotine degradation products were present at levels of 0–4.4%. Although in some samples the levels were higher than those specified in European Pharmacopoeia, they are not expected to cause any measurable harm to users.

Besides the evaluation for the presence of TSNAs, analyses have been performed for the detection of carbonyl compounds. It is known that the thermal degradation of propylene glycol and glycerol can lead to the emission of toxic compounds such as aldehydes [Antal *et al.* 1985; Stein *et al.* 1983]. Goniewicz and colleagues evaluated the emission of 15 carbonyls from 12 brands of ECs (mostly first-generation) [Goniewicz *et al.* 2013]. In order to produce vapor, researchers used a smoking machine and followed a regime of 1.8-second puffs with a very short 10-second interpuff interval, which does not represent realistic use [Farsalinos *et al.* 2013c]; although the puff duration was low, interpuff interval was remarkably short, which could potentially lead to overheating. In addition, the same puff number was used in all devices tested, although there was a significant difference in the design and liquid content between devices. Despite these limitations, out of 15 carbonyls, only 3 were detected (formaldehyde, acetaldehyde and acrolein); levels were

Table 2. Summary of chemical toxicity findings.

Study	What was investigated?	What were the key findings?	
		Liquid	Vapor
Laugesen [2009]	Evaluation of 62 toxicants in the EC vapour from Ruyan 16 mg and mainstream tobacco smoke using a standard smoking machine protocol.	N/A	No acrolein, but small quantities of acetaldehyde and formaldehyde found. Traces of TSNA (NNN, NNK, and NAT) detected. CO, metals, carcinogenic PAHs and phenols not found in EC vapour. Acetaldehyde and formaldehyde from tobacco smoke were 55 and 5 times higher, respectively.
Westenberger [2009]	Evaluation of toxicants in EC cartridges from two popular US brands.	TSNAs and certain tobacco specific impurities were detected in both products at very low levels. Diethylene glycol was identified in one cartridge.	N/A
Hadwiger <i>et al.</i> [2010]	Evaluation of four refill solutions and six replacement cartridges advertised as containing Cialis or rimonabant.	Small amounts of amino-tadalafil and rimonabant present in all products tested.	N/A
Cahn and Siegel [2011]	Overview of 16 chemical toxicity studies of EC liquids/vapours.	TSNAs levels in ECs 500- to 1400-fold lower than those in conventional cigarettes and similar to those in NRTs. Other chemicals found very low levels, which are not expected to result in significant harm.	
Pellegrino <i>et al.</i> [2012]	Evaluation of PM fractions and PAHs in the vapour generated from cartomizers of an Italian EC brand.	N/A	PM fractions were found, but levels were 6–18 times lower compared with conventional cigarettes. Traces of PAHs detected.
Kim and Shin [2013]	TSNAs (NNN, NNK, NAT, and NAB) content in 105 refill liquids from 11 EC brands purchased in Korean shops.	Total TSNAs averaged 12.99 ng/ml EC liquid; daily total TSNA exposure from conventional cigarettes estimated to be up to 1800 times higher.	N/A
Etter <i>et al.</i> [2013]	Nicotine degradation products, ethylene glycol and diethylene glycol evaluation of 20 EC refill liquids from 10 popular brands	The levels of nicotine degradation products represented 0–4.4% of those for nicotine, but for most samples the level was 1–2%. Neither ethylene glycol nor diethylene glycol were detected.	N/A
Goniewicz <i>et al.</i> [2013]	Vapours generated from 12 brands of ECs and a medicinal nicotine inhaler using a modified smoking machine protocol	N/A	Carbonyl compounds (formaldehyde, acetaldehyde and acrolein), VOCs (toluene and trace levels of xylene), trace levels of TSNA (NNN and NNK) and very low levels of metals (cadmium, nickel and lead) were found in almost all examined EC vapours. Trace amounts of formaldehyde, acetaldehyde, cadmium, nickel and lead were also detected from the Nicorette inhalator. Compared with conventional cigarette, formaldehyde, acetaldehyde and acrolein were 9–450 times lower; toluene levels 120 times lower; and NNN and NNK levels 380 and 40 times lower respectively.

(Continued)

Table 2. (Continued)

Study	What was investigated?	What were the key findings?	
		Liquid	Vapor
Williams <i>et al.</i> [2013]	Vapour generated from cartomizers of a popular EC brand using a standard smoking machine protocol	N/A	Trace levels of several metals (including tin, copper, silver, iron, nickel, aluminium, chromium, lead) were found, some of them at higher level compared with conventional cigarettes. Silica particles were also detected. Number of microparticles from 10 EC puffs were 880 times lower compared with one tobacco cigarette.
Burstyn [2014]	Systematic review of 35 chemical toxicity studies/technical reports of EC liquids/vapours.	No evidence of levels of contaminants that may be associated with risk to health. These include acrolein, formaldehyde, TSNAs, and metals. Concern about contamination of the liquid by a nontrivial quantity of ethylene glycol or diethylene glycol remains confined to a single sample of an early technology product and has not been replicated.	

Abbreviations. CO, carbon monoxide; EC, electronic cigarette; NAT, N-Nitrosoanatabine; NNK, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone; NNN, N-Nitrosornicotine; PAHs, polycyclic aromatic hydrocarbons; PM, particulate matter; TSNAs, tobacco-specific nitrosamines; VOCs, volatile organic carbons.

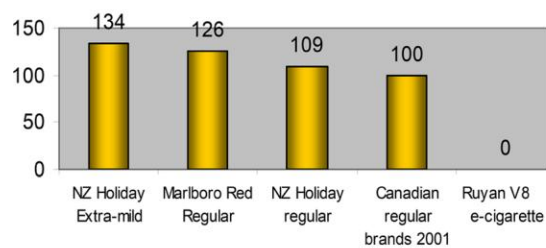


Figure 3. Toxic emissions score, adjusted for nicotine, for electronic cigarette and popular cigarette brands. [Reproduced with permission from Laugesen [2009]].

