ICE: Overall conclusions and recommendations

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(ICE partners)

ICE objective

- To address the health and well-being concerns of the wide spectrum of passengers in commercial aircraft

- Specifically to:
  - Establish accepted target levels and ranges of cabin environmental parameters – individually and in combination
  - Develop design models and predictive tools to determine the health impact of aircraft environment on passengers
  - Draft the European PreStandard – including cabin pressure; and Guides for Stakeholders

ICE researched the following issues

- Impact of cabin pressure on aspects of well-being

- Gaps in knowledge relating to flying and health, specifically:
  - Coagulation parameters suggestion tendency for DVT;
  - Changes in body inflammatory response;
  - Respiratory tract, and cardiovascular perturbation.

- Interaction of cabin environmental parameters on comfort

Slide: Courtesy of Fraunhofer IBP

Overall conclusion

- No significant physiological symptoms or adverse effects identified for passengers using commercial flights of up to eight hours

Recommendations for passengers

- Comply with current medical advice such as leg exercise, correctly fitted support stockings, and alcohol consumption

- No specific systematic adverse relationship between heart rate or ratings of symptoms caused by:
  - Cabin pressure, temperature, humidity, and noise

  (within the levels tested in ICE)

Recommendations for aircraft operators

Cabin pressure

- No consistent relationship between measured passenger physiological symptoms and cabin air pressure altitude (up to 8000 ft) – hence provide environment not more than 8000 ft;
- Rate of change of cabin air pressure:
  - As low as possible;
  - As constant as possible during climb (<500 ft/min) and descent (<300 ft/min)

Recommendations for aircraft operators

- Air temperature: between 21 ^{0}C and 25 ^{0}C (optimum 23 ^{0}C);
- Relative humidity: between 25 – 40% (if technical constraints permit);
- Noise: no specific limits can be recommended for comfort;
- Ventilation: Within a cabin ventilation rate of 15 to 20 cfm, recirculation percentage can be varied between 0 to 50%;

Recommendations for aircraft operators

- Combined effects:
  - Temperature and humidity can be varied independently;
  - Humidity and noise can be varied independently;
  - Temperature and noise interacts;
  - ICE PDM can be used to enhance comfort.

Summary

- Overall, our conclusions indicate that flying in current commercial aircraft environments poses, in general, **no significant health risk** for passengers.