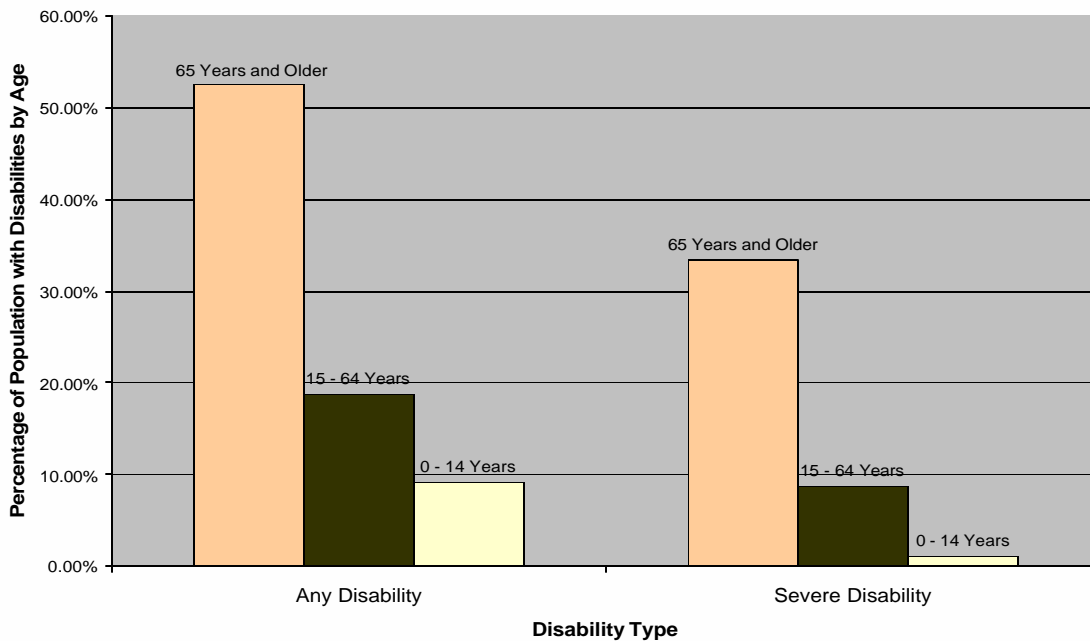


# ATP Improves Quality of Life for the Disabled

## Background

Approximately 1 in 5 Americans has some form of disability, and 1 in 10 has a severe disability.<sup>1, 2</sup> A person is considered to have a disability if he or she has difficulty performing certain functions (seeing, hearing, talking, walking, climbing stairs and lifting and carrying), or has difficulty with certain social roles (doing school work for children, working at a job and around the house for adults). A person who is unable to perform one or more activities, or who uses an assistive device to get around, or who needs assistance from another person to perform basic activities is considered to have a severe disability. Disabilities can occur at any age, but they are most prevalent among those over age 65.<sup>3</sup>

Disabilities and Age: Oct. 1994-Jan. 1995



- Over half of those age 65 or older have a disability, with two out of three of these having a severe disability.
- About one in five of those age 15 to 64 years has a disability, with almost half having a severe disability.

<sup>1</sup> “Disability Status: 2000” U.S. *Census 2000*, C2KBR17, U.S. Census Bureau. March 2003 and “Disabilities and Age: October 1994-January 1995.” *Census Brief*, CENBR/97-5. U.S. Census Bureau. December 1997, p.2.

<sup>2</sup> The *Census Bureau* does not differentiate between temporary and permanent disabilities.

<sup>3</sup> *Ibid.* p.2.

## ATP Investments

As the population ages, growth in the number of people with disabilities can be expected to accelerate in the coming decades. The Advanced Technology Program (ATP) funds technologies that have the potential to offer disabled U.S. citizens a degree of independent living. Since 1990 ATP has funded 37 projects addressing problems of the disabled, investing more than \$76 million which has been matched by industry. Funded projects include 32 single applicants and 5 joint ventures. Of these projects, 97% of participants are small firms and 3% are large firms. Thirty university research centers are included in these projects. ATP funding ranged from \$1.2 million to \$5.6 million on each project with awardees contributing nearly \$50 million of their own funds.

