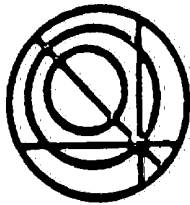




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Smoke Out On Airlines

**WARNING: Congress Has Determined That
The Combination Of Air Travel And Smoking
Is Hazardous To Your Health.**

New findings reported by the Surgeon General's office concerning "second-hand" or "passive" smoking risks spurred Congress to pass a two-year trial ban of smoking on commercial aircraft flights of two hours or less. Following the trend of limiting smoking in hospitals, government buildings and restaurants, the ban is an amendment to the FY88 DOT Appropriations Law (P.L. 100-202), Section 328, and goes into effect in April.

The Airline Transport Association estimates that two thirds of all major airline seats are sold as non-smoking.

A 1986 National Academy of Sciences (NAS) report said that present aircraft ventilation systems cannot adequately deal with the problem of drifting cigarette smoke. The 18 month study cited airline efforts to reduce fuel consumption by reducing fresh air ventilation as aggravating the problem. Present separation requirements by the government since 1973 failed to protect passengers from drifting smoke. They concluded that a total ban is the best answer.

The Department of Transportation (DOT), under then-secretary Elizabeth Dole, rejected the recommendation, saying that the report produced

no "empirical evidence" on the hazards aboard aircraft and that the question should be resolved by market pressures.

Despite the DOT, the controversy on smoking on public conveyances had been reignited. The NAS said that exposure levels for flight attendants and frequent fliers is about the same as for a person living with pack-a-day smoke. The study indicated that the air quality in a civil airline cabin, cruising at 31,000 ft., would violate most building codes for building indoor environments.

Besides the health risks, in-cabin fire is another serious threat. The NTSB said in USA Today that no serious fire on a US carrier has been directly linked to cigarette smoking. However, in 1983, an Air Canada plane, flying from Texas to Toronto, landed at Cincinnati after a cigarette started a washroom fire. At least 20 passengers died from smoke inhalation.

Safety concerns aboard aircraft caused by fire have led to the implementation of FAA flight regulations banning smoking from airline lavatories, and requiring fireproof trash containers and smoke detectors there as well.

John Galipault, president of the Avia-

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The Aviation Safety Institute is a non-profit research organization based in Worthington, Ohio and created for the prevention of aviation accidents.

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Low O₂ Endangers Crew

Passive Smoke Decreases Blood Oxygen Absorption In Aircraft Environment

by Alan R. Kahn, MD

As a pilot, physician, biomedical engineer, and ex-Air Force flight surgeon, naturally I am interested in the question of aircraft cabin environments and their effects on human physiology. Recently I participated in the development of a small, portable device called an oximeter which is used for non-invasive monitoring of the oxygen content of the arterial blood supply in human beings.

In the course of my travels, I used the oximeter to measure the blood oxygen levels of 41 passengers and crew members during commercial airline flights. At the same time, I also employed a portable altimeter to measure the pressure altitude in the aircraft cabin. The data I recorded clearly indicates to me that a significant problem exists in commercial aircraft cabin environments.

The graph (on page 3) shows the relationship between cabin altitude and oxygen saturation in the arterial blood during these commercial flights. The data paint a

(continued on page 3)

Low O₂ *continued from page 1*

these commercial flights. The data paint a clear picture of the marked effect of increased cabin altitude (decreased cabin pressure) on the available oxygen in the blood of passengers and crew.

This diminished blood oxygen level has significant implications for crew performance and the well being of elderly passengers and those with cardiac and respiratory ailments. These concerns are compounded by the effects of cigarette smoke in the atmosphere.

The problem is that not only does cigarette smoke produce particulate matter which causes cardiac and pulmonary diseases as well as cancer, it produces significant amounts of carbon monoxide gas. Carbon monoxide vigorously combines with the hemoglobin in the blood occupying sites which would otherwise carry oxygen.

In smokers and others subjected to high levels of smoke, 3% to 5% of the hemoglobin is locked up with carbon monoxide. Add this effect to the already diminished oxygen saturation caused by high altitudes and a potentially dangerous situation develops. For example, smokers and crew working in smoking areas in an aircraft with a cabin altitude around 8000 feet can have effective oxygen saturation levels as low as 85%.

Oxygen saturation levels below 85% are cause for concern in hospital patients. Oximeters are usually set to warn medical staff of values less than 85% so that they can take appropriate remedial actions. Yet, this condition occurs regularly in our commercial aircraft among passengers and crew in smoking environments.

Lower oxygen saturation levels are more likely to occur in persons who are over 50 years of age, overweight, or have cardiac or pulmonary diseases. Passengers are

probably the least affected by low blood oxygen saturations because they are not active and thus have lower oxygen needs.

This, however, is not true for the crew who are working, and in the case of flight attendants, performing physical tasks with few breaks which would necessitate substantially greater oxygen needs. In fact, flight attendants who work in smoking sections frequently complain of nausea and dizziness.

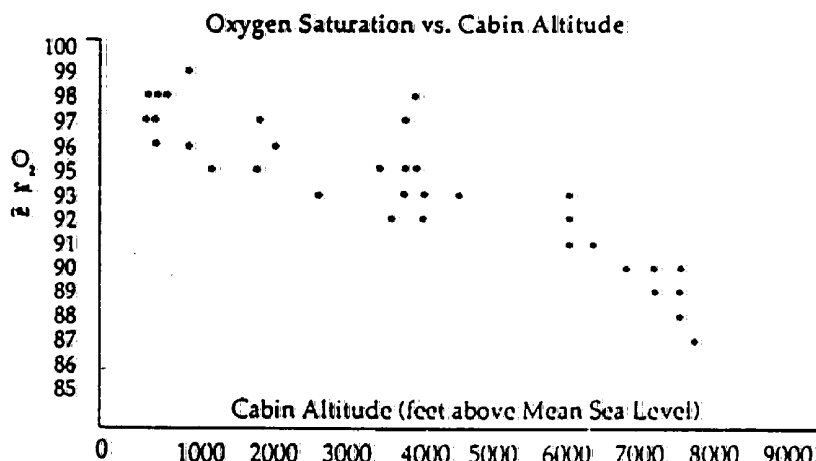
Pilots are also affected by low blood oxygen saturations. There is ample evidence that oxygen saturation values below 90% significantly reduce a person's ability to exercise good judgement. These lower values are likely to occur in the older and more experienced pilots who are usually in command.

