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back, however, is that strong doses of immunosuppressive medications (such as cyclosporine A and prednisone) are necessary to keep the recipient from rejecting the "foreign" pancreas, and the complications of this immunosuppression are not insignificant Therefore, most transplant centers will consider pancreas transplantation only if the person also needs a kidney transplant, since kidney transplantation requires immunosuppression Pancreas transplantation is not, then, a reasonable way to treat early diabetes; the seriousness of the surgical procedure and the requirement for immunosuppression far outweigh the benefit of not having to take insulin.

Future insulin-delivery systems

Several pumps have been developed that can be implanted under the skin and controlled from the outside, delivering insulin in carefully regulated patterns according to the person's estimate of need By means of aerospace technology, with support from the National Aeronautics and Space Administration (NASA), one such pump was developed at the Johns Hopkins University Applied Physics Laboratory and tested in animals and humans at the Johns Hopkins Diabetes Center. It is roughly the size of a hockey puck and is surgically placed under the skin in the abdomen.

As of mid-1989 this pump had been used experimentally in 18 people with IDDM, the longest experience being over two and one-half years. It is important to note that no mechanical insulin infusion pumps measure blood glucose automatically, the person with diabetes still has to do that by the usual methods and then decide for the pump how much insulin is necessary. With the implanted pump, however, refilling the reservoir requires just one essentially painless needle prick every two months (done without anesthesia). Although the approach has been used in only a few people, results thus far have been encouraging.

Other implantable systems under development include pellets and islet cells grown in semipermeable membranes Pellets can be made of various polymers that will bind insulin and release it slowly. The pellets could be placed under the skin with a minor surgical procedure The challenge in this line of research is to find a way to release the insulin in varying rates, rather than just as a constant flow. People with IDDM, especially, require highly variable flow rates—increasing after each meal, decreasing between meals.

The semipermeable membrane approach would put live, transplanted beta cells in a membrane, which could allow them exposure to the blood glucose concentration but protection from the host's immune system. In this way, the islets would secrete insulin according to need but avoid being rejected. As with all research, the idea is simpler than the execution, and this approach is one of many whose ultimate success is yet to be determined.

Social, financial, and legal concerns

As public understanding of diabetes has increased in recent years, people with diabetes have become far more open about what they need and deserve in order to cope with their illness. In its most successful form, this openness begins with the individual's acceptance of diabetes as part of his or her physical makeup—something that, like unusual height or other physical attributes, is just a fact of life, not a reflection of self-worth. It is most important for friends, family, and coworkers to provide support, helping the person with diabetes live in a normal social environment

While the financial costs of having diabetes may be considerable, reimbursement for these costs has improved. To take advantage of financial reimbursement, it is important, first, to have adequate health insurance coverage. Most often, such coverage is obtained through group policies or "entitlement" programs. Group policies are usually offered in larger employment settings, and people with diabetes should carefully consider the health care benefit options when choosing a job Entitlement programs are government sponsored, such as Medicare for the elderly, Medicaid for the poor, Veterans Administration benefits, or Indian Health Service benefits. Given adequate health insurance, the person with diabetes should be in a position to have most expenses covered. In the case of expensive equipment items (pumps or glucose meters, for instance), it may be necessary to have a letter from a physician specifying the medical necessity of such equipment.

It is also important for people with diabetes to avoid discrimination in employment or licensing. Federal and state laws now protect against unfair discrimination; in general, this means that the person with diabetes should be considered eligible for any employment and any license for which he or she is individually qualified There are still exceptions, diabetes will keep a person from being accepted into active military service, for instance, and a history of serious insulin reactions could make a person ineligible for employment in which confusion would be catastrophic. Nevertheless, diabetes as such should not be the determining factor. The American Diabetes Association has experience in dealing with these issues and can be helpful to people who are concerned about discrimination

—Christopher D Saudek, M.D.

