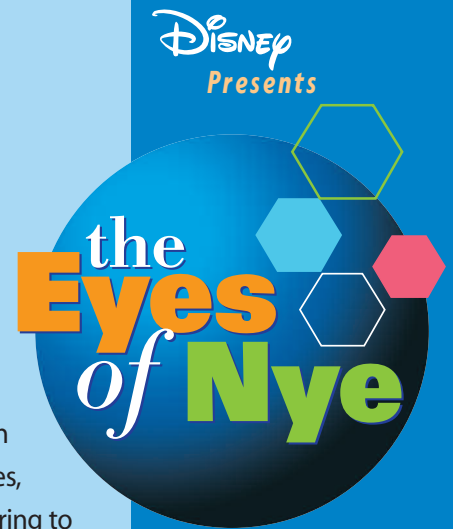


Cloning: The Science and the Controversy

For six seasons, millions of students came to understand, appreciate and enjoy the exploration of science through the series, *Bill Nye the Science Guy*. Bill returns with *The Eyes of Nye*, a more in-depth look at science subjects making news, changing lives, and impacting policy. From the future of alternate fuel sources and genetic engineering to population growth trends and issues of race, Bill and his expert cohorts bring science to life right in your classroom, helping you **Motivate** investigation; **Assess** available information; and **Propose** lines of argumentation.



This Educator's Guide includes:

- An **Introduction** that clearly defines the subject and offers an overview of the issue objectives of the guide; how it relates to science from both a social and personal perspective; as well as pertinent questions and insights regarding the topic.
- A listing of all **National Science Education Standards Addressed**.
- Detailed procedures highlighted in the MAP Framework (**Motivate, Assess, Propose**).
- Illustrative **Video Clips** from *The Eyes Of Nye* DVDs with pinpoint chapter cues.
- **Web Site Resources** to help students further investigate and locate research, charts, data as well as experts featured in the program material.
- Easily downloadable **Support Materials** that include articles, transparencies, charts, and much more.

Introduction:

"Cloning" refers to the creation of genetically identical living material. *The Eyes of Nye – Cloning: The Science and the Controversy* describes two types of cloning—reproductive and therapeutic. Reproductive cloning results in an entirely new living thing whereas therapeutic cloning results in stem cells that can be used for treatment of diseases and injuries.

Cloning involves a variety of details and controversies. Helping students identify and examine cloning involves focusing on amounts of information that can be reasonably addressed as well as awareness that further investigations are needed to make informed decisions. The objectives in this guide focus on basic aspects of reproductive and therapeutic cloning—to help students learn to consider a socio-scientific issue that demands reckoning, to investigate both scientific and social aspects related to the issue, and to construct an

Check the **MAP Teaching and Learning Framework** to explore the phases (motivate, assess, and propose) used in this guide.

argument that describes a position and typifies a way of addressing similar issues that will arise throughout their lives.

National Science Education Standards Addressed

Science As Inquiry

- Abilities necessary to do scientific inquiry
 - Identify questions and concepts that guide scientific investigations.
 - Recognize and analyze alternative explanations and models.
 - Communicate and defend a scientific argument.
- Understanding about scientific inquiry

Life Science

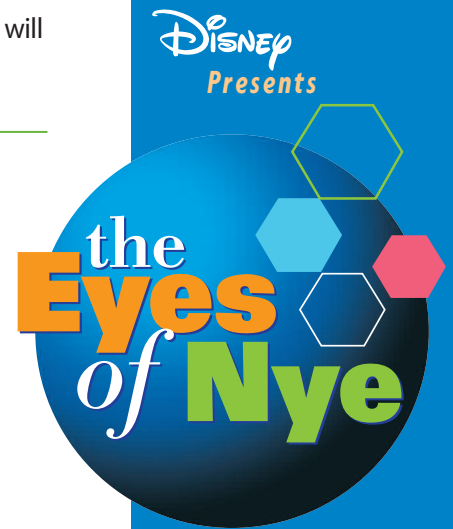
- The cell
- The molecular basis of heredity

Science in Personal and Social Perspectives

- Science and technology in local, national, and global challenges

History and Nature of Science

- Science as a human endeavor
 - Nature of scientific knowledge
-



On the DVD:

Cloning: The Science and the Controversy – Chapters

Chapter 1: Cloning Preview

Beginning to 01:37

Ends with title screen.

