Breast Cancers Prevalence and Mortality in Flight Attendants

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Air travel is an essential mode of transportation

- Blooming industry
- International Air Transport Association (IATA) data
  - 3.8 billion of passengers in 2016
  - Growth rate of 3.7% per year
- US Department of Labor data
  - More than 100,000 women in the United States work as flight attendant (FA)

- Recent report suggested increased risk of breast cancers among flight attendants (FA) (1)

- Implications
  - Potential legal claims
  - Frequent travelers

The Guardian International edition

The New York Times

Airline Crew Have

TIME HEALTH • CANCER

Flight Attendants Have Higher Rates of Many Cancers, Study Says

Newsweek

TECH & SCIENCE

FLYING AND CANCER: FLIGHT ATTENDANTS HAVE HIGHER RATES OF NUMEROUS CANCERS

BY KATHERINE HIGNETT ON 6/25/18 AT 8:00 PM

A study of more than 5,000 U.S. flight attendants has shown they have higher rates of certain cancers than the general public. Data showed a higher prevalence of breast, uterine, thyroid, gastrointestinal and cervical cancers among cabin crew members.

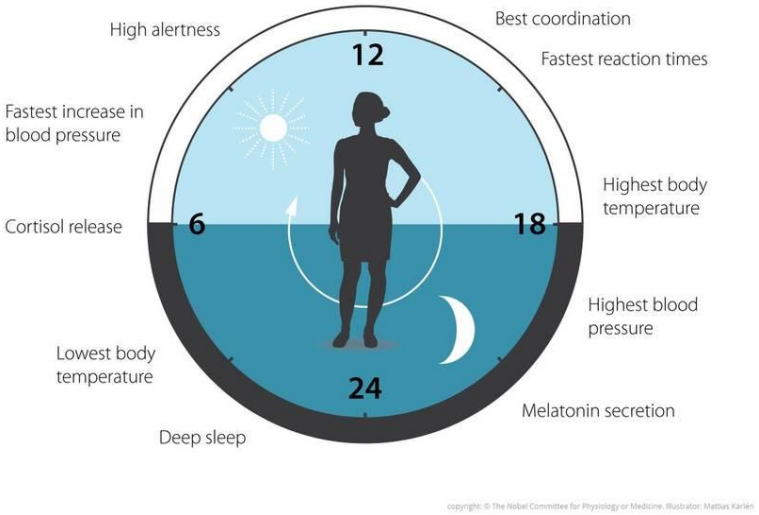
For the first time, researchers also showed cabin crew members have higher rates of non-melanoma skin cancer. Their results were published Monday in the journal *Environmental Health*.

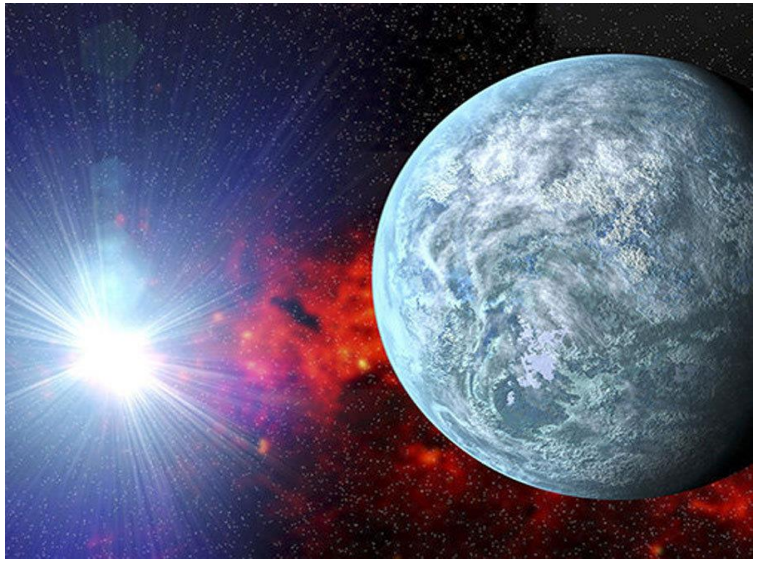
Researchers surveyed 5,366 male and female flight attendants from 2014 to 2015 and compared cancer rates to those recorded in the Centers for Disease Control and Prevention's 2013 to 2014 National Health and Nutrition Examination Survey.

