"Cures not Clones" Briefing
Sponsored by Americans to Ban Cloning
562 Dirksen Senate Office Building
April 10, 2002

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I strongly oppose research involving human cloning and human embryonic stem cell research, based on experimental animal studies and clinical trials, because it is more likely to *harm than help* people with a disease or injury. My reasons for saying this are:

1. Cloning has not been shown to be effective in directly treating any injury or disease in experimental animal studies that form the essential basis for clinical trials. Success in preclinical animal trials is the first step in going to clinical trials. Numerous preclinical trials for spinal cord injury and other injuries or diseases have already had positive results using other avenues. Cloning has never even been tried in treating most injuries or diseases. Cloning is still in the realm of 'wild speculation.'

2. Cloning has never even been tested in the treatment of spinal cord injury in experimental animals. Most publicity is about use of cloning in spinal cord injury. However, there is no evidence that this is a useful prospect for treatment. Several other treatments (person's own stem cells, matrix, growth factor, and immunological methods) hold great promise.

3. In cases where cell therapy is proven effective, the best cells to use are the person's own cells (rather than embryonic human stem cells or cloned human cells), because these would be safer, easier and more feasible. This is a readily available source of cells that does not require use of human egg or nuclear (DNA) transfer. It avoids possible disease transmission, rejection, and the problem of overgrowth, and represents a viable therapy plan. Therapeutic cloning, if ever successful, would be cost prohibitive as a treatment plan.

4. This line of research would divert the limited funds available for research from promising areas of research. Research is always prioritized into most promising areas. It is not possible to go in every theoretical direction, for limited funding is available in research.

5. Significant risks are associated with cloning. There is a general lack of understanding about the reasons for the medical problems in cloned animals. The problem may be due to lack of imprinting (a control mechanism in the cell to turn on half of each of the duplicate genes) or due to foreign mitochondrial DNA or lack of proper environment for growth.

In my own research area of spinal cord injury, several avenues are likely to be successful in the near future (assuming adequate funding), especially if used in combination:

1. **The Patient's Own Stem Cells**: There is no need to waste valuable research funding on other sources of cells, because stem cells and other useful cell types are plentiful in the adult human. At Cedars-Sinai Hospital in California, Dr. Michel Levesque has multiplied a Parkinson's patient's own brain cells in culture and then used them to successfully treat that patient; these studies are continuing. Other researchers have found that bone stromal cells obtained from a simple bone biopsy procedure can form nerve cells. Recently Dr. Lars Olson, a prominent researcher in spinal cord injury, found that bone stromal cells can promote functional recovery after spinal cord injury in animals. Other cell types, found in the olfactory system (sense of smell), have also been used to promote recovery in experimental spinal cord injury. Using a person's own cells eliminates any problems of tissue rejection (the problem cloning is supposed to solve); it also eliminates the possibility of disease transmission, and avoids the problem of uncontrolled growth and tumor formation that has hounded embryonic stem cell research.

2. **Matrix Material**: Various matrices are being developed for use in spinal cord injury to act as bridging

material across the injury site. They provide a substrate for growth that allows remodeling of the damaged area in the spinal cord. These matrices can be mass-produced and sterilized, providing a simple tool for the surgeon to use in repair of the spinal cord. Using one of these matrices in my own research, published last year in the Journal of Neuroscience Research, I found functional improvement in rats with severe, chronic spinal cord injuries. Blood vessels, glial (support) cells, and axons (nerve cell processes) grew into these artificial matrices. Matrices can be used in combination with cells from adults, growth factors or other treatments to produce even greater functional improvement.

3. **Growth Factors**: In recent years a variety of growth factors, including neurotrophic factors and cytokines, were found to protect and stimulate growth after injury in the nervous system. While there is some difficulty in getting these factors to the injury site, new delivery methods are being developed to target particular cell types in the spinal cord. A growth factor called neurotrophin-3 has promoted partial functional recovery after experimental spinal cord injury; interleukin-10, a cytokine, has significantly improved function after acute spinal cord injury in rats. The growth factors are used to overcome inhibitors known to be present at the injury site. Certain growth factors actually stimulate endogenous stem cells to divide and mature, thus may avoid the need for transplantation.

4. **Immunological Method**: The immune system that fights disease and foreign material in our body has been found to play a key role in spinal cord injury. Components of myelin (the insulating coat on axons) actually inhibit the growth of axons. By supplying antibodies to a component of myelin after spinal cord injury, Dr. Martin Schwab has found regeneration of the axons that originate in the brain. In other studies by Dr. Michal Schwartz, stimulation of the immune response to myelin has prevented complete paralysis in animal studies; her work is now in clinical trials in humans.

To claim that human embryo cloning is the only, or even one of the more promising, roads to spinal cord injury treatment is a disservice to the hundreds of dedicated researchers who have brought us to the brink of successful treatments. This is no time to divert our attention to a morally controversial, medically unproven and scientifically speculative avenue such as experimental cloning.