

# What Industry Patents Tell Us About Emerging E-Cigarette Product Design

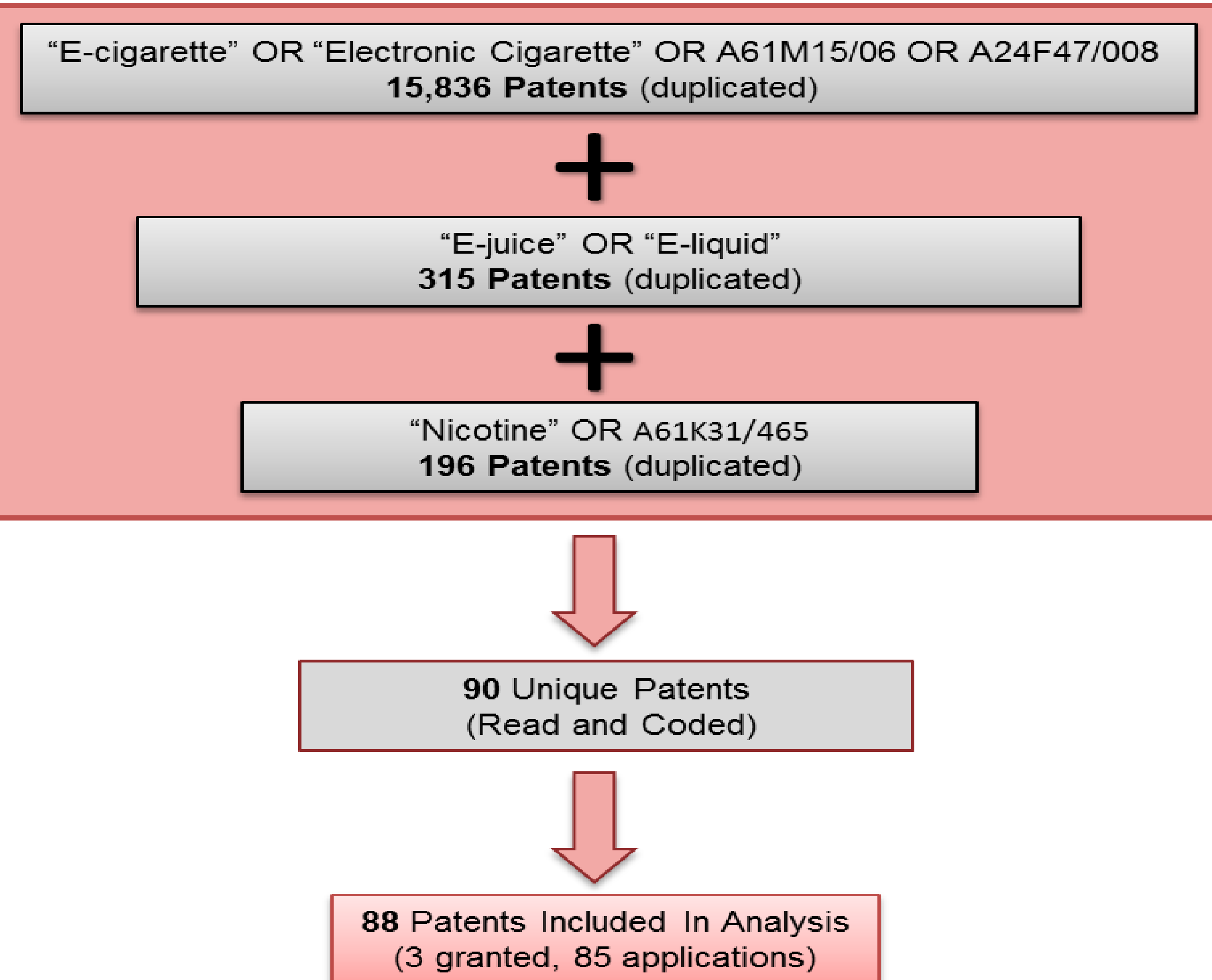
Lauren M. Czaplicki, MPH, Ryan David Kennedy, PhD ([rdkennedy@jhu.edu](mailto:rdkennedy@jhu.edu)), Harkirat Singh, MPH, Lisa P. Lagasse, MHS, PhD, Joanna E. Cohen, PhD

## Background

- Industry patents have been used to inform tobacco control about product innovations around nicotine delivery, volume or efficiency
- This study reviewed publically available patents to understand innovations related to e-cigarettes

## Methods

- Google Patents used to search global database and identify patents with search terms and patent classification codes
- Patents downloaded and inventoried based on year filed, country and inventor
- Qualitative content analysis used to identify major themes of innovation



## How to Read A Patent

Cover Page	Main Text	Claims

## Sample Patents Identified in our Search

### Patent 18: E-cigarette with Usage Control

**Personalized Technology**  
"actual use of device by user can be controlled... audible outputs could include 'You are not allowed to smoke near your wife.'"  
"Input device can include a microphone configured to enable use of **voice recognition**... can include a camera configured to capture still/video images of nearby persons to enable use of **facial recognition**"  
"users maybe able to transmit control signals via their mobile devices that **they do not wish others to use their device**"