9–450 times lower compared with emissions from tobacco cigarettes (derived from existing literature but not tested in the same experiment). Formaldehyde and acetaldehyde were also emitted from the nicotine inhalator, although at lower levels. In addition, they examined for the presence of 11 volatile organic carbons and found only trace levels of toluene (at levels from 0.2–6.3 μg per 150 puffs) and xylene (from 0.1–0.2 μg per 150 puffs) in 10 of the samples; toluene levels were 120 times lower compared with tobacco cigarettes (again derived from existing literature but not tested in the same experiment).

Given that ECs have several metal parts in direct contact with the e-liquid, it is quite obvious to expect some contamination with metals in the vapor. Goniewicz and colleagues examined samples for the presence of 12 metals and found

nickel, cadmium and lead emitted [Goniewicz *et al.* 2013]; the levels of nickel were similar to those present in a pharmaceutical nicotine inhalator, while lead and cadmium were present at 2–3 times higher levels compared with the inhalator. Still, the absolute levels were very low (few nanograms per 150 puffs). Williams *et al.* [2013] focused their research on the presence of heavy metals and silicate particles emitted from ECs. They tested poor quality first-generation cartomisers and found several metals emitted in the aerosol of the EC, specifying that in some cases the levels were higher compared with conventional cigarettes. As mentioned earlier, it is not unusual to find trace levels of metals in the vapor generated by these products under experimental conditions that bear little relevance to their normal use; however, it is unlikely that such small amounts pose a serious threat to users' health. Even if all the aerosol was absorbed by the consumer (which is not the case since most of the aerosol is visibly exhaled), an average user would be exposed to 4–40 times lower amounts for most metals than the maximum daily dose allowance from impurities in medicinal products [US Pharmacopeia, 2013]. Silicate particles were also found in the EC aerosol. Such particles come from the wick material, however the authors did not clarify whether crystalline silica oxide particles were found, which are responsible for respiratory disease. In total, the number of microparticles (< 1000 nm) estimated to be inhaled by EC users from 10 puffs were 880 times lower compared

Table 3. Levels of nitrosamines found in electronic and tobacco cigarettes. Prepared based on information from Laugesen [2009], Cahn and Siegel [2011] and Kim and Shin [2013].

Product	Total nitrosamines levels (ng)	Daily exposure (ng)	Ratio ⁴
Electronic cigarette (per ml)	13	52 ¹	1
Nicotine gum (per piece)	2	48 ²	0.92
Winston (per cigarette)	3365	50 475 ³	971
Newport (per cigarette)	3885	50 775 ³	976
Marlboro (per cigarette)	6260	93 900 ³	1806
Camel (per cigarette)	5191	77 865 ³	1497

¹Based on average daily use of 4ml liquid
²Based on maximum recommended consumption of 24 pieces per day
³Based on consumption of 15 cigarettes per day
⁴ Difference (number-fold) between electronic cigarette and all other products in daily exposure to nitrosamines

with one tobacco cigarette. Similar findings concerning microparticles were reported by Pellegrino and colleagues who found that, for each particulate matter fraction, conventional cigarettes released 6–18 times higher amounts compared with the EC tested [Pellegrino *et al.* 2012].

Burstyn has recently reviewed current data on the chemistry of aerosols and the liquids of ECs (including reports which were not peer-reviewed) and estimated the risk to consumers based on workplace exposure standards (i.e. Threshold Limit Values [TLVs]) [Burstyn, 2014]. After reviewing all available evidence, the author concluded that there was no evidence that vaping produced inhalable exposure to contaminants of aerosol that would warrant health concerns. He added that surveillance of use is recommended due to the high levels of propylene glycol and glycerol inhaled (which are not considered contaminants but ingredients of the EC liquid). There are limited data on the chronic inhalation of these chemicals by humans, although there is some evidence from toxicological studies (which are discussed later in this paper).

In conclusion, chemical studies have found that exposure to toxic chemicals from ECs is far lower compared with tobacco cigarettes. Besides comparing the levels of specific chemicals released from tobacco and ECs, it should be taken into consideration that the vast majority of the >4000 chemicals present in tobacco smoke are completely absent from ECs. Obviously, surveillance of use is warranted in order to objectively evaluate the *in vivo* effects and because the effects of inhaling flavoring substances approved for food use are largely unknown.

Toxicological studies

To date, only a handful of toxicological studies have been performed on ECs, mostly cytotoxicity studies on established cell lines. The cytotoxicity approach also has its flaws. Findings cannot be directly applied to the *in vivo* situation and there is always the risk of over- (as well as under-)estimating the interpretation of the toxic effects in these investigational models. An ample degree of results variability is to be expected from different cell lines and, sometimes, also within the same cell line. Comparing the potential cytotoxicity effects of EC vapor with those resulting from the exposure of cigarette smoke should be mandatory, but standards for vapor production and exposure protocols have not been clearly defined.

Bahl and colleagues [Bahl *et al.* 2012] performed cytotoxicity tests on 36 EC liquids, in human embryonic stem cells, mouse neural stem cells and human pulmonary fibroblasts and found that stem cells were more sensitive to the effects of the liquids, with 15 samples being moderately cytotoxic and 12 samples being highly cytotoxic. Propylene glycol and glycerol were not cytotoxic, but a correlation between cytotoxicity and the number and height of the flavoring peaks in high-performance liquid chromatography was noted. Investigations were just restricted to the effect of EC liquids and not to their vapors, thus limiting the importance of the study findings; this is not a trivial issue considering that the intended use of these products is by inhalation only and that it is unlikely that flavoring substances in the EC liquids will still be present in the aerosol in the same amount due to differences in evaporation temperature [Romagna *et al.* 2013]. Regrettably, a set of experiments with cigarette smoke extracts as

comparator was not included. Of note, the authors emphasized that the study could have underestimated the cytotoxicity by 100 times because when they added the EC liquids to the cell, medium final concentration was 1%. However, cells were cultured for 48 hours with continuous exposure to the liquid, while in real use the lungs come in contact with aerosol instead of liquid, the contact lasts for 1–2 seconds per puff and most of the aerosol is visibly exhaled. Finally, Cinnamon Ceylon, the liquid found to be mostly cytotoxic in this study, was not a refill liquid but a concentrated flavor which is not used in ECs unless it is diluted to 3–5%.