Chapter 2: Asexual Reproduction and the Process of Cloning

01:37—05:05

Ends with the close of the eyes in the dark. The actual program ends with Bill raising the issue, “Are we really ready to try it with humans?”

Chapter 3: Cloning for Reproductive Purposes

05:05—10:37

Ends with Dr. Swalla raising the potential of therapeutic cloning as the alternative of choice.

Chapter 4: Cloning for Therapeutic Purposes

10:37—16:42

Ends with a glowing endorsement of therapeutic cloning and sets stage for debate.

Chapter 5: Stem Cell Research, Controversy, and Debate

16:42—19:32

Ends with the questions, “Can human embryos be declared inventions that we can patent?” and, “How can we pursue a thoughtful discussion of stem cell research?” which sets a stage for the importance of our own views, morals, and ethics and those predominant in our culture.

Chapter 6: Bioethics and Social Policy Bioethics and Social Policy

19:32—Through end

Ends with the close of the program.

Cloning: The Science and the Controversy – Activity Clips

Process of Cloning and Somatic Cell Nuclear Transfer

03:57—04:49

(referenced in Educator’s Guide step 6)

Divergence of Reproductive and Therapeutic Cloning

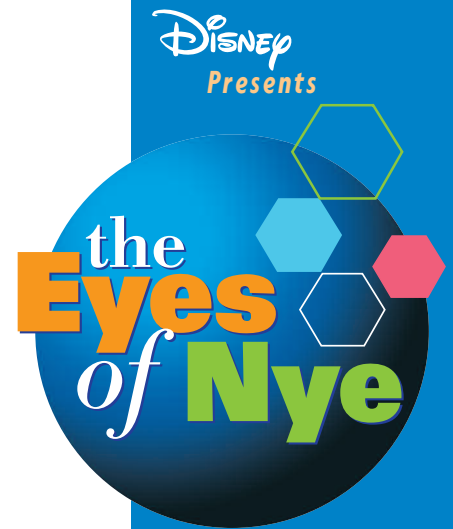
09:57—11:30

(referenced in Educator’s Guide step 8)

Difficulties with Dolly

04:50—05:04

(referenced in Educator’s Guide step 9)



Research on Reproductive Cloning and Stem Cells

06:41—09:17

(referenced in Educator's Guide step 9)

Embryos and Babies

11:16—12:01

(referenced in Educator's Guide step 10)

Research on Therapeutic Cloning and Stem Cells

12:05—15:21

(referenced in Educator's Guide step 10)

Cloning Controversies and Claims

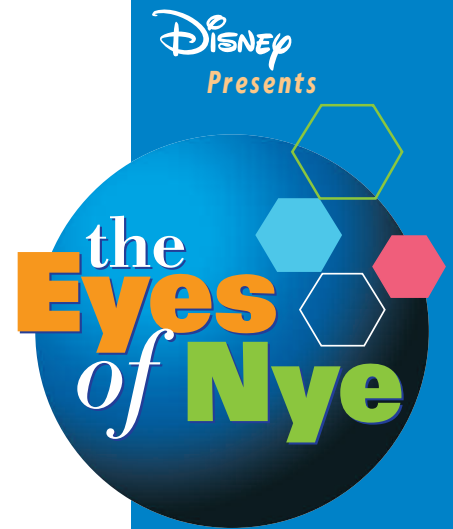
9:17—9:57

(referenced in Educator's Guide step 11)

Setting the Debate

17:12—18:12

(referenced in Educator's Guide step 11)



Procedure: Motivate Phase

- 1) Ask students what the term "clone" means. Accept and record each on chart paper or blackboard. Discuss and group responses into categories that highlight aspects of the definition (e.g., remake/recreate, same/identical, genetic makeup/DNA, etc.) in order to obtain an agreed-upon definition.
- 2) Based on the definition, ask students to describe what they think it means to clone. Responses will vary, but look for suggestions that imply *process* (e.g., making or creating a "clone"). Ask them to suggest what it means to make a clone. Students will likely focus on the more obvious aspects of reproductive cloning. Accept these but look for suggestions that imply cloning for other purposes. Discuss and probe students' level of awareness of therapeutic cloning. Describe the differences.

reproductive cloning: process of creating a new living thing with the identical genetic makeup of another living thing.

therapeutic cloning: process of creating genetically identical stem cells for use in the treatment of disease or physical injury and rehabilitation.

