



Aviation Human Factors Industry News

August 23, 2007

Vol. III. Issue 30

Jet fuel gushed from plane on landing

Jet fuel was gushing from the China Airlines Boeing 737-800 aircraft when it parked at Naha Airport terminal Monday and exploded in a fireball minutes later, transport ministry officials said.

Japanese and Taiwanese aviation authorities, along with Okinawa prefectural police, on Tuesday examine the charred fuselage of the China Airlines plane that went up in flames soon after landing at Naha Airport the previous day. TOSHIYUKI TSUNENARI/ THE ASAHI SHIMBUN **They suspect the fuel leaked from the pylon** that connects the main wing and the right engine, according to investigation officials.



Flight 120 from Taipei carried 157 passengers and eight crew members, all of whom miraculously evacuated without incident.

Aviation experts from the Aircraft and Railway Accidents Investigation Commission of the Land, Infrastructure and Transport Ministry, as well as Okinawa prefectural police and aviation authorities from Taiwan, inspected the charred wreckage Tuesday.

Officials quoted one of **two ground maintenance workers who first noticed fuel leaking from the aircraft** and alerted the pilots to the danger as saying that jet fuel was gushing out in a torrent.



The other maintenance worker told the team he saw fuel leaking from the wing where the right engine is mounted.

As of now, inspectors said they believe a huge quantity of jet fuel that leaked from near the engine on the right wing of the aircraft flowed to the other side of the aircraft.

It remains unclear what ignited the fuel, just seconds or so after all the passengers had evacuated the plane by emergency chutes.

The fire was fanned by 18 kph winds and the heat became intense as the flames engulfed the main body of the plane.

Transport ministry officials surmised that fuel pipes inside the aircraft were either damaged or had been poorly maintained.

Aviation experts are also looking at possible defects in the manufacturing process. The plane was first serviced in July 2002.

It was estimated that the aircraft had some 4,700 kilograms of fuel remaining after it landed.

The fuel is stored in three tanks within the main wings and an onboard computer controls the flow of jet fuel to the engines.

For the most part, the jet fuel passes through pipes in tanks within the wings. Even if a pipe ruptures, fuel is not supposed to escape from the wings.

But aviation experts said piping in the pylon that connects the main wing and the engine, as well as part of the valves that shuts off fuel flow, which is controlled by the pilot in the cockpit, are outside the tanks and could result in fuel leakage.

The pilot shut off the fuel supply to the engines by operating the valve after he was alerted by ground maintenance staff about the leak.

The China Airlines aircraft had already reached its assigned parking spot at the terminal, according to officials.

Another procedure involving a separate switch is required to stop pumps that move fuel to the pipes.

It means fuel will continue to flow if only the valve is closed.

Aviation experts are investigating the procedures the pilots took after they learned what dire circumstances faced the passengers and crew members.

Jet fuel usually ignites at around 60 degrees and explodes at 240 degrees even if there is no naked flame or spark to trigger it.

The inspection team still does not understand what triggered the blaze. The exhaust openings for the engines and exhaust fumes were already very hot and could have ignited the fuel.

The transport ministry's commission also found that the No. 1 engine on the left wing was burned more severely than the No. 2 engine on the right side which apparently caught fire first.

Investigators noted that the air was dry at the time. They said the effects of wind blowing contributed to the spread of the blaze.

The lower surface of the wings have holes for draining water from the fuel tanks, which could also trigger leaks.

However, this was not deemed to be the cause of Monday's near-disaster.

China Airlines has been involved in a string of accidents in recent years, including one at Nagoya Airport in 1994 that killed 264 people

[NTSB Issues Safety Recommendations For Airline Maintenance Practices](#)

Says FAA Failed To Detect Errors At Chalks Ocean Airways

On Tuesday, the National Transportation Safety Board recommended the Federal Aviation Administration take additional steps to [verify the maintenance programs of commercial aircraft operators](#) include [stringent criteria to address recurring or systemic discrepancies](#), including, if necessary, further analysis of the discrepancies through a comprehensive engineering evaluation.



The recommendations stem from the December 19, 2005 downing of a Grumman G73-T Turbo Mallard operated by Chalks Ocean Airways. The NTSB investigation of that accident [revealed numerous fuel leak discrepancies](#) involving the accident airplane.

