Earthquake Damage to a Laboratory Animal Facility
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ABSTRACT. Our seven-storey laboratory animal facility was damaged during the 1995 earthquake of magnitude 7.2. The seismic intensity experienced at our facility was estimated to be around 5 on the Japanese version of the Richter scale (a very strong shock). However, no damage was sustained to the water, gas or electricity supplies. In many of the offices, the upper drawers of the steel cabinets fell to the floor. In the animal-rooms, while the floor-fixed cage-racks were hardly damaged, most of the movable cage-racks were dislodged by the shocks. We describe here our countermeasures, including those taken prior to the earthquake. — KEY WORDS: animal facility, earthquake, risk management.

Although earthquakes are frequent in Japan, their occurrence has been considered rare in the Kansai area. Early on the morning of January 17, 1995, an earthquake of magnitude 7.2 hit the Hanshin district in Kansai, destroying buildings and highways and claiming approximately 6,000 lives.

Increasingly, veterinarians are becoming responsible for overseeing laboratory animal facilities. However, there have been few reports concerning earthquake damage to laboratory animal facilities [1, 2]. Because our facility experienced the Great Hanshin Earthquake, we are in a position to report damage that should provide an example for the adoption of countermeasures for laboratory animal facilities world-wide.

Our laboratory animal facility is approximately 10 km away from the nearest area that experienced seismic shocks of 7 on the Japanese version of the Richter Scale (Fig. 1). Although the exact seismic intensity experienced at our facility is unknown, we estimate it as being around 5 on the Japanese version of the Richter scale, based on the seismic intensity in neighboring cities. There was, however, no damage to our supplies of water, electricity or gas.

There are offices on every floor of our seven-floor facility, and animal rooms on the first, second, third, fourth and sixth floors. The damage to our facility was as follows.

Structural damage: There was no serious damage except for water leakage from a boiler-pipe and cracks on the wall.

Offices: There was some damage on the first floor, and more severe damage on the higher floors. The upper drawers of many steel cabinets fell to the floor, and in the worst case, the lower drawers fell as well. There was little damage to instruments, such as microscopes and computers, which were on tables fixed to the floor (Fig. 2). No one at our facility was injured, since the earthquake occurred early in the morning, when no one was present.

Animal-maintenance areas: In the animal rooms, the severity of the damage was reflected by the type of cage-rack rather than the number of the floor. Although there was little damage to the floor-fixed cage-racks, the movable cage-racks were affected. While some of the damaged cage-racks had been arranged face-to-face, 3 m apart, the worst shocks had narrowed this distance to approximately 0.5 m. The most severely damaged cage-racks were found leaning against a wall (Fig. 3). Some cages had dropped from the leaning cage-racks to the floor, and the animals had escaped. They were later re-captured. In one type of cage-rack with a removable water-tank on top, the tank had tilted, and water had flowed from the tank into the cages beneath, and the animals were found dead by drowning (Fig. 4). With the exception of these drownings, no other abnormalities were found in any of the animals.

Countermeasures taken prior to the earthquake: There was no damage to the few steel cabinets that had upper and lower sections cojoined by metal fixtures (Fig. 5). Cabinets containing chemicals had been affixed to the wall by an anti-fall-provision (Fig. 6), and also sustained little damage. Because anti-cage-fall-stoppers had been fitted to the cage-racks (Fig. 7), no cages fell from the disturbed cage-racks except for those in the leaning cage-racks.

Countermeasures taken after the earthquake: To stabilize the movement of cage-racks against shocks, our laboratory animal facility in Saitama prefecture has adopted the following measures. A metal beam fixed to the hind pole of the cage-rack connects it to the wall. Cage-racks arranged...
Fig. 2. Fallen steel cabinets. No damage occurred to microscopes or computers on the tables fixed to the floor.

Fig. 3. The cage-racks which were found leaning against a wall.

Fig. 4. The water-tank tilting on top of a cage-rack.

Fig. 5. The metal fixture (arrow) connecting the upper and lower parts of a steel cabinet.

Fig. 6. The anti-fall-stopper (arrow) on a steel cabinet.

Fig. 7. The anti-cage-fall stopper (arrow).

Fig. 8. The metal beam (arrowheads) connecting the wall with the hind pole of the cage-rack. The long metal beam (large arrow) connects each front pole of the cage-rack. The small arrows indicate cage-rack poles.

Fig. 9. The metal tie (arrow) and bolt (arrowhead) attaching the tie to the cage-rack.
face-to-face are connected by a long metal beam affixed to each forepole of each cage-rack (Fig. 8). In our facility, since there are no poles for the cage-racks, we made the following improvements. A bolt in the cage-rack assembly has been used to fix one end of a metal the attached to the wall to the cage-rack (Fig. 9). Water-tanks have been fixed to the cage-racks by common clamps, and can be separated easily as needed. All remaining steel cabinets have been fitted with the metal fixtures.

Based on our experience, even these simple counter-measures might be sufficient to prevent earthquake damage.

REFERENCES