- ❖ **ATP funding helps elders live more independently.** *Honeywell International Inc., Minneapolis, MN. (commercialization expected in 2005)*
  - An automated system called Independent Lifestyle Assistant (I.L.S.A.) will monitor the senior at home, noting activity level and whether medications have been taken on schedule.
  - I.L.S.A. uses a variety of sensors and wireless communications devices located throughout the home that offer telephone or wireless web reminders to take medication. The system maintains privacy and secure communication, and it can alert a third party, such as a caretaker, when assistance may be required.
- ❖ **ATP funds contribute to the development of a touch-free computer interface** to enable effective communication for individuals affected by severe communication/ motor disabilities. *Advanced Interfaces, Inc., State College, PA. (awarded in 2004)*
  - Useful for those who cannot rely on the spoken word to communicate or use a standard keyboard and mouse.
  - Using multiple sensors to capture head movements, hand movements, and vocalizations, the user may access the system from a variety of positions (sitting or lying in bed).
  - The interface will adapt automatically to the characteristics of each individual (such as tremors and uncontrolled reflex movements) making the interaction reliable.
- ❖ **ATP promotes heart healthy management.** *APEX Medical, Inc. and East Developmen, East Walpole, MA. (awarded in 1997)*
  - A durable, miniature, blood-pressure-sensing and monitoring system compatible with an artificial pump will effectively regulate heart functions and improve long-term management of heart disease.

- ❖ **ATP funds are used to develop a long-term implantable sensor for blood glucose**, enabling people with diabetes to better monitor and regulate their blood glucose levels. Long-term complications of diabetes, including kidney failure, blindness, and circulatory compromise resulting in loss of limbs are caused in large measure by unnaturally large variations in blood glucose and insulin levels. *Glysens, Inc., San Diego, CA. (in prototype)*
  - Patient compliance will be enhanced through a continuous monitoring device that integrates glucose sensors, electronics, and a power supply in a biocompatible casing.
  
- ❖ Epilepsy is being treated through an investigational implantable neurostimulator intended to normalize brain activity and reduce the likelihood and severity of seizures. *NeuroPace, Inc., Mountain View, CA. (in development)*
  - Using a standardized database of human electrographic data, algorithms will be developed to detect abnormal electrographic brain activity and determine when to administer preemptive electrical stimulation therapy in response. New kinds of preemptive electrical stimulation are being investigated.
  - Preemptive neurostimulation technology may also have potential in other abnormal brain disorders, such as depression, bipolar disease, and schizophrenia.
  
- ❖ **ATP funding facilitates painless registration and image-based revision total hip replacement surgery.** A computer-integrated robotic system assists physicians in accurate preparation of bone surfaces for total hip arthroplasty (THA). *Integrated Surgical Systems, Inc., Davis, CA. (currently available to surgeons in Europe, Japan, Korea, and India.)*
  - The system supports image-based planning for cement removal and for revision implant placement to occur in a single planning/surgical session.
  - Benefits of a minimally invasive surgical procedure while significantly reducing complications and operative times.
  - A successful outcome is more deterministic through accurate pre-surgical planning and robotic bone preparation.

- ❖ **ATP funds the development of miniature, wireless, batteryless, implantable pressure sensors for tailored treatment of congestive heart failure, and hydrocephalus diseases.** *Integrated Sensing Systems Inc., Ypsilanti, MI, the Cleveland Clinic Foundation, and the Kellogg Eye Center at the University of Michigan. (in development)*
  - Miniature implantable pressure sensors are being tested in animal studies to determine the potential usefulness in humans for monitoring cerebrospinal fluid pressure (hydrocephalus treatment) and cardiovascular biological pressures (treatment of congestive heart failure).
  - The sensor will be small, self-contained, biocompatible, and requiring no battery, external catheter, leads, or antenna. The sensor will be read externally by use of a hand-held device.
  - The system is minimally invasive (catheter delivered) and allows the custom tailored treatment of many diseases, permits earlier detection of related disease conditions, improves patient management, minimizes patient discomfort, supports the trend toward home health monitoring.

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