"Minutes from the July 2005 continuing analysis and surveillance system (CASS) meeting showed that the [accident airplane had a fuel leak from either the left or right wing near the fuel tank six times during a 5-day period](#)," the NTSB writes. "Also, the minutes from the September 2005 CASS meeting showed that the [accident airplane had a fuel leak in its right wing dry bay for 3 consecutive days](#)."

The repair methods used to address these fuel leaks involved removing and replacing the sealant on the fuel tank."

The NTSB states the **continued fuel leaks on the right wing "were repeated indicators of structural damage inside the right wing" -- which should have tipped Chalks employees to the looming structural failure that later brought the aircraft down** in Government Cut, near Miami, FL. **All 20 persons** onboard the plane were killed.

Both right-hand engines on crashed Antonov An-12 failed simultaneously

Russian investigators have discovered **that both right-hand engines** on an Atran **Antonov An-12** **simultaneously failed just after take-off** from Moscow, before the freighter crashed in woodland.

The An-12 was on a domestic cargo service from Moscow Domodedovo on 29 July and had been airborne for 1min when the outboard right-hand engine stopped operating.



Russia's **Interstate Aviation Committee (MAK)** says that, within **about 1s, the inboard engine on the same wing also failed. It says that the propellers of both engines were feathered.**

"Subsequently the aircraft continued flying for about 1min, after which it struck the ground, leading to a fire of high intensity," says MAK. **All seven occupants were killed.**

The investigation agency has yet to determine the reason for the powerplants' failure. The An-12 was powered by four Ivchenko AI-20 engines.

While overloading of freighters has been a particular concern in Russia, MAK has confirmed that the aircraft was within weight and balance limits.

It was carrying just over 9,000kg (19,800lb) of cargo and MAK says the payload was not dangerous. The An-12 had 15,500kg of fuel on board giving it an overall take-off weight of 60,500kg, far below the maximum of 64,000kg.

The aircraft's centre of gravity was at 25.7% of mean aerodynamic chord and lay within the acceptable range of 16-32%. **No evidence of maintenance problems has been discovered and, although the aircraft was 43 years old, MAK says it was still serviceable.**

MAK has been forced to investigate the accident using only cockpit voice recorder information because the flight data recorder was badly damaged by the post-crash fire.

Too Close A Call For Fire-Fighting DC-10?

OAKLAND -- The photo nearly speaks for itself. While the state continues its investigation into how a multi-million-dollar DC-10 outfitted to fight fires nearly crash in June, a photo given to KTVU shows the extent of the damage to the jet.

The DC-10 air tanker returned to duty in late July after being out of commission since June 25 when as it prepared to drop fire retardant along a Kern County ridge a [severe downdraft forced the aircraft to sink and its left wing clipped several treetops.](#)



"We're thankful that no one got hurt and the damage was as minimal as it was," said Rick Hatton, managing partner of the company that owns the DC-10. ["It's a testament to the robustness of the airplane."](#)

The converted plane was hailed by California fire officials last year as the first jumbo fire bomber of its kind to battle wildland fires. The U.S. Forest Service has refused to certify the plane over concerns about the number of hours already logged on [the 31-year-old DC-10.](#)

A preliminary report by the National Transportation Safety Board has revealed that the aircraft's left wing dropped downward while making a left turn. A state investigation was still ongoing.

While the cause of the accident has not been determined, the pilots say they hit air turbulence immediately before they hit the trees, according to Hatton. Since the accident, two of the DC-10's captains and one co-pilot, all experienced airline pilots, have undergone refresher training for air-tanker operations and have been accompanying veteran tanker pilots in the state's medium-sized S-2T tankers, state fire aviation officials say.

The accident inflicted substantial damage on the leading and trailing edges of the jet's left wing, including portions of the leading-edge slats, the ailerons and flaps, according to the preliminary report and Hatton.

Cal Fire air boss Mike Padilla says [preliminary findings have determined that the cause of the near-crash was "mechanical."](#) "We're looking at everything from the weather -- turbulence -- on that date to our procedures for lining up the aircraft (toward the target) and how the pilots were perceiving the drop," Padilla said.

Flying with Confidence

New Center at USC Will Make Helicopters Safer, But is Defense Department Money Shaping Research?

