

Do the associations between the use of electronic cigarettes and smoking reduction or cessation attempt persist after several years of use?

Longitudinal analyses in smokers of the CONSTANCES cohort

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Conflicts of interest

- Speaker and/or consulting fees for Pierre Fabre, Pfizer, Sanofi, Lundbeck and Zentiva.
- No links of interest with the tobacco, alcohol and gaming industries, nor with the electronic cigarette industry.



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Introduction

- Tobacco smoking remains the leading cause of premature death worldwide (Drummond et al., 2014)
- In some countries, electronic cigarettes are now used more frequently than pharmacological treatments to quit smoking (Adkison et al., 2013; Adriaens, Van Gucht et al., 2014; Berlin et al., 2019; Etter, 2010; Hartmann-Boyce et al., 2018)
- In adult smokers, the use of electronic cigarettes is associated with a decreased number of cigarettes consumed per day and an increased likelihood of cessation attempt at follow-up
 - Randomized controlled studies (Adriaens et al., 2014; Bullen et al., 2013; Lee et al., 2019; O'Brien, et al., 2015)
 - Observational studies (Brose, et al., 2015; Etter et al., 2014; Gomajee et al., 2019)
- Duration of follow-up ranged from 6 to 24 months. Thus, **the length of time needed for the benefits of electronic cigarettes use on tobacco consumption to appear remains to be determined.**

Aims

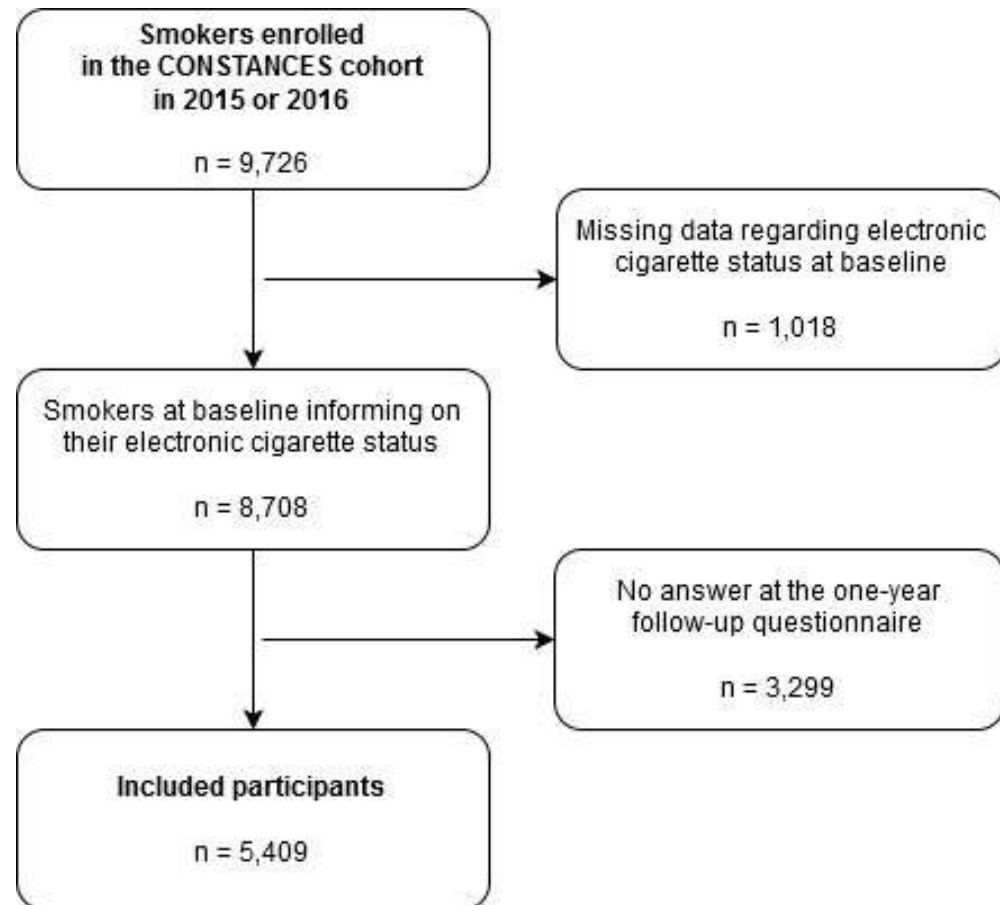
- To examine the length of time needed to observe a change in tobacco consumption after starting to use electronic cigarettes
- To observe whether changes in tobacco consumption occur directly after starting to use electronic cigarettes or may be expected after a longer duration
- To look at the changes in tobacco consumption in individuals with former electronic cigarettes use who start using it again
- To explore whether sociodemographic and clinical factors could moderate the association of electronic cigarettes on changes in tobacco consumption