- 3) Tell students to keep in mind the definitions as you play "**Chapter 1: Cloning Preview**". Wait a moment to repeat the question posed, "Should we pursue cloning?" Most comments will be decisive but based on opinion and emotion. Wait until a comment is made in the form of a question, and then lead from that point to a brief discussion about the "need-to-know" certain information before we can make decisions. Ask students to suggest questions that might address this information, distinguishing between questions that are "scientific" and "social" (e.g., societal, economic, political). Narrow the questions to a few "scientific" and at least one "social".

Potential scientific questions

- a) What are the processes involved in reproductive and therapeutic cloning, and how are these different and similar?
- b) What scientific difficulties and/or opportunities might result from cloning?

Potential social questions

- c) What are the ethical, economic, and/or political considerations?
- 4) Explain though we can explore questions, we cannot conduct experiments that prove or refute lab-derived data and claims of scientists. We can, however, learn the complexities and processes involved in making a decision. Leave students with the following: When societies make decisions, such as whether to allow cloning research, do they have *all* the information needed? If not, must they still make those decisions? Students will soon understand answers are “no” and “yes,” respectively.

Procedure: Assess Phase

- 5) Tell students they will focus first on the initial scientific question identified above. Recall the definition and descriptions of cloning; ask them what comes to mind. Expect a dramatic set of “baby assembly line” visions, but suggest there may be more to it than that. Tell them they will explore the process of cloning.
- 6) Ask students to take notes as you play “**Process of Cloning and Somatic Cell Nuclear Transfer**” describing the process of cloning and somatic cell nuclear transfer. Divide class into groups of 3-4 students. Ask students in each to compare notes and construct a diagram (illustrations and text) that describes the process. Give each a transparency (or chart paper). You may allow students to view the segment again by setting up a viewing zone. Use diagrams and information below to guide the discussion that follows.

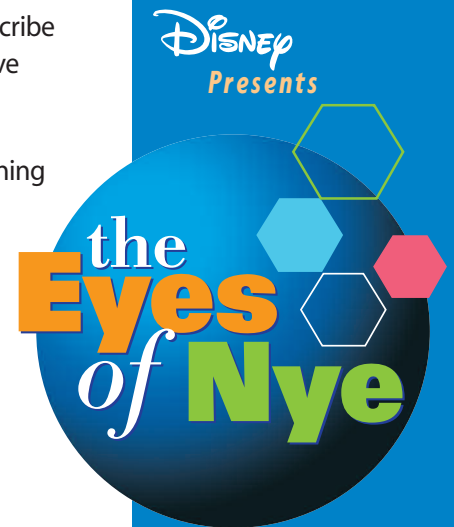
Teacher Note: The steps in cloning and SCNT are illustrated in the transparency T-CP, used through step 9. An optional transparency T-NR is provided for comparing the process of normal reproduction to that used in cloning.

- 7) When groups have completed the outlines, ask each to present the steps. Discuss similarities and differences in each group’s process description. Use transparencies provided to reinforce the process and allow students to modify and take notes.

You may use the transparency T-NR to illustrate the difference between normal reproduction and reproductive cloning, depending on the amount of background your students have had.



See **The Eyes of Nye** Issue Support **Process of Cloning**.



- 8) Play **"Divergence of Reproductive and Therapeutic Cloning."** Ask students to describe the "fork." Use transparency T-CP to emphasize where therapeutic and reproductive cloning processes diverge.
- 9) Play **"Difficulties with Dolly,"** introducing students to problems scientists had cloning Dolly the Sheep and leaving them with the question, "Are we really ready to try it (cloning) with humans?" Ask students to recall the questions we identified for investigation, and point out the second question dealing with the scientific difficulties and opportunities of cloning. Ask students to suggest difficulties or opportunities presented in cloning. Other than our presently low success rates (1-2%), they will have few suggestions. Re-emphasize need-to-know. Ask students to take notes as you play **"Research on Reproductive Cloning and Stem Cells"** featuring Dr. Billie Swalla and its discussion of stem cell research and reproductive cloning.
- 10) Relate above information to the cloning process and the description of therapeutic cloning presented earlier. Ask students to suggest other opportunities or difficulties that might be faced in therapeutic cloning. Tell them to take notes as you play **"Research on Therapeutic Cloning and Stem Cells"** in which Dr. Hans Keirstead discusses his research on therapeutic cloning at the Reeve-Irvine Research Center in California. Discuss positive prospects (e.g., disease and repair of injured tissues) presented, and ask students if they saw any problems with the research being done. There won't be many offered, given the perspective presented. Ask if anyone recalled what type of stem cell Dr. Keirstead was using (human embryonic). Ask them what that means. Ask students if there are non-scientific questions we need to investigate—recall the social question(s) mentioned earlier.