A new research facility at USC will work to make Black Hawk and Apache helicopters, such as the ones shown here, safer. Courtesy photo

S.C. Army National Guard aviation maintenance officer Lem Grant says it's hard enough being a helicopter pilot in Iraq or Afghanistan without having to worry about the aircraft.

"You're out there running a mission in the middle of the night ... you've got bad guys shooting at you," says Grant, who oversees maintenance of helicopters used by the S.C. Army National Guard. "The last thing you want to worry about is your aircraft falling apart."



Grant has seen his share of parts fail and other maintenance issues with helicopters used in conflicts overseas.

Just last year in fact, the Army lost three Apaches in Iraq to mechanical problems, which Grant says caused onboard fires and complete system failures in the helicopters. Fortunately, no one was killed or injured in those incidents, but the cost of the three lost aircraft totaled more than \$120 million.

Now, thanks to a long-term, multimillion-dollar research initiative conducted by the USC department of engineering and the S.C. Army National Guard — an initiative that has resulted in the opening of a new facility at USC — helicopters both overseas and stateside might soon be made safer.

As Abdel Bayoumi, lead researcher for the project, explains, the Aug. 2 opening of the Condition-Based Maintenance Research Center at USC — one of only two like it in the country — has been long in the making.

"The project actually dates back to the '80s when we first began collecting data, all data in fact, related to helicopter movement," Bayoumi says. Since then, Bayoumi and his team of researchers, comprised mostly of USC students, have collected more than 145 million pieces of data on everything from helicopter drive trains to gearboxes, propeller motion and more. Analyzing the data, Bayoumi's team developed models for detecting what he calls "hot spots."

"Say you go to the doctor because you're having headaches, he says. "Well, now your doctor knows about the headaches and can begin making a diagnosis."

Condition-based maintenance, or CBM, uses a similar approach in identifying the source of a problem by considering the condition of a machine. The technology is high-tech and replaces older, **cruder methods such as routine maintenance checks based on time or mileage.**

Bayoumi says that not only will CBM save the military and companies that use the technology time and money but **it could also help prevent helicopter crashes and fatalities.** Plus, he says, giving an example of how it could some day be used to predict the safety of larger systems, "It might be used in helicopters today but it could be used in nuclear power stations tomorrow."

And while the CBM Research Center is funded from more than \$5 million in grants from the Department of Defense, Bayoumi says that's "just part of being a competitive research institute. We are competing against many other schools for funding. But it's not the Department of the Defense writing us a check for just research. We wrote a specific proposal for the funding."

NTSB: Turbine Blade Fatigue Failure Behind 2006 Tour Helo Accident

Findings Led FAA To Reduce Blade Life Limit To 3,000 Hours

The National Transportation Safety Board has determined a **fatigue failure of a turbine blade** brought down a tour helicopter in Hawaii last year.



A Sunshine Helicopters Eurocopter AS350BA crash-landed onto a canopy of trees on January 10, 2006 in Maui, after departing Kahului Airport for a one hour sightseeing tour.

According to the NTSB probable cause report, the helo was coming out of Manawainui Gulch near Kaupo following a viewing of Haleakala Crater when **"the helicopter vibrated, shuddered, and the low rotor rpm warning horn sounded."** The pilot entered an autorotation and set it down into a canopy of trees on its right side, according to the report. All aboard were able to lower themselves to the ground and call for help.

The NTSB investigation **revealed a turbine blade from the second stage gas producer turbine had separated from the turbine wheel, a result of a fatigue fracture caused by a corrosion/oxidation pit.**

As a result of this investigation, the Federal Aviation Administration and engine manufacturer Turbomeca **reduced the life limit of the second stage turbine blades from 6,000 hours to 3,000 hours and implemented additional turbine inspection criteria.**

The part in question in this accident had been in service 2,986 hours and **had been used as a replacement part during a 2004 overhaul.**

According to the Honolulu Advertiser, Sunshine Helicopters' Ross Scott said the NTSB report gives the company "a clean bill of health."

The pilot sustained a broken ankle, but his four passengers walked away without serious injury.

Action fails to stem runway incursions

No improvement over past five years, say US inspectors

The numbers of runway incursions in the USA have failed to fall over the past five years despite action by the Federal Aviation Administration, according to a new report by Department of Transportation watchdog the Inspector General's Office (IGO).

Incident numbers had been climbing since 1998 and they peaked in 2001, says the IGO, but following the drop in runway incursions in financial year 2002, the number and rate of runway incursions have remained much the same, with some particularly dangerous events continuing to occur at four major international airports.