Disasters

It is rare that many months pass without the news of a major disaster occurring in some part of the world. The year 1988 proved to be no exception During the year, the Office of U.S. Foreign Disaster Assistance (OFDA) responded to 78 independently declared disasters worldwide. This agency provides assistance only in those situations that surpass the capability of

Morocco was one of the countries hardest hit in the spring of 1988 when regions of northern and western Africa faced one of the worst locust plagues the world had seen in three decades. Swarms of destructive desert locusts multiplied as heavy rains facilitated their breeding. The effort to control the ravenous pests was led by an international team of experts and field staff, and countries around the world donated millions of dollars' worth of insecticides.

cal government to provide adequate relief, as ·sed by U S Foreign Service personnel stationed country. For this reason, neither disasters oc- in the U S nor those of lesser impact occurring as are included in this figure. Among those se- enough to warrant U.S. assistance were locust ons in Africa (12 countries), floods in Africa, America, and Asia (14); civil unrest (8); earth- in the Soviet Union, India, Nepal, and China, displacement in southern Sudan and Mozam- refugees in Ethiopia, Rwanda, and Malawi, rted hurricanes, cyclones, volcanic eruptions, s wars, and epidemics

ugh the publicity that follows a disaster is short- e impact—direct and indirect—of a catastro- the lives of the affected population is often n Extensive experience with the human and ental consequences of disasters has been recent years by various agencies and individ- stematic studies and increased documentation events has led to improved understanding and ted efforts to improve both the preparedness response to disasters of all kinds. Neverthe- lessons learned from the past are not always practice during the excitement and chaos that ize the aftermath of an acute emergency

portant to emphasize that both prevention of s and mitigation of their impact on the popu- possible if resources are allocated to emer- reparedness. Accordingly, many governments ently developed preparedness plans that will em to prevent the worst effects of disasters spond efficiently to disasters once they oc- se governments have been helped in this task Disaster Relief Organization (UNDRO), the World Health Organization (WHO), the Office of the UN High Commissioner for Refugees (UNHCR), the League of Red Cross and Red Crescent Societies, UNICEF, and other international agencies.

Disasters may be categorized according to their mode of onset as "sudden-impact" or "gradual-onset" and further by their etiology as "natural" or "man-made." In many instances, disasters that are combinations of these categories occur at the same time, as will be apparent from the discussion of disasters in 1988.

Armenian earthquake

At 11·41 AM (Moscow time) on Dec 7, 1988, an earthquake registering 6.9 on the Richter scale struck the northern part of the Armenian Soviet Socialist Republic. Occurring in a known earthquake zone, this was the strongest quake in the region in over 80 years. The town of Spitak (population estimates vary from 15,000 to 40,000) was completely leveled, and half the buildings in Kirovakan (population 165,000) were demolished. In all, 56 villages were totally destroyed, and an additional 100 sustained serious damage. Over 21,000 residential buildings, 83 schools, 84 hospitals, and hundreds of stores and public buildings were totally or partially destroyed. In addition to the loss of cattle and other livestock, damage to the agricultural sector was estimated at more than $3 billion, while physical damage to the area was valued at more than $13 billion. As of December 1988 the death toll was estimated at nearly 25,000, and more than 150,000 were injured. At least 510,000 people were rendered homeless, and in the first few weeks more than 100,000 people were evacuated from the area.

Medical services in the affected area were disrupted because of the death or injury of medical personnel

A young girl was rescued some three days after an earthquake struck the Armenian Soviet Socialist Republic in December 1988. The quake destroyed most of the region's health facilities, and many local medical personnel were killed or injured. Although help came from all corners of the world, most of the foreign rescue teams arrived on the scene too late to have an impact. Additionally, the millions of dollars' worth of donated medical and surgical supplies could not be put to immediate use; medications, for example, arrived in small packages with instructions in unfamiliar languages, and thousands of hours were needed just to sort them.

and the destruction of most health facilities. All relief resources had to be brought in from outside the affected area. The world's response was immediate and dramatic; search dogs, medical workers, medicines, surgical supplies, food, clothes, and blankets were donated by governments, international agencies, and voluntary organizations from at least 53 countries. More than $100 million worth of material assistance was provided during the three weeks following the earthquake.

Lessons from Armenia. Earthquakes are characterized by their poor predictability, high lethality, narrow geographic focus, and rapidity of onset. Of all the common natural disasters, earthquakes present the highest risk of death to those affected. Data compiled by the OFDA show that the numbers of people affected by and deaths due to earthquakes have been increasing since 1960. This may be due to rapid urbanization in certain high-risk zones (such as Mexico) and the unregulated housing construction in some of these cities. Unreinforced masonry (including adobe) is the most hazardous building material and can be expected to collapse during an earthquake. Poor building design has contributed to high mortality in urban earthquakes. Japan is one of the few high-risk countries to have an effective warning and evacuation system, as well as excellent community education programs.