Romagna and colleagues [Romagna *et al.* 2013] performed the first cytotoxicity study of EC vapor on fibroblast cells. They used a standardized ISO 10993-5 protocol, which is used for regulatory purposes of medical devices and products. They tested the vapor of 21 liquid samples containing the same amount of nicotine (9 mg/ml), generated by a commercially available EC device. Cells were incubated for 24 hours with each of these vapors and with smoke from a conventional cigarette. Only one sample was found to be marginally cytotoxic, whereas cigarette smoke was highly cytotoxic (approximately 795% more cytotoxic), even when the extract was diluted up to 25% of the original concentration.

The same group also investigated the cytotoxic potential of 20 EC liquid samples in cardiomyoblasts [Farsalinos *et al.* 2013a]. Vapor was produced by using a commercially available EC device. Samples contained a wide range of nicotine concentrations. A base liquid mixture of propylene glycol and glycerol (no nicotine and no flavorings) was also included as an additional experimental control. Four of the samples examined were made by using cured tobacco leaves in a steeping process, allowing them to impregnate a mixture of propylene glycol and glycerol for several days before being filtered and bottled for use. Of note, this was the first study which evaluated a limited number of samples with an EC device delivering higher voltage and energy to the atomizer (third-generation device). In total, four samples were found to be cytotoxic; three of them were liquids made by using cured tobacco leaves, with cytotoxicity observed at both 100% and 50% extract concentration, while one sample (cinnamon flavor) was marginally cytotoxic at 100% extract concentration only. In comparison, smoke from three tobacco cigarettes was highly cytotoxic, with toxicity observed even when the

extract was diluted to 12.5%. The samples made with tobacco leaves were three times less cytotoxic compared with cigarette smoke; this was probably due to the absence of combustion and the significantly lower temperature of evaporation in EC use. Concerning high-voltage EC use, the authors found slightly reduced cell viability without any of the samples being cytotoxic according to the ISO 10993-5 definition. Finally, no association between cell survival and the amount of nicotine present in the liquids was noted.

A recent study evaluated in more detail the cytotoxic potential of eight cinnamon-flavored EC liquids in human embryonic stem cells and human pulmonary fibroblasts [Behar *et al.* 2014]. The authors found that the flavoring substance predominantly present was cinnamaldehyde, which is approved for food use. They observed significant cytotoxic effects, mostly on stem cells but also on fibroblasts, with cytotoxicity associated with the amount of cinnamaldehyde present in the liquid. However, major methodological issues arose from this study. Once again, cytotoxicity was just restricted to EC liquids and not to their vapors. Moreover, the authors mentioned that the amount of cinnamaldehyde differed between liquids by up to 100 times, and this raises the suspicion of testing concentrated flavor rather than refills. By searching the internet and contacting manufacturers, based on the names of samples and suppliers mentioned in the manuscript, it was found that at least four of their samples were not refills but concentrated flavors. Surprisingly, the levels of cinnamaldehyde found to be cytotoxic were about 400 times lower than those currently approved for use [Environmental Protection Agency, 2000].

Few animal studies have been performed to evaluate the potential harm of humectants in EC liquids (i.e. propylene glycol and glycerol) when given by inhalation. Robertson and colleagues tested the effects on primates of inhaling propylene glycol vapor for several months and found no evidence of toxicity on any organ (including the lungs) after post-mortem examination of the animals [Robertson *et al.* 1947]. Similar observations were made in a recent study in rats and dogs [Werley *et al.* 2011]. Concerns have been raised in human use, based on studies of people exposed to theatrical fog [Varughese *et al.* 2005; American Chemistry Council, 2003] or propylene glycol used in the aviation industry [Wieslander *et al.* 2001]. Irritation of the respiratory tract was found, but no permanent lung injury or other

long-term health implications were detected. It should be reminded that, in these circumstances, nonpharmaceutical purity propylene glycol is used and in some cases oils are added, making it difficult to interpret the results in the context of EC use. Evidence for the potential harm of inhaled glycerol is sparse. A study using Sprague–Dawley rats found minimal to mild squamous metaplasia of the epiglottis epithelium in the high-dose group only, without any changes observed in lungs or other organs [Renne *et al.* 1992]. No comparative set of experiments with cigarette smoke was included, but it is well known that exposure to tobacco smoke in similar animal models leads to dramatic changes in the lungs, liver and kidneys [Czekaj *et al.* 2002].

In conclusion, toxicological studies have shown significantly lower adverse effects of EC vapor compared with cigarette smoke. Characteristically, the studies performed by using the liquids in their original liquid form have found less favorable results; however, no comparison with tobacco smoke was performed in any of these studies, and they cannot be considered relevant to EC use since the samples were not tested in the form consumed by vapers. More research is needed, including studies on different cell lines such as lung epithelial cells. In addition, it is probably necessary to evaluate a huge number of liquids with different flavors since a minority of them, in an unpredictable manner, appear to raise some concerns when tested in the aerosol form produced by using an EC device.

Clinical studies and research surveys

Clinical trials can be very informative, but they require monitoring of hundreds of users for many years to adequately explore the safety/risk profile of the products under investigation. Research surveys of EC users, on the other hand, can quickly provide information about the potential harm of these products and are much cheaper to run. However, self-reported data, highly self-selected study populations, and the cross-sectional design are some of the most common limitations of research surveys. Taken together, findings from surveys and follow-up studies of vapers have shown that EC use is relatively safe.

Polosa and colleagues followed up smokers for 24 months, after a 6-month period of intervention during which ECs were given [Polosa *et al.* 2013a]. Only mild symptoms such as mouth and throat

irritation and dry cough were observed. Farsalinos and colleagues retrospectively evaluated a group of 111 EC users who had completely quit smoking and were daily EC users for a median period of 8 months [Farsalinos *et al.* 2013b]. Throat irritation and cough were the most commonly reported side effects. Similar findings have been observed in surveys [Dawkins *et al.* 2013; Etter *et al.* 2011]. However, it is expected that dedicated users who have more positive experiences and fewer side effects compared with the general population participate in such studies, therefore interpretation should be done with caution. The only two existing randomized controlled trials have also included detailed EC safety analysis. The ECLAT study [Caponnetto *et al.* 2013b], a three-arm, controlled, randomized, clinical trial designed to compare efficacy and safety of a first-generation device with 7.2, 5.4, or 0 mg nicotine cartridges, reported clinically significant progressive health improvements already by week two of continuous use of the device, and no serious adverse events (i.e. major depression, abnormal behavior or any event requiring an unscheduled visit to the family practitioner or hospitalization) occurred during the study. The ASCEND study [Bullen *et al.* 2013], a three-arm, controlled, randomized, clinical trial designed to compare the efficacy and safety of a first-generation device (with or without nicotine) with nicotine patches, reported no serious adverse events in any of the three study groups.