Material

- **The CONSTANCES cohort**

(Goldberg et al., 2017)

- Large randomized sample
- > 210 000 participants
- Representative of the French population at inclusion
- Aged 18–69 years at baseline
- From various occupational status and sociodemographic factors



Methods

- Change in tobacco consumption =
 number of cigarettes per day at one-year of follow-up
 minus
 number of cigarettes per day at baseline
- Based on both baseline and follow-up data, we computed a categorical variable reflecting the duration of electronic cigarette use:
 - Never;
 - Former for more than one year;
 - Former for less than one year;
 - New user for less than one year;
 - Return to use for less than one year;
 - Regular use for more than one year and less than two years;
 - Regular use for more than two years.

Statistics

- Change in the number of cigarettes per day was considered as the dependent variable in general linear regressions models
- Binomial logistic regressions were used when cessation attempt was the dependent variable, with no cessation attempt being the reference category
- Adjustments
 - Baseline number of cigarettes per day
 - Age, gender, education, household income, marital status
 - Pack-year, risk of alcohol use disorder (AUDIT total score)
 - Depressive symptoms (CES-D total score)
 - Existence of respiratory or cardiovascular disease, perceived global health status and perceived respiratory health status

Changes in tobacco consumption

| | B ¹ | 95%CI | | p |
|---|----------------|-------|-------|--------|
| | | min | max | |
| FULLY-ADJUSTED MODEL³ | | | | |
| Never | Ref | . | . | . |
| Former for more than one year | 0.95 | 0.57 | 1.33 | <0.001 |
| Former for less than one year | 1.03 | 0.47 | 1.59 | <0.001 |
| New user for less than one year | -3.31 | -4.07 | -2.54 | <0.001 |
| Return to use for less than one year | -3.27 | -4.12 | -2.41 | <0.001 |
| Regular use for one to two years | -2.58 | -3.48 | -1.69 | <0.001 |
| Regular use for more than two years | -4.18 | -5.06 | -3.29 | <0.001 |

Greater reduction in the number of cigarettes per day in men, in those living with a partner, having a higher number of pack-years and a higher number of cigarettes per day

Likelihood of cessation attempt

| | OR ¹ | 95%CI | | p |
|---|-----------------|-------|------|--------|
| | | min | max | |
| FULLY-ADJUSTED MODEL³ | | | | |
| Never | Ref | . | . | . |
| Former for more than one year | 0.80 | 0.67 | 0.95 | 0.012 |
| Former for less than one year | 0.77 | 0.60 | 0.99 | 0.047 |
| New user for less than one year | 3.12 | 2.32 | 4.19 | <0.001 |
| Return to use for less than one year | 2.13 | 1.53 | 2.98 | <0.001 |
| Regular use for one to two years | 2.14 | 1.51 | 3.03 | <0.001 |
| Regular use for more than two years | 3.36 | 2.39 | 4.72 | <0.001 |

Odds ratios were higher in those with lower education, living with a partner and having a higher number of pack-years

Summary of the results

- **Reduction of tobacco consumption was observed in a duration of e-cig use of less than one year to more than two years, even after adjusting for potential confounders.**
- Returning to e-cig use after a period of discontinuation was associated with similar benefits.
- Former e-cig users had the poorest outcomes with regards to tobacco consumption.
- In exploratory analyses, better outcomes were found in men, in those with lower level of education, living with a partner and having a higher number of pack-years.

Public health benefits and future research

- **Benefits of electronic cigarettes use may be greater among subgroups that are difficult to treat** such as individuals with a higher level of dependence and a lower education level (Holm et al., 2017)
- **Smokers who have stopped using electronic cigarettes should switch rapidly to validated treatments** such as NRT and promoting self-efficacy may be particularly useful (Blevins, et al., 2016)
- Studies comparing the effectiveness of electronic cigarettes use *versus* pharmacological treatments will be helpful (Berlin, Dautzenberg et al., 2019; Hajek et al., 2019)
- It would be also helpful to assess which of these different strategies might be most likely to lead to the cessation of all nicotine-containing substances (Martínez et al., 2019)

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