Most deaths and serious injuries occur during or soon after the earthquake, and the overwhelming cause is trauma due to partial or complete collapse of man-made structures. Studies have revealed that young children and the elderly are most at risk of death or serious injury. The disruption to health services caused by the Armenian quake was typical of this kind of disaster. The same problem occurred after the Mexico City quake of 1985 and, thus, the major long-term threat to the health of the population may be the result of the lack of functioning health services. In addition, major damage to the water supply, markets and food storage facilities, and communications systems usually occurs. Epidemics of acute, infectious diseases are the exception rather than the rule, and the threat to public health posed by the many corpses in the area is usually exaggerated.

The priorities of earthquake relief are the following: (1) rapid assessment of the extent of damage and injuries, (2) establishment of medical triage centers; (3) search-and-rescue operations for trapped victims, (4) appropriate surgical treatment of injured survivors; (5) reestablishment of communications; (6) evacuation of survivors to safe areas and provision of shelter for the homeless; (7) establishment of clean water supply and adequate food supply channels; (8) disease surveillance, (9) reestablishment of primary health care services; and (10) reconstruction and rehabilitation.

The flood of foreign medical personnel unfamiliar with local conditions and of supplies and equipment that are often inappropriate may hinder local relief efforts. For example, 450 people (more than 90% of survivors trapped in destroyed buildings) in Armenia were extricated within the first two days by 1,000 Soviet rescue workers who had been mobilized immediately. Only two persons were extricated by U.S. relief workers, although their dogs aided in the detection of several others. Most foreign medical teams arrived on the scene after the period when they might have been of greatest benefit. Many donations were inappropriate to the needs of the situation; for example, large numbers of medications in small packets, with brand names and instructions for use in unfa-

ar languages The sorting and distribution of such ·ed cines can consume thousands of man-hours and g vital supply lines.

Treating the injured required appropriate surgical s supplies, and facilities. Although there is often nsiderable pressure to vaccinate the entire popula- against certain diseases (such as typhoid fever), s not usually a priority; establishment of a clean ter supply is a more effective public health measure eltering and feeding survivors requires culturally d technically appropriate supplies. The rebuilding shattered communities is largely an architectural, gineering, and sociological task and requires little edical input, except in planning the reestablishment health services. Seismic and geologic experts are en needed to provide both short- and long-term as- tance during the recovery period. In Armenia these ecialists were among the first requested by the So- government.

Thus the health consequences of an acute natural ster such as an earthquake may be lessened by l assessment of the initial impact and provision ef based on that assessment. Donations not only be based on good intentions but should reflect al needs of disaster victims. Many lives could un- edly be saved by thorough preparedness: most rthquake zones are known, and all construction se areas should comply with safety guidelines. munity education and contingency plans based on nown risks of earthquakes would also contribute ective disaster mitigation

ds in Bangladesh

gust 1988 heavy rains in the state of Assam in n Bhutan, and in other areas of the Himalayas caused flooding of the Brahmaputra-Jamuna, Meghna, and Ganges rivers in Bangladesh, displacing more than 25 million people from their homes. Flooding is a recurrent problem in Bangladesh, the most serious in recent history having occurred in 1974. The floods affected both urban and rural areas and covered approximately one-third of the total land mass. The poor were generally the most severely affected since they lived on marginal, low-lying lands and 50% of the population depended on daily-paid agricultural labor for their livelihood. While several hundred people were drowned in the acute flooding, the major immediate health risks derived from the lack of clean drinking water in urban areas and the lack of food supplies in rural areas. Long-term health effects were likely to stem from crop damage and a resulting deficit in food production

Lessons from Bangladesh Floods are moderate on the scales of predictability, lethality, scope, and rapidity of onset The number of people killed in relation to the population affected is fewer than is the case for earthquakes and hurricanes. Their scope of damage, however, is generally wider and more pervasive. The relief program in Bangladesh quite correctly focused on reestablishment of a clean water supply, disease surveillance, monitoring of the nutritional status of the affected population, and provision of food aid to those in need It is believed that detrimental health effects, due to malnutrition, might occur in this population for up to nine months following the floods. Initially, there was considerable pressure to perform mass vaccination of the population, however, epidemics are not common after floods, and the relief priority sensibly remained the provision of clean water, a more effective measure for preventing such diseases as cholera

In 1988, 14 floods in Africa, Latin America, and Asia were serious enough to warrant aid from the U.S Office of Foreign Disaster Assistance. In August torrential rains hit Khartoum, the capital of The Sudan, and the swollen waters of the White and Blue Nile rivers were unleashed on the area The capital was already overwhelmed by vast numbers of people living in squatter settlements—refugees of civil war and those seeking relief from starvation in the southern part of the country Typically, this natural disaster took its greatest toll on these poorest and most vulnerable inhabitants