The agency says that in FY2005 and 2006, **Boston Logan** airport suffered 22 runway incursion incidents (one severe), **Chicago O'Hare** 15 incidents (five severe), **Los Angeles International** 16 (two severe) and **Philadelphia** 16 (one severe). But according to the IGO, the specific local remedial actions that have now been carried out by these airports were not adopted until after a serious runway incursion had occurred.



At **Boston Logan**, says the report, action was not taken until after a 9 June 2005 incident in which two aircraft came within 52m (171ft) of a high-speed collision. The main problem at Logan was **pilot deviations from procedure**, and as a result the airport has since installed new lighting and runway markings and the FAA has revised its traffic procedures there.

In **Philadelphia**, where **controller errors** were identified as a particular problem, the FAA appointed a new traffic manager and more supervisors and operational managers, says the report. One of the additional operational positions was a supervisor responsible for reducing runway crossings, and for coordinating them when they do take place.

At all these four airports, the IGO recommends increasing information sharing among air carriers, pilots and airport personnel to identify the root causes of pilot deviation focusing attention on human factors and improved training and finally greater national authority and accountability.

Meanwhile, in 2006, a fatal accident occurred as a result of pilots misidentifying the runway from which they had been cleared to take off, and an incident in which a Continental Airlines Boeing 757 landed mistakenly on a taxiway. The fatal accident took place in August 2006 at Lexington, Kentucky when a Comair Bombardier CRJ100 crew attempted, in the pre-dawn darkness, to take off from the short general aviation runway - even though it was unlit - and overran its end at high speed.

Neither of these events meets the present FAA definition of a runway incursion so they are not included in the statistics, although the Lexington accident would be classified as such under International Civil Aviation Organization standards. The FAA plans to adopt the ICAO definition next year.

Transport Canada and industry partner to improve aviation safety

OTTAWA, Transport Canada hosted the 5th annual meeting of the Canadian Aviation Executives' Safety Network in May. The network enables Transport Canada and leaders from the Canadian aviation industry to work together to enhance aviation safety in Canada.



"Canada's New Government must continue to work with the aviation industry to maintain the public's high level of confidence in the safety of Canada's air transportation system," said the Honourable Lawrence Cannon, Minister of Transport, Infrastructure and Communities. "The Canadian Aviation Executives' Safety Network provides an ideal forum for senior executives from Transport Canada and industry to explore new opportunities to continue to reduce risks to safety."

More than 85 industry leaders attended this year's conference, including representatives of air carriers, pilot associations, manufacturers, air navigation service providers and airports from across the country. The attendees discussed ways to maintain and improve Canada's already enviable aviation safety record with the implementation of the Safety Management System (SMS).

"The Safety Management System is an international initiative recognized as the most significant advancement in aviation safety in recent years. SMS helps instill more accountability and a positive safety culture throughout aviation organizations and the industry as a whole," said Mr. Michael DiLollo, senior vice president of Air Transat. "I believe that the development, implementation and maintenance of SMS in all areas of aviation activity are key to improving the safety and well-being of the aviation industry."

The introduction of SMS regulations in June 2005 coincides with the decreasing accident rate in Canada's commercial airline industry. SMS is not self-regulation, it is not de-regulation and it is not about reducing the number of inspectors or cutting costs. SMS adds an additional layer of safety oversight to Transport Canada's existing and ongoing oversight programs to help make a safe system even safer.

Transport Canada established the Canadian Aviation Executives' Safety Network in 2003. The forum enables key decision makers from Transport Canada and the aviation industry to identify aviation safety challenges, develop strategies to address them and engage in regular dialogue regarding the viability and direction of the aviation industry in Canada.

