FACT SHEET

NATIONAL INSTITUTES OF HEALTH

Burns and Traumatic Injury

Yesterday

- Trauma: In 1985, nearly 18 million people were traumatically injured due to car accidents, falls, and firearms. Of these incidents, more than 90,000 were fatal. The total cost to the nation was more than $100 billion in medical treatment and lost productivity.
- Burns: In the mid-1970s, about 9,000 people in the United States died each year from burn injuries. People whose burns covered more than 20 percent of their bodies almost always died.
- Because facilities specializing in the treatment of burns or trauma were rare, most people with these injuries were treated in regular hospitals.
- Those who survived the initial burn or traumatic injury were likely to die from infection or other complications, such as multiple organ dysfunction syndrome, acute respiratory distress syndrome, or sepsis.
- Little was known about the myriad biochemical changes that occur throughout the body in response to burns and traumatic injuries — including in organs distant from, and seemingly unconnected to, the site of injury.

Today

- The annual number of traumatic injuries (vehicular, falls, and firearms) fell by close to 5 million between 1985 and 2008. Although advances in the early care of injured patients have helped to improve survival rates, subsequent complications are still a major public health problem.
- The number of burn fatalities in the United States has declined dramatically, to about 3,800 a year.
- Now, people with burns covering 90 percent of their bodies can survive, although they often have permanent impairments.
- More than 50 percent of burn patients are treated in specialized burn centers, and most hospitals have trauma teams that care exclusively for patients with traumatic injuries.
- We can attribute this remarkable improvement, in large part, to NIH-sponsored research that revealed the best approaches to fluid resuscitation, wound cleaning, skin replacement, infection control, and nutritional support. As these research findings transformed clinical practice, survival rates increased dramatically, along with the health, functioning, and quality of life of survivors.
- Recent research revealed that inflammation plays critical and complex roles following injury — it is necessary for healing, but can also cause many life-threatening complications.
- The discovery of new connections between the brain and the inflammatory system throughout the body is leading to exciting new therapeutic possibilities, including stimulation of the vagus nerve to control systemic inflammation.
- Investigators have learned that internal organs often suffer damage after a critical injury. This is because, when faced with a life-threatening injury, the body will redirect blood to try to save the brain and heart. This may rob the intestines and lungs of oxygen and other vital blood-borne substances.
- Advances in bioengineering and cell culturing techniques have allowed scientists to grow replacement skin based on a patient's own tissues. Such material allows more natural healing, a greater return to function, and less scarring than standard wound dressings.
- Collaborative, multidisciplinary research teams are rapidly advancing understanding of the highly complex, body-wide response to injury.
    - One such team is the NIH-funded Inflammation and the Host Response to Injury Large-Scale Collaborative Project (http://www.gluegrant.org/). The team uses state-of-the-art techniques to analyze the activity of genes and proteins in patients and

will use these data to develop models that accurately predict patient outcomes, which is exceedingly difficult today. The team also is publishing a series of standard procedures that capture best practices in treating severely injured patients.

- Trauma is still the leading cause of death for Americans under the age of 40. More years of potential life are lost due to injury than to heart disease or cancer.
- The cost of injuries in the year 2005 due to motor vehicle crashes exceeded $99 billion in medical expenses and lost productivity.
- The World Health Organization projects that by 2020, injury will surpass infectious diseases as the leading cause of death worldwide.
- Doctors cannot predict how individual burn or trauma patients will fare based solely on the type and severity of their injuries.

Tomorrow

- By immediately evaluating the levels of expression of relevant genes and proteins, doctors will be better prepared to determine the best course of treatment and personalize care for each injured patient.
- Laboratory-grown cells and other advances in wound treatment are speeding the healing of damaged tissue, and may enable full regeneration and restoration of function without scarring.
- Death rates from serious burns and traumatic injuries will continue to decline, as will the number and severity of complications associated with these conditions.
- Recovery will be faster and more complete as doctors improve their ability to understand and promote the body's healing process.

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