Few clinical studies have been performed to evaluate the short-term *in vivo* effects of EC use in current or former smokers. Vardavas and colleagues evaluated the acute effects of using an EC for 5 minutes on respiratory function [Vardavas *et al.* 2012]. Although they did not report the results of commonly-used spirometry parameters, they found that a sensitive measure of airways resistance and nitric oxide levels in exhaled breath were adversely affected. Similar elevations in respiratory resistance were reported by other research groups [Palamidas *et al.* 2013; Gennimata *et al.* 2012], who also documented some bizarre elevation in exhaled carbon monoxide levels after EC use; this finding has been challenged by several other studies [Farsalinos *et al.* 2013f; Nides *et al.* 2014; Van Staden *et al.* 2013]. Schober and colleagues found that EC use led to elevated exhaled nitric oxide [Schober *et al.* 2013], contradicting the findings from Vardavas and colleagues [Vardavas *et al.* 2012]. Characteristically, none of the above studies performed any comparative tests after smoking tobacco cigarettes. Flouris and colleagues found

that only smoking had an acute adverse effect on respiratory function [Flouris *et al.* 2013]; no difference was observed after the group of smokers was exposed to active or passive EC use.

Two studies have evaluated the short-term effects of ECs on the cardiovascular system. Farsalinos and colleagues evaluated the acute effects of using ECs with an 11 mg/ml nicotine-containing liquid on hemodynamics and left ventricular function, in comparison with the effects of cigarette smoking [Farsalinos *et al.* 2012]. They found that EC use resulted in a slight elevation in diastolic blood pressure while, after smoking, both systolic and diastolic blood pressure and heart rate were significantly elevated. Obviously, this was due to the relatively low nicotine content of the EC (which is considered medium strength). Diastolic dysfunction was observed in smokers after smoking, which was in line with findings from previous studies. However, no adverse effects were observed in EC users after using the device *ad lib* for 7 minutes. Another study by the same group [Farsalinos *et al.* 2013], evaluated the acute effects of EC use on coronary flow. In particular, they measured the flow velocity reserve of the left anterior descending coronary artery by echocardiography after intravenous infusion of adenosine, representing the maximal ability of the artery to deliver blood to the myocardium. Smoking was associated with a decline in flow velocity reserve by 16% and an elevation in resistance to flow by 19%. On the contrary, no difference was observed in any of these parameters after using the EC. Blood carboxyhemoglobin levels were also measured in participants; baseline values were significantly higher in smokers compared with vapers and were further elevated after smoking but were not altered after EC use. Similar observations for carboxyhemoglobin levels were observed by Van Staden and colleagues [Van Staden *et al.* 2013].

A clinical case report of a smoker suffering from chronic idiopathic neutrophilia was published. According to that report [Farsalinos and Romagna, 2013], switching from smoking to EC use led to a reversal of the condition after 6 months. In addition, C-reactive protein levels, which were consistently elevated for more than 6 years, decreased to normal levels. Another case report of a patient with lipid pneumonia was published, with the condition attributed to glycerin-based EC liquids used by the patient [McCauley *et al.* 2012]. However, glycerin is an alcohol (polyol) and thus it is impossible to cause

lipid pneumonia. Only oil-based liquids could be the cause for this condition; such liquids should not be used with ECs.

One study evaluated the acute effects of tobacco and EC use on white blood cell count [Flouris *et al.* 2012]. Smoking one tobacco cigarette caused an immediate elevation in white blood cells, neutrophils and lymphocytes, indicating acute inflammatory distress. On the contrary, no differences were observed after using ECs.

In conclusion, clinical studies evaluating the effects of short-term EC use on selected cardiovascular and respiratory functional outcomes have shown that even if some harmful effects of vaping are reported, these are considerably milder compared with smoking conventional cigarettes. However, it is difficult to assess the prognostic implications of these studies; longer-term data are needed before any definite conclusions are made.

Passive vaping

Passive smoking is an established risk factor for a variety of diseases [Barnoya and Navas-Acien, 2013]. Therefore, it is important from a public health perspective to examine the impact of EC use on bystanders. Indirect data can be derived from chemical studies in vapor mentioned above, which show that the potential of any significant adverse effects on bystanders is minimal. In fact, since side-stream exposure is nonexistent in EC (aerosol is produced only during activation of the device, while tobacco cigarettes emit smoke even when no puffs are taken), such studies are undoubtedly overestimating the risk of environmental exposure.

Few studies have focused on second-hand vaping. McAuley and colleagues [McAuley *et al.* 2012], although mentioning indoor air quality in the title of their study and finding minimal health-related impact, did not in fact evaluate second-hand vaping because aerosol was produced from an EC device and was evaluated without previously being inhaled by any user. Moreover, there were some problems with cross-contamination with tobacco cigarette smoke, which made the results somewhat questionable, at least for some of the parameters tested. Schripp and colleagues [Schripp *et al.* 2013] evaluated the emissions from an EC by asking a volunteer to use three different EC devices in a closed 8 m³ chamber. From a selection of 20 chemicals analyzed, only formaldehyde, acrolein, isoprene, acetaldehyde and acetic acid were