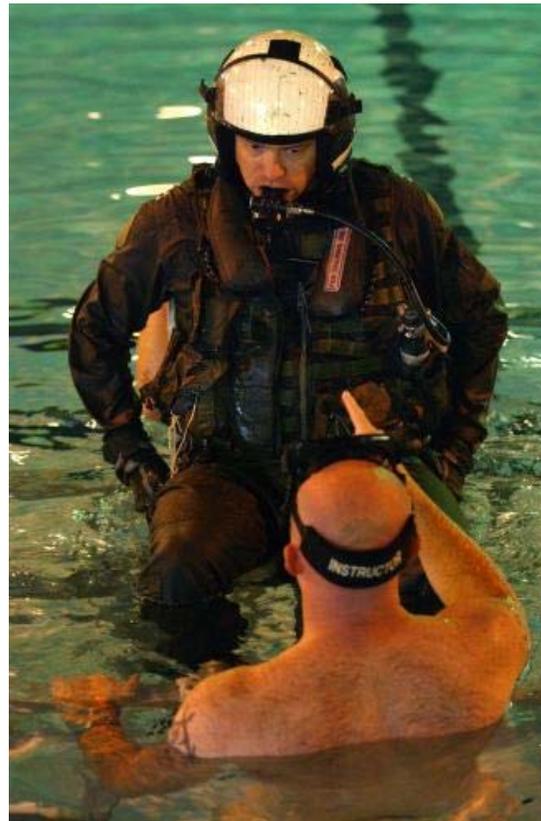
My day in the dunker

It was shortly before 8 o'clock Thursday morning when I was asking myself: "What am I doing here?"

Two Navy sailors and I, in full flight gear and opaque goggles at Jacksonville Naval Air Station, were seated and strapped inside a giant beer can-shaped contraption called "the dunker," which is designed to simulate a crashed aircraft. In seconds it would drop 7 feet into a pool, turn upside-down and sink into 12 feet of water. Our mission was - while holding our breath - to unstrap, discern up from down, find a narrow exit and swim to safety.

"Everybody ready?" one of the Navy instructors shouted. With the others I yelled "ready," but really wanted to say, "get me out of here."

What was I doing - and why?





I was taking the Navy's initial survival course taken by all sailors, Marines and Coast Guard members who fly on military aircraft. Lt. Cmdr. Susan Jay, director of the Aviation Survival Training Center at Jacksonville Naval Air Station, said the course prepares aviators to survive aviation mishaps at sea and on land.

Somewhere between 2,000 and 3,000 students a year come through the center, which teaches its initial survival course once a quarter and refresher courses about six times a month, Jay said.

The center is one of seven such facilities in the Navy, and students can include law enforcement personnel and civilians whose jobs regularly place them on military aircraft, Jay said.

The Navy required me to take the course after approving my request to fly on one of its Jacksonville-based P-3 Orion patrol planes. I was there with about a dozen other students, most of them enlisted Navy fliers.

What subjects are taught at the center?

It's a crash course in aviation physiology, the aeromedical aspects of ejection seats, combat first aid, parachute fall and landing methods, flight equipment swimming, underwater problem solving, waterborne parachute drag, and the aforementioned underwater escape exercise.

Was I ready for something this grueling?

I agreed to the training because I was sure my regular gym routine and the handful of 5Ks and sprint triathlons I run each year would help this 43-year-old reporter succeed.

The first day

On Tuesday, we listened to talks about the low-pressure chamber, the indoor ejection seat and parachute descent trainers. Then we went and used those devices. A low-pressure chamber is a large, rectangular room that re-creates the effects of hypoxia - oxygen deprivation - on the human body.

We were taken to a simulated altitude of close to 30,000 feet, told to remove our oxygen masks and start playing patty cakes with the student next to us. The Navy really had us play patty cakes? Yes. Well, they tried anyway. The idea was to demonstrate how quickly coordination and vision begin to deteriorate under those conditions.

My partner in the exercise, Marine Lance Cpl. Richard Oglesby, 22, said he started noticing the signs of hypoxia in himself almost immediately. "My hands started shaking, which was uncontrollable," he said. "I knew I was slowing down, but I couldn't do anything about it."



[My memory vs. the video](#)

What I remember from the chamber is putting the oxygen mask back on and switching to 100 percent oxygen when told to do so by one of the instructors. But the video shows the instructor picking up my air mask and holding it to my face for several seconds before I responded. "I saw you slowing down while we were playing patty cakes, and then I saw the corpsman putting your mask on for you," Oglesby said. "I was kinda laughing about that in my head."

[The second day: Fun at the pool](#)

After a morning of lecture and video, we were off to the pool to learn to swim in full flight gear (helmets, harnesses, flight gloves and boots) and without the aid of flotation devices. I did pretty well in all the above activities and usually exited the pool with a big smile on my face.