Play **"Embryos and Babies"** to learn about embryonic stem cells and distinctions between embryos and babies.
For more on stem cell research, go to eyesofnye.org

Teacher Note: Before proceeding into social questions related to cloning, discuss the importance of not only obtaining evidence from experts but also considering reasons for their perspectives; it is a difficult undertaking. Also, though this guide approaches scientific and social aspects separately, note when we consider pros and cons, counterarguments to a scientific claim are often social in nature and vice versa. Discuss with students science, for all its reliance on evidence, is a part of society.
For more on exploring claims and claimants, go to eyesofnye.org.

- 11) Write the words *reproductive* and *therapeutic* cloning, and ask students to suggest advantages or disadvantages of each. Construct a T-chart to record responses (see sidebar). Model the act of “turning” suggestions, as advantages may often be viewed from the opposite direction as disadvantages, and vice versa. Help reword suggestions (three to five) to ensure the information is sufficient to construct arguments in the next phase. View the list of social concerns of cloning at the beginning of “**Chapter 3: Cloning for Reproductive Purposes**”. Ask students to modify their list and identify one or two items they believe are important when deciding whether or not to clone. Tell them that though views vary, they may be interested in Dr. Swalla’s opinion. Play “**Cloning Controversies and Claims**” where she presents two focal controversies regarding cloning. Reiterate these along with her (as with Dr. Keirstead’s) support of cloning for therapeutic purposes. Ask if therapeutic cloning involves human embryos (recall Dr. Keirstead’s comment in step 10). Play “**Setting the Debate**” and close with these questions: Should human embryos be declared inventions that you could patent? How do we pursue a thoughtful discussion of stem cell research?

The first item on the list of concerns in Chapter 3 relates to conflicts of interest between researchers and biotech firms.

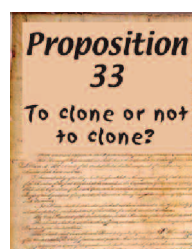
For more on exploring claims and claimants, go to eyesofnye.org.

Procedure: Propose Phase

- 12) Tell students that they are now going to play a role as either a proponent or opponent of cloning. As a “proponent” their task will be to construct and write an argument in favor of a cloning proposition. As an “opponent” their task is similar, but they are to construct a case against the proposition. Use the following scenario. Tell students, “*Proposition 33 has recently been placed on the ballot for a statewide vote. You and your colleagues (classmates) are to construct an argument for voting yes or no to the proposition, and write it so it convinces voters of your cause.*”

Proposition 33: Establishes the constitutional right to conduct stem cell research and a state institute to regulate and provide funding for research through grants and loans. Prohibits funding of human reproductive cloning research. Provides \$2 million to the institute for start-up expenses, and projections of cost to the state will average approximately \$4 billion over 30 years to pay off both the principal (\$2 billion) and interest (\$2 billion) on the bonds.

- 13) Assign each student a role—research scientist, community member, or politician. Tell each to choose (or assign) a stance “for Proposition 33” or “against Proposition 33” and join the others with the same role and stance. Explain the task of their “expert” group is to outline an argument (for or against) *that represents the perspectives of their role* (provided on the Proposition 33 Prep Cards). Distribute the cards, and allow students to construct their points. Instruct each student to write the points the group has agreed upon.



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Presents

the Eyes of Nye

Check the sample
pros and cons
of cloning.
See **The Eyes of
Nye Issue Support
Cloning
Arguments
and Counters**

General role perspectives are provided, but students should decide views.
A "community member" may be a parent, a retired person, etc. A parent
"for Proposition 33" may have a child with spinal damage. A parent
"against Proposition 33" may be worried about their daughter being
coerced into selling her eggs.

Check the support for student role cards that can be printed, cut out, and laminated.

See the Eyes of Nye Issue Support Proposition 33 Prep Cards.