detected. The levels were 5–40 times lower compared with emissions from a conventional cigarette. For formaldehyde, the authors specifically mentioned that the levels were continuously rising from the time the volunteer entered the room, even before he started using the EC. Moreover, no acute elevation was observed when the smoker used the three EC devices, contrary to the acute elevation and spiking of levels when a tobacco cigarette was lit. The authors concluded that formaldehyde was not emitted from the ECs but was due to human contamination, since low amounts of formaldehyde of endogenous origin can be found in exhaled breath [Riess *et al.* 2010]. Romagna and colleagues [Romagna *et al.* 2012] evaluated chemicals released in a realistic setting of a 60 m³ room, by asking five smokers to smoke *ad lib* for 5 hours and five vapers to use ECs *ad lib* for a similar period of time on two separate days. Nicotine, acrolein, toluene, xylene and polycyclic aromatic hydrocarbons were detected in room air after the smoking session, with the amount of total organic carbon (TOC) reaching to 6.66 mg/m³. In contrast, after the EC session, only glycerol was detected in minimal levels (72 µg/m³), while TOC reached a maximum level of 0.73 mg/m³. Characteristically, the amount of TOC accumulated after 5 hours of EC use was similar to the amount found after just 11 minutes of smoking. The study on heavy metals mentioned previously [Williams *et al.* 2013] could also be used to examine any potential risk of bystanders' exposure to toxic metals. The levels of heavy metals found in vapor were minimal, and considering the dispersion of these molecules in the whole room air, it is unlikely that any of these metals could be present in measurable quantities in the environment. Therefore, the risk for bystanders would be literally nonexistent. Contrary to that, Schober and colleagues [Schober *et al.* 2013] found that levels of aluminum were raised by 2.4 times in a 45 m³ room where volunteers were asked to use ECs for 2 hours. This is a highly unexpected finding which cannot be supported by the findings of the study by Williams and colleagues [Williams *et al.* 2013]; because the levels found in the latter could not result in such elevation of the environmental levels of aluminum, unless nothing is retained in or absorbed from the lungs. Moreover, Schober and colleagues [Schober *et al.* 2013] found that levels of polycyclic aromatic hydrocarbons (PAHs) were raised by 20% after EC use. However, a major methodological problem of this study is that control environmental measurements were performed on a separate day and not on the same day of EC

use. This is a major limitation, because the levels of environmental PAHs have significant diurnal and day-to-day variations [Ravindra *et al.* 2008]; therefore, it is highly likely that the differences in levels of PAHs (which are mainly products of combustion and are not expected to be emitted from EC use) represented changes due to environmental conditions and not due to EC use. Bertholon and colleagues [Bertholon *et al.* 2013] examined the EC aerosol exhaled from a user, in comparison with exhaled smoke from a smoker. The authors found that particle size diameters were 0.29–0.033 µm. They observed that the half life of EC aerosol was 11 seconds compared with 20 minutes for cigarette smoke, indicating that risk of passive vaping exposure is significantly lower compared with passive smoking.

The recent findings by Czogala and colleagues [Czogala *et al.* 2013] led to similar conclusions. The authors compared the emissions of electronic and conventional cigarettes generated by experienced dual users in a ventilated full-sized room and found that ECs may emit detectable amounts of nicotine (depending on the specific EC brand tested), but no carbon monoxide and volatile organic carbons. However, the average ambient levels of nicotine of ECs were 10 times lower than those of conventional cigarettes (3.32 ± 2.49 versus 31.60 ± 6.91 µg/m³).

In his review and comparison with TLVs, Burstyn found that emissions from ECs to the environment are not expected to pose any measurable risk for bystanders [Burstyn, 2014].

An issue that needs further clarification relates to the findings of microparticles emitted from ECs. In most studies, these findings are presented in a way implying that the risk is similar to environmental or smoking microparticles. In reality, it is not just the size but the composition of the microparticles that matters. Environmental microparticles are mainly carbon, metal, acid and organic microparticles, many of which result from combustion and are commonly called particulate matter. Particulate matter exposure is definitely associated with lung and cardiovascular disease [Peters, 2005; Seaton *et al.* 1995]. In the case of ECs, microparticles are expected to consist mostly of propylene glycol, glycerol, water and nicotine droplets. Metal and silica nanoparticles may also be present [Williams *et al.* 2013], but, in general, emissions from ECs are incomparable to environmental particulate matter or cigarette smoke microparticles.

Flouris and colleagues [Flouris *et al.* 2013] performed the only clinical study evaluating the respiratory effects of passive vaping compared with passive smoking. Researchers found significant adverse effects in spirometry parameters after being exposed to passive smoking for 1 hour, while no adverse effects were observed after exposure to passive vaping.

Although evaluating the effects of passive vaping requires further work, based on the existing evidence from environmental exposure and chemical analyses of vapor, it is safe to conclude that the effects of EC use on bystanders are minimal compared with conventional cigarettes.

Miscellaneous safety issues

Specific subpopulations: psychiatric and chronic obstructive pulmonary disorder patients

A challenging population subgroup with unique smoking patterns is that of psychiatric patients and in particular schizophrenic patients. This subpopulation is characterized by a very high smoking prevalence [De Leon and Diaz, 2005] with an excess of smoking-related mortality [Brown *et al.* 2000]. Currently, only NRTs are recommended to treat nicotine dependence in this specific subpopulation, but in general they are not particularly effective [Aubin *et al.* 2012]. ECs could be used as an alternative to smoking products in this group. Caponnetto and colleagues performed a prospective 12-month pilot study to evaluate the efficacy of EC use in smoking reduction and cessation in a group of 14 patients with schizophrenia [Caponnetto *et al.* 2013a]. In 50% of participants, smoking consumption went from 30 to 15 cigarettes per day at 52 weeks of follow up, while 14.3% managed to quit smoking. Importantly, no deterioration in their psychiatric condition was observed, and side effects were mild and temporary. The results were promising although an outdated EC device was used in this study.

There is also anecdotal evidence that successful smoking cessation could be attained by using an EC in smokers with other psychiatric conditions such as depression [Caponnetto *et al.* 2011a]. Both patients described in this case series stated that EC use was well tolerated and no adverse events were reported.

Considering that first-line oral medications for nicotine addiction are contraindicated in such patients (prescribing information for bupropion and varenicline carry a 'black-box' warning for certain psychiatric conditions), ECs may be a promising tool in these challenging patient groups.