[Not so much smiling on the third day](#)

There was the parachute drag and parachute disentanglement; we practiced using emergency underwater breathing devices and escaping from the underwater escape trainer. The parachute drag exercise simulates being pulled across water by an inflated parachute. So they dragged me back and forth across the pool, on my back, three times before I could get out of my harness. It was embarrassing, but I passed.

[Yikes - the dunker](#)

Every student I talked to about "the dunker" feared it. Petty Officer 2nd Class Roger Debiase even asked why jet crew members like himself - who most likely would eject from their stricken aircraft - had to endure the dunker. "Let's say you eject from an S-3, a helo picks you up and then the helo goes down," civilian instructor Al Parks said to uproarious laughter. "[You're having a real bad day.](#)"

[So down we went](#)

Each person had to take four trips in the dunker - two without opaque goggles, and two with. With vision, it wasn't so bad. Even fun. I felt the water rush in and took a deep breath. Once inverted, I unbuckled and swam toward the light. But with the black goggles on, to simulate nighttime conditions, it was flat-out scary.

[To the rescue](#)

On my fourth ride in the dunker, I became disoriented. I forgot the route I planned to take out the window and slammed my head into a wall where I thought the exit would be. I began to feel panicky at that moment. Fortunately, Petty Officer 2nd Class Cory Flament was behind me, realized I was in trouble and helped guide me to the surface. I had been one second from summoning the center's nearby divers for help.



Afterward, Flament, a 21-year-old helicopter crewman stationed at Jacksonville Naval Air Station, was joking with me about being in the dunker for the first time.

"It was the craziest thing I've ever done," he said, spitting water. **"It seems like it puts you close to a life-and-death situation."**

'People don't like it'

I passed all sections of the course with a "Q" for qualified, but I am glad I don't have to ride that dunker again.

Lt. Cmdr. Jay said she hears that a lot, even from Navy pilots.

"The dunker leads the pack" in the most-dreaded-events category, Jay said. "Some people just don't like being turned upside-down underwater."

Added into action, they needed little more to experience improvement.

Midnight Shift Nugget

Blackout Drapes for a Good Days Sleep

When you're sleeping during the daytime, does it seem like you can never get your bedroom totally dark, no matter how thick your curtains are? If so, **this product** may be great for you.

Roc-Lon TLC (total Light Control) poly/cotton draperies and drapery liners **are designed with shiftworkers** and other day sleeper in mind.



Construction from a special fabric that blocks 100% of light, Roc-Lon drapes feature magnetic closures to **prevent light from entering a room** through gaps at the sides of the curtain.

Prices for blackout drapery liners, which hang underneath existing curtains with no additional hardware needed, range from \$25.00 to \$100.00 per window. A drapery liner from a 50 x 63" (average size) window costs about \$35.00

Originally sold only to hotels, Roc-Lon drapes are now available to consumers. You can find Roc-Lon TLC drapes at J.C. Penny and other stores.

Managing Stress

Mini-Relaxations

The busy times are often the most stressful. See some of our mini - relaxations below.

Glance at the most recent National Vital Statistics Report listing the **10 leading causes of death** in America, and you won't find the word "stress" anywhere. **Yet many well-respected studies link stress to heart disease and stroke – two of the top 10 killers.** Stress may also influence cancer and chronic lower respiratory diseases, which rank as numbers two and four, respectively, in the top 10.



Stress has implications for many other ailments as well. Depression and anxiety, which afflict millions of Americans, can be caused or exacerbated by stress. It also triggers flare-ups of asthma, rheumatoid arthritis, and gastrointestinal problems. And illness is just the tip of the iceberg. **Stress affects you emotionally as well,** marring the joy you draw from life and loved ones.

In the course of a lifetime, odds are good that you'll experience some very stressful events. You'll also face a gamut of far smaller, day-to-day stressors. **How you deal with these stressful events, big and small, will determine the impact on your physical health and emotional well-being.**

Quantifying stress

Several decades ago, two psychiatrists at the University of Washington devised a scale for researchers that weighed the stress of major life events. **The death of a spouse – which ranks highest –** was later shown to have a serious impact on the health of the surviving spouse. Although most of the events on the scale would be considered traumatic, many of the life events aren't obviously negative. An outstanding personal achievement, a new baby, or a marriage may seem like cause for celebration. But **even these life events can cause stress.**