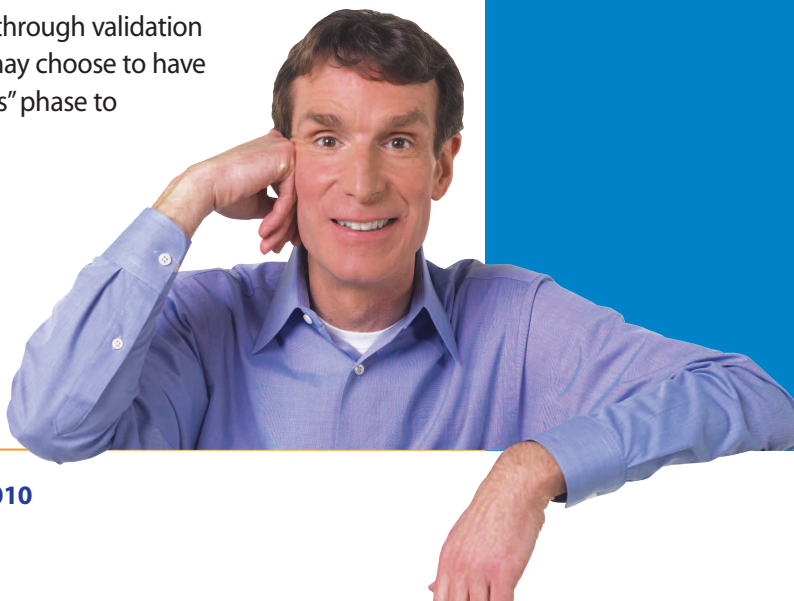
See "assess"
and "propose"
phases in
MAP
Framework

- 14)** Rearrange class into six groups—three "for" and three "against"—so each includes one member from each role (for instance, one "expert" who prepared as a research scientist, community member, and politician "for Proposition 33" and the same against). Assign each group a code (for instance A, B, C "for" and A, B, C "against"), and ask each to construct an argument that draws from the information obtained by "experts" in the previous step. They do not have to use every argument, but should try to equally represent the points made by each role. Allow one class period.

You may provide as many challenges or assistance as you feel is warranted.
For instance, students may be forewarned that:

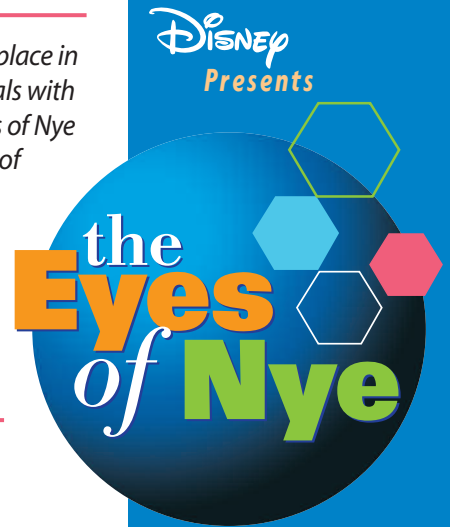
- Scientific arguments should outweigh opinion, but don't count on it if the opinions are expressed persuasively enough.
- Facts and figures are powerful, but can play against you unless sources are credible and data is consistent with acceptable science norms (see "assess" phase of MAP)
- Where opinions or inferences are used, good arguments consistently build from specific data to those viewpoints and opinions (see "propose" phase of MAP).

- 15)** Tell students to construct a rebuttal (also to be published) to one of the opposing arguments. Ask matched groups to exchange arguments (for instance, group "A for Proposition 33" with group "A against Proposition 33"). Emphasize the nature and purpose of a *rebuttal*, and its importance as possibly the last opportunity to refute the claims of the other argument *in writing* before the voting public.
- 16)** Ask each group to return their rebuttal to the group that constructed the argument, and discuss the argument points and rebuttals students have developed. You may arrange to have students take turns presenting their arguments and rebuttals, provide all students in the class with a printed copy of each for discussion, or arrange a vote by students or teachers who have not been part of the activity. Close with discussing the challenges in dealing with data that results from both "science-in-the-making" and "core science" (proven and accepted through validation and consensus in the scientific community). You may choose to have students modify questions and re-enter the "assess" phase to delve deeper into the issue of cloning.



Final Teacher Note: The Proposition 33 scenario is based on a similar situation that took place in California in 2004. Students will find it interesting to compare their arguments and rebuttals with those actually constructed by proponents and opponents of **Proposition 71** (see *The Eyes of Nye Issue Support*). Should you choose, additional reinforcement of the relation of the issue of cloning to ethics and social policy can be provided through use of
“Chapter 6: Bioethics and Social Policy”

To further emphasize students’ likely participation in such an issue in the near future,
explore past and impending cloning legislation.
For more, go to eyesofnye.org.