McNeely E, et al. Cancer prevalence among flight attendants compared to the general population. Environmental Health 2018 17:49

Postulated reasons

- Circadian rhythm disruption
- Cosmic irradiation





Disruption of circadian rhythm

- Simulated chronic jet lag that disrupts circadian rhythm has shown to accelerate tumor growth in mice

Filipski E, Levi F. Circadian disruption in experimental cancer processes. Integr Cancer Ther 2009; 8: 298–302.

Cosmic irradiation

- Radiation is a known risk factor for breast cancer
- Estimated radiation dose of each FA: 2- 3 mSv / year
- Radiation exposure increases with
  - Increased altitude
  - Increased latitude (polar areas)

Pukkala E, et al. BMJ. 1995 9;311(7006):649-52.

Clinical Questions

- Is prevalence of breast cancer increased among FA?
- Is breast cancer mortality higher among FA?

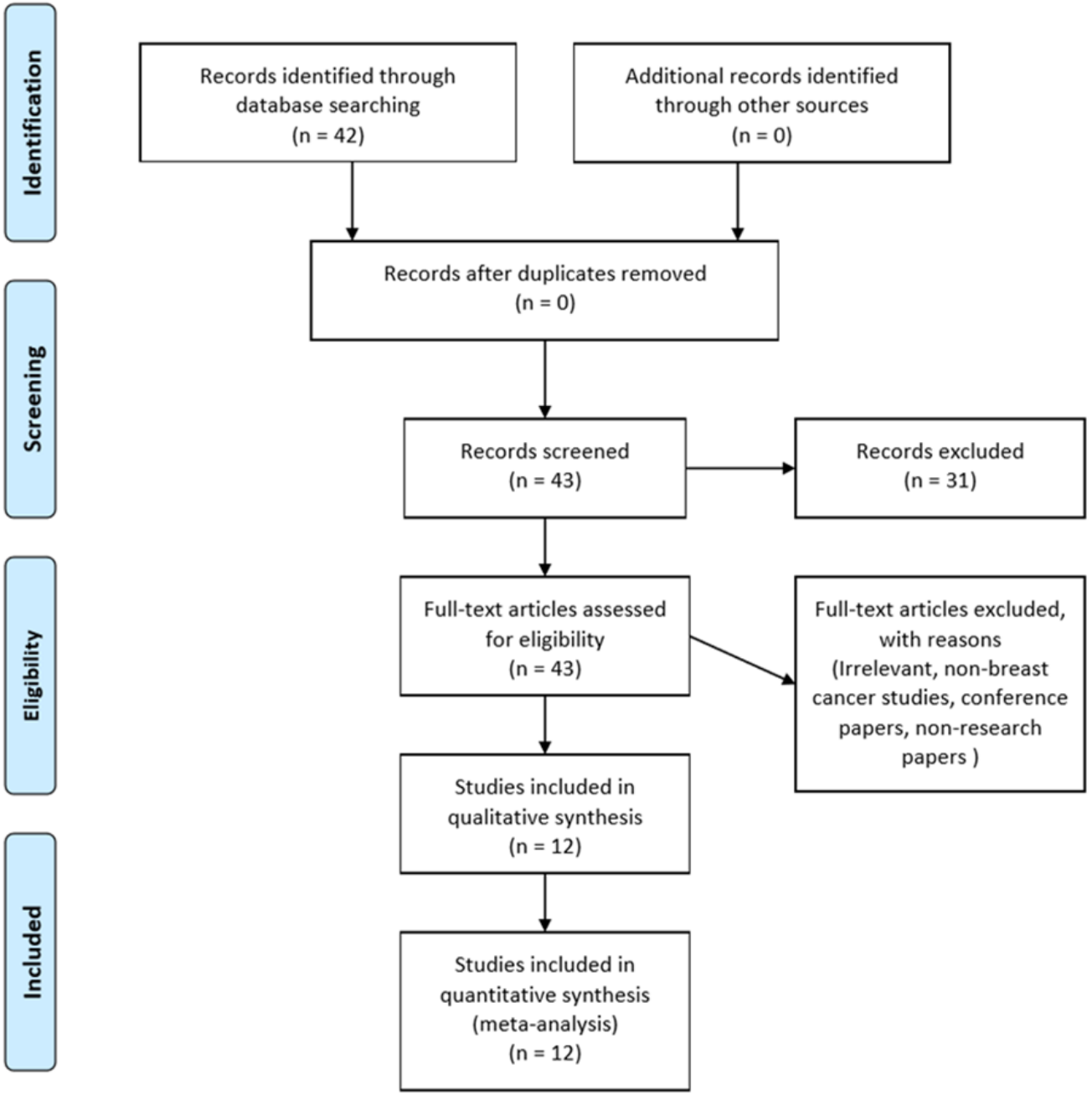
Is flying a RISK FACTOR for breast cancer?