While **most symptoms of stress may be obvious,** many symptoms are more subtle. The **first line of defense** is to recognize that certain physical and emotional changes may indeed be caused by stress itself. Although most people might attribute headache, sleep disturbances, or irritability to stress, less obvious symptoms can include ringing in the ears, a frequent and urgent need to urinate, and difficulty swallowing. Understanding the many ways that stress can manifest itself in physical and behavioral symptoms, and **identifying the triggers for stress, is the first step toward achieving relief.**

Achieving relaxation

There are almost as many techniques, practices, and treatments for dealing with stress as there are causes of it. From ancient relaxation techniques to the latest thinking on proper nutrition, from breathing exercises to repetitive prayer, there are numerous tools to help people cope. Some techniques can be especially beneficial under certain circumstances, but not as helpful under others.

Understanding what works for us as individuals, and for the stressful circumstances at hand, can require an exploration of a number of stress-reduction methods. And as always, it is important to know when to seek professional help. These efforts can reward you richly with better health, greater peace of mind, and a smoother course through life.

Mini-relaxations

Mini-relaxations can help allay fear and reduce pain while you sit in the dentist's chair or lie on an examining table. They're equally helpful in thwarting stress before an important meeting, while stuck in traffic, or when faced with people or situations that annoy you. Here are a few quick relaxation techniques to try.

When you've got 1 minute. Place your hand just beneath your navel so you can feel the gentle rise and fall of your belly as you breathe. Breathe in slowly. Pause for a count of three. Breathe out. Pause for a count of three. Continue to breathe deeply for one minute, pausing for a count of three after each inhalation and exhalation.

Or alternatively, while sitting comfortably, take a few slow deep breaths and quietly repeat to yourself "I am" as you breathe in and "at peace" as you breathe out. Repeat slowly two or three times. Then feel your entire body relax into the support of the chair.

When you've got 2 minutes. Count down slowly from 10 to zero. With each number, take one complete breath, inhaling and exhaling. For example, breathe in deeply saying "10" to yourself. Breathe out slowly. On your next breath, say "nine," and so on. If you feel lightheaded, count down more slowly to space your breaths further apart. When you reach zero, you should feel more relaxed. If not, go through the exercise again.

When you've got 3 minutes. While sitting down, take a break from whatever you're doing and check your body for tension. Relax your facial muscles and allow your jaw to fall open slightly. Let your shoulders drop. Let your arms fall to your sides. Allow your hands to loosen so that there are spaces between your fingers. Uncross your legs or ankles. Feel your thighs sink into your chair, letting your legs fall comfortably apart. Feel your shins and calves become heavier and your feet grow roots into the floor. Now breathe in slowly and breathe out slowly. Each time you breathe out, try to relax even more.

QUIZ

How Safe Are Our Bridges?

The I-35 bridge in Minneapolis that collapsed a few weeks ago was rated as "structurally deficient" by engineers. Here's a little quiz on the state of bridges in the U.S.



A bridge inspector at work

1. According to 2006 Federal Highway Administration data, what percentage of the 594,709 bridges in the U.S. are rated as structurally deficient or functionally obsolete?

- a. 7
- b. 12
- c. 26
- d. 31

2. Which state has the highest percentage of structurally deficient or functionally obsolete bridges?

- a. California
- b. Massachusetts
- c. New York
- d. Pennsylvania
- e. Rhode Island

3. Which state has the lowest percentage of structurally deficient or functionally obsolete bridges?

- a. Arizona
- b. Nevada
- c. Minnesota
- d. Utah

4. What's the average age of a highway bridge in the U.S.?

- a. 20
- b. 30
- c. 40
- d. 50



5. How often are most bridges in the U.S. rated and inspected?

- a. Every 6 months
- b. Every year
- c. Every 18 months
- d. Every 2 years

6. True or False? The fact that a bridge has been rated functionally obsolete or structurally unsound means it's unsafe.

ANSWERS

1. c; 2. e (56% of RI's bridges are rated functionally obsolete or structurally deficient); 3. a (only 10% of AZ's bridges are functionally obsolete or structurally unsound); 4. c; 5. d; 6 False. Neither designation necessarily means a bridge is unsafe. For example, a bridge may be rated structurally deficient if its shoulders are too narrow or was built with outmoded construction techniques.

Source: American Road & Transportation Builders Association. Based on 2006 data.

END