Another subpopulation that may benefit from regular EC use is that of respiratory patients with chronic obstructive pulmonary disease (COPD), a progressive disease characterized by a persistent inflammatory response to tobacco smoke that generally leads to decline in lung function, respiratory failure, cor pulmonale and death. Consequently, smoking cessation plays a crucial part in the management of COPD patients. However, the available evidence in the medical literature indicates that COPD patients who smoke respond poorly to smoking cessation efforts [Schiller and Ni, 2006]. To date, no formal efficacy and safety assessment of EC use in COPD patients has been conducted. There is only evidence from a case report of inveterate smokers with COPD and a documented history of recurring relapses, who eventually quit tobacco smoking on their own by using an EC [Caponnetto *et al.* 2011b]. Significant improvement in quality of life and reduction in the number of disease exacerbations were noted. EC use was well tolerated with no reported adverse events.

Accidental nicotine exposure

Accidental ingestion of nicotine, especially by children, or skin contact with large amounts of liquid or highly concentrated nicotine solution can be an issue. However, the historically referenced lethal dose of 60 mg has recently been challenged in a review by Mayer [Mayer, 2013]; he found that the lethal levels currently reproduced in every document originated from dubious experiments performed in the 19th century. Based on post-mortem studies, he suggested that the acute dose associated with a lethal outcome would be 500–1000 mg. Taking into account that voluminous vomiting is the first and characteristic symptom of nicotine ingestion, it seems that far higher levels of nicotine need to be ingested in order to have lethal consequences.

A surveillance system of adverse events has been developed by the FDA, which identifies safety concerns in relation to tobacco products. Since 2008, 47 adverse events were reported for ECs

[Chen, 2013]. Eight of them were serious events such as hospitalizations for pneumonia, heart failure, seizures and hypotension and burns. A case of second-degree burns was caused by a battery explosion, which is generally a problem observed in lithium batteries and has occurred in other products (such as mobile phones). The author emphasized that the reported events were not necessarily associated with EC use but may have been related to pre-existing conditions or other causes. No condition was characteristically associated with EC use.

A recent review of the California Poison Control System database from 2010 to 2012 identified 35 cases (14 children) associated with EC exposure (accidental exposure in 25 cases) [Cantrell, 2013]. A total of five patients were evaluated in an emergency department and all were discharged within 4 hours. Nausea, vomiting, dizziness and oral irritation were most commonly reported. Taken together, data from surveillance systems of adverse events suggest that short-term adverse effects and accidental exposures to EC cartridges are unlikely to result in serious toxicity.

Notwithstanding, avoiding preventable contact with highly concentrated nicotine solution remains important; this can be achieved by specific labeling of the products, child-proof caps and proper education of consumers. There is no evidence that nicotine-containing EC liquids should be treated in any different way compared with other consumer products used every day in households (such as bleach, washing machine powder, etc.).

Electrical accidents and fires

The electronic equipment of ECs may be the cause for accidents. ECs are mainly composed of lithium batteries. There have been reports of explosions of batteries, caused either by prolonged charging and use of improper chargers or by design defects. Similar accidents have occurred with batteries of other popular devices, such as mobile phones. Therefore, this does not occur specifically with ECs, however, quality standards of production should be used in order to avoid such accidents.

Smoking is a major cause of residential fires. Between 2008 and 2010, an estimated annual average of 7600 smoking-related fires occurred in residential buildings in the US [US Fire

Administration, 2012]. They account for only 2% of all residential building fires but for 14% of fire deaths. Since ECs are activated only when used by the person and there is no combustion involved, there is the potential to avoid the risk of smoking-related fires.

Use by youngsters and nonsmokers

Although beyond the scope of this review, it is important to briefly discuss the potential for addiction from EC use. It should be acknowledged that nicotine is addictive, although recent studies have shown that several other chemicals present in tobacco are associated with a significant enhancement of the addictiveness of nicotine [Lotfipour *et al.* 2011; Rose, 2006; Guillem *et al.* 2005]. Still, nicotine intake should not be recommended to nonsmokers. Smokers are already addicted to nicotine, thus ECs will be a cleaner form of nicotine intake, while at the same time they will maintain their sensory stimulation and motor stimulation of smoking; these are important aspects of the addiction to smoking. Regulatory authorities have expressed concern about EC use by youngsters or by never-smokers, with ECs becoming a gateway to smoking or becoming a new form of addiction. However, such concerns are unsubstantiated; research has shown that EC use by youngsters is virtually nonexistent unless they are smokers. Camenga and colleagues [Camenga *et al.* 2013] examined the use of ECs and tobacco in a group of adolescents, in a survey conducted in three waves. In the first wave of the survey (February 2010), 1719 adolescents were surveyed from which only one nonsmoker was found to be using ECs. In the second and third wave of the surveys, only five nonsmoking adolescents were using ECs. In fact, these are adolescents who reported first ever use of ECs in the past 30 days; therefore they were not necessarily regular or daily EC consumers. The increased prevalence of EC use from 0.9% in 2010 to 2.3% in 2011 concerned smoking adolescents, therefore it should be considered a positive finding that smokers are experimenting with the significantly less harmful ECs. Similarly, the Medicines and Healthcare Products Regulatory Agency (MHRA) found that less than 1% of EC users are never-smokers [MHRA, 2013]. Data from the Centers for Disease Control [2013] National Youth Tobacco Survey reported doubling in EC experimentation by 13–18 year old students from 1.1% in 2011 to 2.1% in 2012; however, 90.6% of them were smokers. From the whole population, only 0.5% were nonsmokers experimenting with ECs.

Once again, participants were asked about ever experimenting with an EC in the past 30 days, not regular or daily EC use. Recently, a survey of more than 75,000 students in South Korea was published [Lee *et al.* 2013]. Although they found that 12.6% of them were daily smokers (8.6% were using only tobacco cigarettes and 3.6% were using both tobacco and ECs), only 0.6% of nonsmokers had used ECs in the past 30 days. Although the above mentioned data have been used as arguments to support the fact that a new epidemic of nicotine addiction through the use of ECs is appearing, in reality they are showing that any experimentation with ECs is done by smokers. This is in fact a positive finding, and could lead to reduced smoking prevalence through adoption of EC use. Therefore, ECs could serve as gateway from smoking; on the contrary, there is no evidence indicating that they could be a gateway to smoking. It is promising to see that penetration of EC use in youngsters is virtually nonexistent, especially when you take into consideration that there is currently no official regulation in most countries to prohibit the access to ECs by youngsters.