Methods

- Systematic review / Meta-analysis was conducted in line to the PRISMA statement

- Search terms
  - Combination of “breast cancer” AND “flight attendants” OR “air crew”
  - Abstracts were screened by 2 reviewers independently
  - Additional search on grey literature

- Databases
  - PubMed
  - EMBASE
  - CINAHL
  - Cochrane database


Identification
Screening
Eligibility
Included
Records identified through database searching (n = 42)
Additional records identified through other sources (n = 0)
Records after duplicates removed (n = 0)
Records screened (n = 43)
Records excluded (n = 31)
Full-text articles assessed for eligibility (n = 43)
Full-text articles excluded, with reasons (Irrelevant, non-breast cancer studies, conference papers, non-research papers)
Studies included in qualitative synthesis (n = 12)
Studies included in quantitative synthesis (meta-analysis) (n = 12)

Studies on breast cancer rate in FA

- 10 studies
- 4 American and 6 European studies
- Prevalence ranges from 0.7% - 5.6%

Author / Year	Study Design	Sample size	Results (%)	Conclusion	Region
Studies on breast cancer rates					
McNeely (2018)	Case-control	5366	195 (3.6%)	Higher rate of breast cancer	US
Pinkerton (2012)	Cohort	11311	79 (0.7%)	No increased incidence	US
Kojo (2005)	Case-control	1041	27 (2.6%)	Inconclusive But not related to occupational factors	Finland
Linnersjö (2003)	Case-control	2324	33 (1.4%)	Statistically insignificant	Sweden
Lynge E (1996)	Letter (cohort)	915	14 (1.5%)	Increased incidence	Danmark
Reynolds (2002)	Case-control	6895	60 (0.9%)	Increased incidence	US
Rafnsson (2001)	Population-based	1532	26 (1.7%)	Increased incidence	Iceland
Pukkala (1995)	Cohort	1577	20 (1.3%)	Increased incidence	Finland
Pukkala (2012)	Cohort	8057	263 (3.3%)	Increased incidence	4 Nordic nations
Schubauer-Berigan (2015)	Cohort	6093	344 (5.6%)	Increased incidence	US

Pooled analysis

- Breast cancer prevalence among FA
  - 1061 out of a total of 45111 flight attendants ***(2.35%)***
- Breast cancer prevalence in US (SEER data 2015)
  - 348,124 out of 157.4 million female population ***(2.17%)***
- Standardized prevalence ratio (SPR)
  - 1.08 (90% CI 0.3 – 2.58)

*Using data derived from SEER program 2015, National Cancer Institute.

Studies on breast cancer mortality in FA

- 2 studies
- European studies

Author / Year	Study Design	Sample size	Results (%)	Conclusion	Region
Studies on breast cancer mortality rates					
Zeeb (2003)	Cohort	33063	59 (0.2%) Mortality	Statistically insignificant	8 European nations
Paridou (2003)	Cohort	1835	2 (0.1%) Mortality	Statistically insignificant	Greece

- **Pooled analysis**
  - 61 (0.17%) out of 34898 flight attendants had breast-cancer related mortality

Potential pitfalls

- Difficult to quantify exposure
  - Most studies depends on log books of each FA
  - Some depends on printed flight schedules of individual airline
- Potential confounders
  - Response bias
  - Detection bias
    - Annual health check (as required by aviation authorities)
  - Other workplace factors unique to this profession
    - Electromagnetic fields from cockpit instruments
    - Onboard pesticides like DDT
    - Chronic exposure to jet fuels and engine exhaust fumes

CONCLUSIONS

Breast cancer prevalence is not increased among flight attendants

Breast cancer mortality among flight attendants is low

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&

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THANK YOU
고맙습니다
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