Patent ID: US20150114407A1  
Sponsor Type: Private Lab  
Country: United States

### Patent 81: Smart case for mobile device and e-cigarette

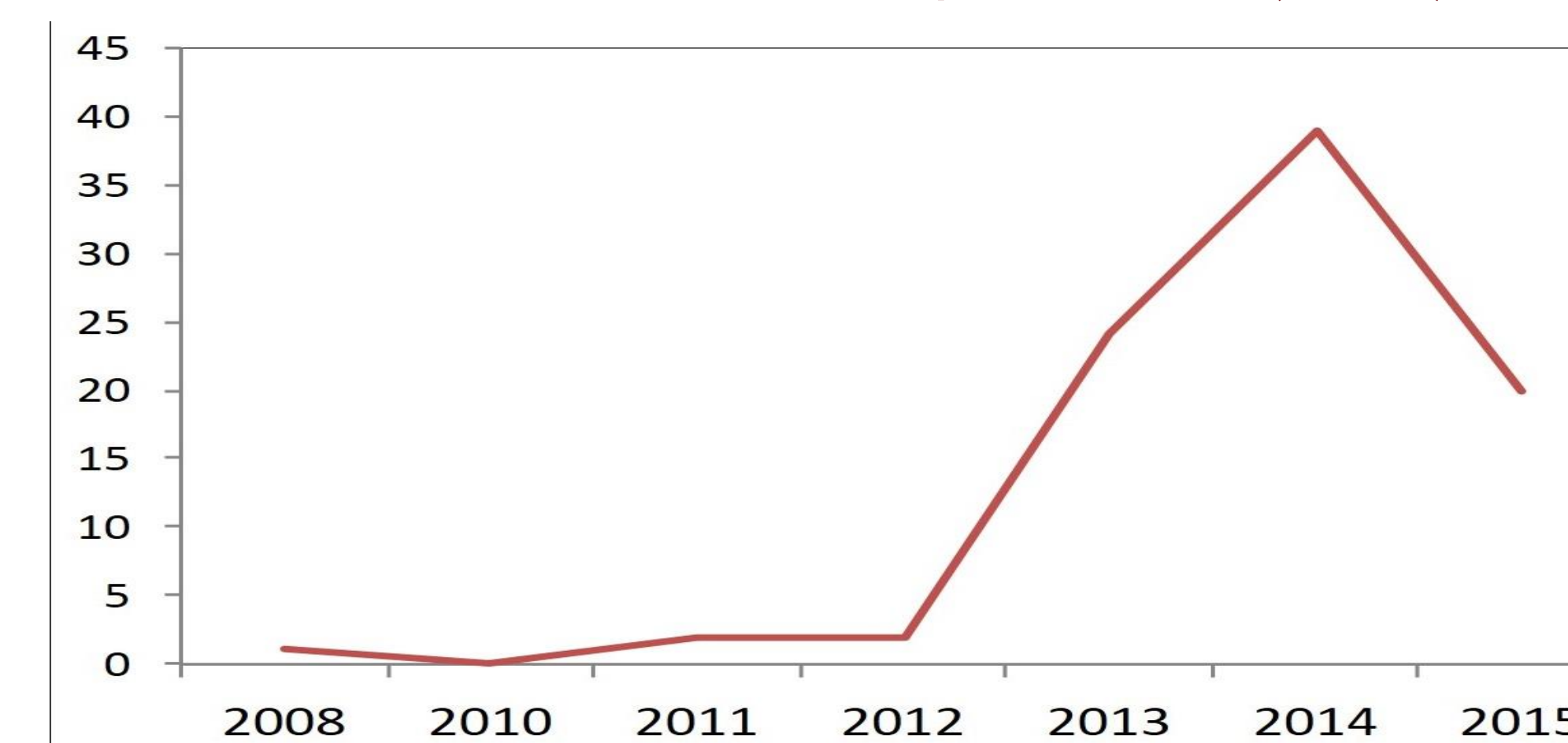
**Personalized Technology, Accessories**  
• Smart case to hold Mobile phone and E-cigarette  
• Wireless communication with both  
• Can charge the device  
• Hold additional cartridge

Patent ID: WO2015050981A1  
Sponsor Type: Tobacco Company  
Country: United States

## Results

- Patent filing dates ranged from March 2008 to December 2015
- The majority of patent applications were filed in a few countries, including the United States (n=45), Israel (n=17) and China (n=11)
- Private companies filed almost half (n=38), followed by tobacco corporations (n=26), individual inventors (n=17) and e-cigarette companies (n=7)
- Innovations identified in the search related to improved *Nicotine delivery* including harm reduction and increased absorption; *Appeal/Attractiveness* including personalized technology, improved safety, accessories and improved satisfaction; and *Sensory Enhancement* including throat hit, act of smoking and flavor

Number of Patents in Sample by Year (n=88)



Patent Landscape

	US	Israel	China	Other
Private Companies	8	17	8	6
Tobacco Corporations	21	-	-	5
Individual Inventors	10	-	3	4
E-cigarette Companies	6	-	-	1

## Conclusions

- Results demonstrate expanding development of e-cigarette features over past several years
- Analysis highlights advancements to improve safety and effectiveness of e-cigarette design, while also pointing to practices that may increase abuse liability

## Next Steps

- FDA has proposed to regulate e-cigarettes as "tobacco products." These data can help inform future policy and regulation