Conclusion

Existing evidence indicates that EC use is by far a less harmful alternative to smoking. There is no tobacco and no combustion involved in EC use; therefore, regular vapers may avoid several harmful toxic chemicals that are typically present in the smoke of tobacco cigarettes. Indeed, some toxic chemicals are released in the EC vapor as well, but their levels are substantially lower compared with tobacco smoke, and in some cases (such as nitrosamines) are comparable with the amounts found in pharmaceutical nicotine products. Surveys, clinical, chemistry and toxicology data have often been misrepresented or misinterpreted by health authorities and tobacco regulators, in such a way that the potential for harmful consequences of EC use has been largely exaggerated [Polosa and Caponnetto, 2013]. It is obvious that some residual risk associated with EC use may be present, but this is probably trivial compared with the devastating consequences of smoking. Moreover, ECs are recommended to smokers or former smokers only, as a substitute for conventional cigarettes or to prevent smoking relapse; thus, any risk should be estimated relative to the risk of continuing or relapsing back to smoking and the low efficacy of currently approved medications for smoking cessation should be taken into consideration [Moore *et al.* 2009; Rigotti

et al. 2010; Yudkin *et al.* 2003]. Nonetheless, more research is needed in several areas, such as atomizer design and materials to further reduce toxic emissions and improve nicotine delivery, and liquid ingredients to determine the relative risk of the variety of compounds (mostly flavorings) inhaled. Regulations need to be implemented in order to maintain the current situation of minimal penetration of EC use in nonsmokers and youngsters, while manufacturers should be forced to provide proof for the quality of the ingredients used and to perform tests on the efficiency and safety of their products. However, any regulatory decisions should not compromise the variability of choices for consumers and should make sure that ECs are more easily accessible compared with their main competitor, the tobacco cigarette. Consumers deserve, and should make, informed decisions and research will definitely promote this. In particular, current data on safety evaluation and risk assessment of ECs is sufficient enough to avert restrictive regulatory measures as a consequence of an irrational application of the precautionary principle [Saitta *et al.* 2014].

ECs are a revolutionary product in tobacco harm reduction. Although they emit vapor, which resembles smoke, there is literally no fire (combustion) and no 'fire' (suspicion or evidence that they may be the cause for disease in a similar way to tobacco cigarettes). Due to their unique characteristics, ECs represent a historical opportunity to save millions of lives and significantly reduce the burden of smoking-related diseases worldwide.

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kawakami3-Benigno

From: mailinglist@capitol.hawaii.gov
Sent: Tuesday, February 18, 2014 4:00 PM
To: CPCtestimony
Cc: mikenakas@hotmail.com
Subject: *Submitted testimony for HB2133 on Feb 19, 2014 14:15PM*



HB2133

Submitted on: 2/18/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Michael S. Nakasone	Individual	Oppose	No

Comments:

Please note that testimony submitted less than 24 hours prior to the hearing, improperly identified, or directed to the incorrect office, may not be posted online or distributed to the committee prior to the convening of the public hearing.

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kawakami3-Benigno

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HB2133

Submitted on: 2/18/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Jeff Stevens	Individual	Oppose	No

Comments: Totally unfair and unjust to do this to adults.

Please note that testimony submitted less than 24 hours prior to the hearing, improperly identified, or directed to the incorrect office, may not be posted online or distributed to the committee prior to the convening of the public hearing.

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kawakami3-Benigno

From: Abby Brown-Watson <abbykailua@gmail.com>
Sent: Tuesday, February 18, 2014 4:23 PM
To: CPCtestimony
Subject: Strong Support HB2133

LATE

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
Members of House Committee on Judiciary

Re: Strong Support for HB2133, Relating to Health

Hrg: February 19, 2014 at 2:15 p.m. in Room 325

Thank you for the opportunity to submit testimony in support of HB2133. I strongly support raising the age of sale of tobacco products to 21.

Tobacco use is still the leading cause of preventable death in the United States and in Hawai`i, and costs our state over \$336 million in healthcare expenditures every year. The cost of tobacco is real for both the smoker and people exposed to secondhand smoke: in lives cut short by cancer, cardiovascular disease, COPD, and other chronic lung diseases. More than 1,000 people die in Hawai`i every year from tobacco use.

Nearly all smokers begin smoking regularly before they turn 21. According to the Surgeon General, 95 percent of adult smokers start smoking before they turn 21. Tobacco companies heavily target kids and young adults with marketing and advertising.

This policy will also reduce access to tobacco for youth under 18 by keeping tobacco out of our schools. Any effort to prevent tobacco use among young people is worthwhile.

This bill will save lives.

Mahalo.

Abby Brown-Watson
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kawakami3-Benigno

From: Nathan Kanale Sadowski <nkanales@gmail.com>
Sent: Tuesday, February 18, 2014 4:57 PM
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Subject: Strong Support HB2133



To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
Members of House Committee on Judiciary

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This bill will save lives.

Mahalo.

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kawakami3-Benigno

From: Bryan Mih <bmih@hawaii.edu>
Sent: Tuesday, February 18, 2014 5:49 PM
To: CPCtestimony
Subject: Strong Support HB2133



To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
Members of House Committee on Judiciary

Re: Strong Support for HB2133, Relating to Health

Hrg: February 19, 2014 at 2:15 p.m. in Room 325

Dear House Committees:

As a pediatrician and medical director of the HEALTHY Quit Smoking Program, I strongly support HB2133, raising the age of sale of tobacco products to 21.

The early initiation of smoking before age 21 is an important problem to address. Over 90% of all adult smokers started when they were younger than 21. A higher purchase age effectively reduces access for those under 18 as well, since the vast majority of their supply comes from young adults aged 18-20.

Tobacco use is still the leading cause of preventable death in the United States and in Hawai'i, and costs our state over \$336 million in healthcare expenditures every year. I urge you to consider the adverse health effects from tobacco use.