The pilots whom I interviewed reported that they do not use supplemental oxygen during level flight. Some do use oxygen masks for a few minutes during descent before landing. Breathing supplemental oxygen for a few brief minutes

during descent to landing is not sufficient to replace the depleted oxygen level within the body's tissues. Thus pilot's judgement during this phase of the flight is questionable.

Possible remedies for this include: (1) better pressurization of the cabin to assure that cabin altitudes never exceed 6000 feet above sea level; (2) adequate protocols requiring the use of supplemental oxygen by the pilots; and, (3) banning of smoking during flight, especially long flights cruising at high altitudes.

Alan R. Kahn is a physician with 33 years experience in the application of biomedical engineering to clinical uses. His current activities include consulting and applications of new research in brain physiology to artificial intelligence, human behavior, and communications. Dr. Kahn has ten patents and more than 70 scientific publications and presentations to his credit.



Even with the relatively small number of test points on the graph, the data shows the profound effect of increased cabin altitude (decreased cabin pressure) on the oxygen available in the circulating blood of passengers and crew.

Smoke Out *Continued from page 1*

tion Safety Institute, has spoken in favor of the anti-smoking legislation and the ban because of the "inherent danger of uncontrolled fire in a pressurized aircraft. All other fire sources in an aircraft, except cigarettes, are engineered and certified to meet FAA flight safety rules."

Under a wave of public pressure, the 1987 100th Congress was flooded with anti-smoking legislation. At least four representatives and one senator introduced bills to ban smoking.

A new California law went into effect Jan.

1, 1988, the first state legislation banning cigarettes, cigar and pipe smoking on all public conveyances that begin and end in the state. Delta Airlines was the first carrier to comply with the California law while others declared the state law invalid. Eventually carriers began complying to determine potential problems in implementing the new federal regulations.

The transition to smoke-free travel will not be easy. On Dec. 3, 1987, on a Trans-World Airlines L-1011, on a non-stop six-hour flight with 273 passengers, it was

announced that smoking would be prohibited because of the death of non-smoking passengers. Later, the pilot had to leave the cockpit in the ensuing "smoker's revolt". Disgruntled passengers lit up in defiance of the ban which lead to verbal exchanges and the pushing of a flight attendant who attempted to halt the revolt. 11 people were involved in the fracas.

The DOT is planning to conduct a 14 month, \$300,000 study to determine whether onboard smoking is a risk to non-smoking passengers and crew.

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SMOKING SURVEY RESULTS ANNOUNCED

by Carole Stevenson
National Health Coordinator

Shortly after we published the smoking survey in the newsletter, Elizabeth Dole attempted to kibbosh the AMA and National Science Foundation endorsed smoking ban on aircraft, saying that the issue of health effects of in-flight smoking needed further study! But we did not give up and neither did anyone else, apparently. As you know, the Congress is now beginning to act on — as a first step — a limited ban that would effect only short haul flights.

Health representatives for flight attendants and frequent passenger organizations are continuing to fight for a total ban of in-flight smoking helped, without a doubt, by the Surgeon General's goal of a smokeless society in a few years time.

Here are the results of our survey. By the way, we were swamped with them and what was most interesting, they continued to come in a steady stream for months and months after publication, the only survey that has ever come in for such a protracted period of time:

- average years of service of respondents—9.6
- average age—33
- 1/2 have smoked at one time 3/4 have never smoked
- range was from 1/2 pack a week to 2 packs a day
- only 1/4th of respondents smoke NOW
- "Sidestream" effects—
 - 97% suffer burning and red eyes
 - 30% notice inflamed eyelids
 - 95% reported nasal irritation and 90% stuffiness
 - 65% develop post nasal drip and 48% blood in nostrils
 - 85% respond to sidestream smoke with sinus problems and pain and 51% exhibit coughs

- headaches are suffered by 95%, wheezing by 13%, nausea by 48%, tightness of chest and shortness of breath by around 50% of the respondents; 70% ascribed fatigue to their exposure to cabin smoke
- 75% reported an increase in colds, bronchitis, sore throats and other respiratory problems since they began flying, and equally significant percentages reported increased allergies and specific allergies to cigarette smoke, with resulting loss of work and medical bills for treatment.
- 90% of respondents bid positions away from smoking section on aircraft.
- 75% of respondents reported they have seen cigarette related fire or potential fire on airplanes.

This is a list of F/A's answers to the fire related section. They are listed in order of what was listed the most. All listed were either a fire or had the potential to start a fire.

- A. Dropped cigarette on the floor, between seat and fuselage wall or seat.
- B. A sleep or intoxicated passengers who have either cigarettes in hands or in ashtray.
- C. F/A's who are burned or have holes in their uniforms from passengers hanging cigarettes out in aisle.
- D. Passengers smoking in lavs — (one F/A reported that smoke alarm didn't go off).
- E. Passengers who stand at back of plane and flick ashes on floor — or who flick ashes on floor when seated.
- F. Cigarette burns in carpet or in seats.
- G. Passengers who put out cigarette in trash containers.

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American Airlines

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