

# Pain Management



## Yesterday

- Early Greeks and Romans advanced the idea that the brain played a role in producing the perception of pain.
- In the 19th century, physician-scientists discovered that opiates such as morphine could relieve pain and chemist Felix Hoffmann developed aspirin from a substance in willow bark. Aspirin remains the most commonly used pain reliever.
- The French physician, Dr. Albert Schweitzer, proclaimed in 1931 that, "Pain is a more terrible lord of mankind than even death itself."
- In 1994, the International Association for the Study of Pain (IASP) (<http://www.iasp-pain.org/>) defined pain as an "unpleasant sensory and emotional experience associated with actual or potential tissue damage."

## Today

- Pain affects more Americans than diabetes, heart disease and cancer *combined*.
- Pain is cited as the most common reason Americans access the health care system. It is a leading cause of disability and it is a major contributor to health care costs.
- According to the National Center for Health Statistics (2006), approximately 76.2 million, one in every four Americans, have suffered from pain that lasts longer than 24 hours and millions more suffer from acute pain.
- Chronic pain is the most common cause of long-term disability.
- The diversity of pain conditions requires a diversity of research and treatment approaches.
- Pain can be a chronic disease, a barrier to cancer treatment, and can occur alongside other diseases and

conditions (e.g. depression, post-traumatic stress disorder, traumatic brain injury).

- For infants and children, pain requires special attention, particularly because they are not always able to describe the type, degree, or location of pain they are experiencing.
- Discoveries of differences in pain perceptions and responses to treatment by gender has led to new directions for research on the experience and relief of pain. For example, medications called kappa-opioids provide good relief from acute pain in women, yet increase pain in men.
- NIH-supported scientists identified a gene variant of an enzyme that reduces sensitivity to acute pain and decreases the risk of chronic pain.
- COX-2 (cyclooxygenase-2) is a major contributor to pain associated with inflammation. A study of genes affected by COX-2 led to the discovery of its role in connection to multiple cellular pathways that contribute to pain relief and adverse side-effects.
- Behavioral interventions for pain also demonstrate promise for providing pain relief either in conjunction with or in lieu of drug interventions. For example, NIH-supported research has demonstrated that individualized pain management programs may reduce cancer pain for some patients.

## Tomorrow

The NIH is poised to make major discoveries that will improve health outcomes for individuals experiencing acute or chronic pain by applying opportunities in genomics and other technologies to improve our understanding of the fundamental causes of pain. This will be accomplished through translating basic laboratory science to new, improved pain treatments and by providing strategic support for the research community to discover more effective pain treatment strategies.

*Applying genomics and other technologies to understand pain.* Advances in basic and clinical genetics are making it

possible to both characterize genetic factors related to pain sensitivity and develop novel therapeutic approaches.

- In ongoing pain studies, scientists are using technologies such as microarray-based assays (complex genetic and molecular tests) to better understand the mechanisms of pain and analgesia, identify new targets for analgesic drugs, and test the efficacy and adverse reactions of newly developed or currently used drugs to treat pain. Researchers are currently using these technologies to discover the mechanisms by which drugs such as COX-inhibitors and neurotropins may relieve pain.

*Translating basic science to improved pain treatments.*

Researchers will continue to focus on advancing both biological and behavioral pain management strategies from the research sphere to clinical applications.

- Innovative ways to categorize and measure pain are currently being studied. For example, scientists are using computer-assisted technology to develop a novel program that will capture and quantify pain experiences. Tools such as this will be combined with existing methods to more accurately and consistently measure pain over time and across groups, diseases, and conditions.
- Research will continue identifying biomarkers and biological pathways associated with painful conditions resulting from the use of drugs to treat diseases such as cancer and HIV/AIDS (<http://www.umgcc.org/research/et.htm>).

*Providing Strategic Support for Research into Pain Treatment Strategies.*

- The NIH Pain Consortium (<http://painconsortium.nih.gov/>), an effort involving over 21 NIH Institutes, Centers, and Offices, promotes collaboration among the various NIH programs that support pain research, and provides strategic direction for accelerating advances in pain prevention, and treatment.
- The Patient Protection and Affordable Care Act has established an Interagency Pain Research Coordinating Committee, led by the Department of

Health and Human Services, to assess and coordinate pain research efforts across the Federal government.

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