I care for many children that suffer from secondhand smoke, as well as young people who start tobacco use and remain addicted to nicotine for their lifetimes. On a daily basis, I see newborn infants, children, adolescents, and young adults that are adversely affected by tobacco exposure. Effects include low birth weight in infants, increased respiratory infections in children, or asthma exacerbation in all age groups.

Tobacco companies have been proven to aim their marketing and advertising to children and young adults. By reducing access to tobacco for those under 21, we improve the health outcomes for many, and prevent the normalization of tobacco use for young people.

Thank you for your consideration and support of this important measure.

Sincerely,

Bryan Mih, MD, MPH, FAAP
Pediatrician

Bryan Mih
1944 Naniu Pl
Honolulu, HI 96822

kawakami3-Benigno

From: Ryan Mandado <ryan_mandado@yahoo.com>
Sent: Tuesday, February 18, 2014 6:43 PM
To: CPCtestimony
Subject: Strong Support HB2133



To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

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Rep. Sharon E. Har, Vice Chair
Members of House Committee on Judiciary

Re: Strong Support for HB2133, Relating to Health

Hrg: February 19, 2014 at 2:15 p.m. in Room 325

Thank you for the opportunity to submit testimony in support of HB2133. I strongly support raising the age of sale of tobacco products to 21.

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Nearly all smokers begin smoking regularly before they turn 21. According to the Surgeon General, 95 percent of adult smokers start smoking before they turn 21. Tobacco companies heavily target kids and young adults with marketing and advertising.

This policy will also reduce access to tobacco for youth under 18 by keeping tobacco out of our schools. Any effort to prevent tobacco use among young people is worthwhile.

This bill will save lives.

Mahalo.

Ryan Mandado
1720 Kalani St Apt 202
1545 Ahonui st
Honolulu, HI 96819

kawakami3-Benigno

From: mailinglist@capitol.hawaii.gov
Sent: Tuesday, February 18, 2014 6:53 PM
To: CPCtestimony
Cc: kathyk323@hotmail.com
Subject: *Submitted testimony for HB2133 on Feb 19, 2014 14:15PM*

LATE

HB2133

Submitted on: 2/18/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Kathy Kim	Individual	Oppose	No

Comments:

Please note that testimony submitted less than 24 hours prior to the hearing, improperly identified, or directed to the incorrect office, may not be posted online or distributed to the committee prior to the convening of the public hearing.

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kawakami3-Benigno

From: mailinglist@capitol.hawaii.gov
Sent: Tuesday, February 18, 2014 8:06 PM
To: CPCtestimony
Cc: brianportal808@gmail.com
Subject: *Submitted testimony for HB2133 on Feb 19, 2014 14:15PM



HB2133

Submitted on: 2/18/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Brian Santiago	Individual	Oppose	No

Comments:

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kawakami3-Benigno

From: mailinglist@capitol.hawaii.gov
Sent: Tuesday, February 18, 2014 8:32 PM
To: CPCtestimony
Cc: pipelinemax@outlook.com
Subject: *Submitted testimony for HB2133 on Feb 19, 2014 14:15PM



HB2133

Submitted on: 2/18/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Kimo Cruz	Individual	Oppose	No

Comments:

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kawakami3-Benigno

From: Hyunhee Heo <hyunheeh@hawaii.edu>
Sent: Tuesday, February 18, 2014 8:34 PM
To: CPCtestimony
Subject: Strong Support HB2133



To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
Rep. Sharon E. Har, Vice Chair
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Nearly all smokers begin smoking regularly before they turn 21. According to the Surgeon General, 95 percent of adult smokers start smoking before they turn 21. Tobacco companies heavily target kids and young adults with marketing and advertising.

This policy will also reduce access to tobacco for youth under 18 by keeping tobacco out of our schools. Any effort to prevent tobacco use among young people is worthwhile.

This bill will save lives.

Mahalo.

Hyunhee Heo
300 Wai Nani Way #1504
Honolulu, HI 96815

kawakami3-Benigno

From: mailinglist@capitol.hawaii.gov
Sent: Tuesday, February 18, 2014 9:10 PM
To: CPCtestimony
Cc: susanlarsen78@gmx.com
Subject: Submitted testimony for HB2133 on Feb 19, 2014 14:15PM



HB2133

Submitted on: 2/18/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Susan Larson	Individual	Oppose	No

Comments: This bill will be bad for local businesses. Don't let it pass. Mahalo.

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kawakami3-Benigno

From: Jayson O'Donnell <jaysonod@hawaii.edu>
Sent: Tuesday, February 18, 2014 9:58 PM
To: CPCtestimony
Subject: Strong Support HB2133



To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

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Rep. Sharon E. Har, Vice Chair
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This bill will save lives.

Mahalo.

Jayson O'Donnell
3311 Campbell Ave
Honolulu, HI 96815

kawakami3-Benigno

From: Brent Tamamoto <AieaPediatrics@gmail.com>
Sent: Tuesday, February 18, 2014 11:28 PM
To: CPCtestimony
Subject: Strong Support HB2133



To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
Members of House Committee on Consumer Protection & Commerce

Rep. Karl Rhoads, Chair
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This bill will save lives.

Mahalo.

Brent Tamamoto
98-1065 Kaamilo Street
Aiea, HI 96701

kawakami3-Benigno

From: mailinglist@capitol.hawaii.gov
Sent: Wednesday, February 19, 2014 6:59 AM
To: CPCtestimony
Cc: jjw333333@gmail.com
Subject: *Submitted testimony for HB2133 on Feb 19, 2014 14:15PM*



HB2133

Submitted on: 2/19/2014

Testimony for CPC/JUD on Feb 19, 2014 14:15PM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Jake J. Watkins	Individual	Oppose	No

Comments:

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This bill will save lives.

Mahalo.

Paul Perretta
1511 Punahou St Apt 208
Honolulu, HI 96822

LATE

To: Rep. Angus L.K. McKelvey, Chair
Rep. Derek S.K. Kawakami, Vice Chair
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This bill will save lives.

Mahalo.

Shelly Ogata
N. Ala Road
Kurtistown, HI 96749