Further Research

Investigating the Issue: Cloning

Making decisions and constructing lines of argumentation related to an issue requires students obtain and assess information related to scientific and social aspects of the issue, and particularly pertaining to claims made regarding the issue. Scientific aspects of claims (e.g., data, evidence) are analyzed and assessed according to adherence to accepted scientific norms (*constitutive* criteria such as accuracy, precision, and consistency). Social aspects of claims are analyzed and assessed according to contextual criteria such as potential bias and qualifications of “expert” claimants and/or their sponsoring organizations as well as corroboration of viewpoints.

In addition to the information and claims presented in *The Eyes of Nye - Cloning*, students may access a variety of informative sources related to cloning to assist them in assessing both scientific and social aspects of claims made. Teachers may direct them to specific information or leave research tasks as open as they feel is necessary for students to adequately explore and assess cloning information.

Exploring Stem Cell Research

The National Institutes of Health (NIH) provides useful information for teachers and students who wish to obtain additional data and/or descriptions regarding stem cell research. These resources are particularly helpful during the “assess” phase of the educator’s guide as students investigate scientific evidence related to the issue of cloning, and as they construct and analyze lists of pros and cons related to therapeutic and reproductive cloning.

Access at:

<http://stemcells.nih.gov/index.asp>

Exploring Cloning Claims and Claimants

An important aspect of dealing with socio-scientific issues involves looking beneath the scientific evidence and viewpoints expressed by acquiring additional information on the experts themselves as well as the organizations for whom they are affiliated. Through such exploration, students are better able to infer social (contextual) factors that may influence the

claims. In *The Eyes of Nye - Cloning*, the principal information was provided by Doctors Hans Keirstead, Billie Swalla, and Jeffrey Kahn. Teachers may encourage students to conduct open-ended searches for this type of information, or direct students to the links provided below.

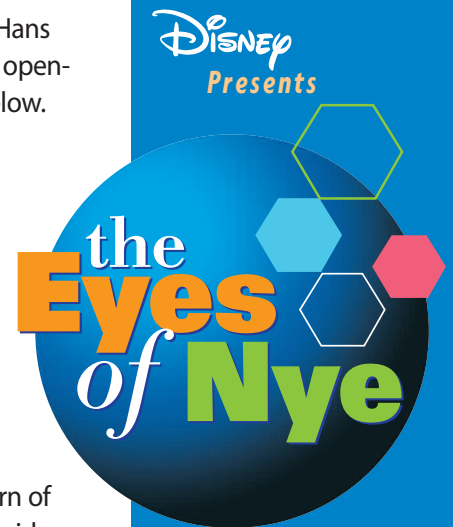
Dr. Billie Swalla, scientist	University of Washington, Dept. of Biology
Dr. Hans Keirstead, scientist	Reeve-Irvine Research Center (at the University of California)
Dr. Jeffrey Kahn, director	Center for Bioethics (at the University of Minnesota)

Exploring “experts” beyond information offered at sites such as those above often reveals additional details that may be relevant to discussions and students’ attempts to learn more about potential bias that may accompany expert claims. For instance, one concern of note in *The Eyes of Nye - Cloning* and discussed in the “assess” phase of the educator’s guide dealt with potential conflicts of interest between researchers and biotech firms. For example, you may wish students to access information (which also may be subject to assessment of credibility) on Dr. Keirstead’s recently formed biotech company and some of its subsequent activities through standard search procedures.

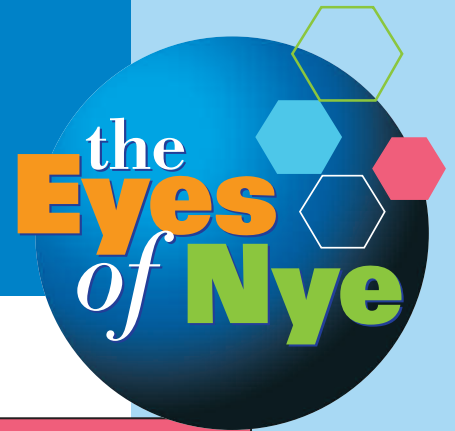
Exploring Past and Impending Cloning Legislation

As an issue, cloning is particularly relevant to students from the perspective of a future voter. Depending on when you are teaching with these materials, some 12th grade students presently studying the issue in your class may in fact be called upon this year to vote on impending state legislation. The educator guide that accompanies *The Eyes of Nye - Cloning* makes use of students’ interest in past and impending (future) legislation in the “propose” phase.

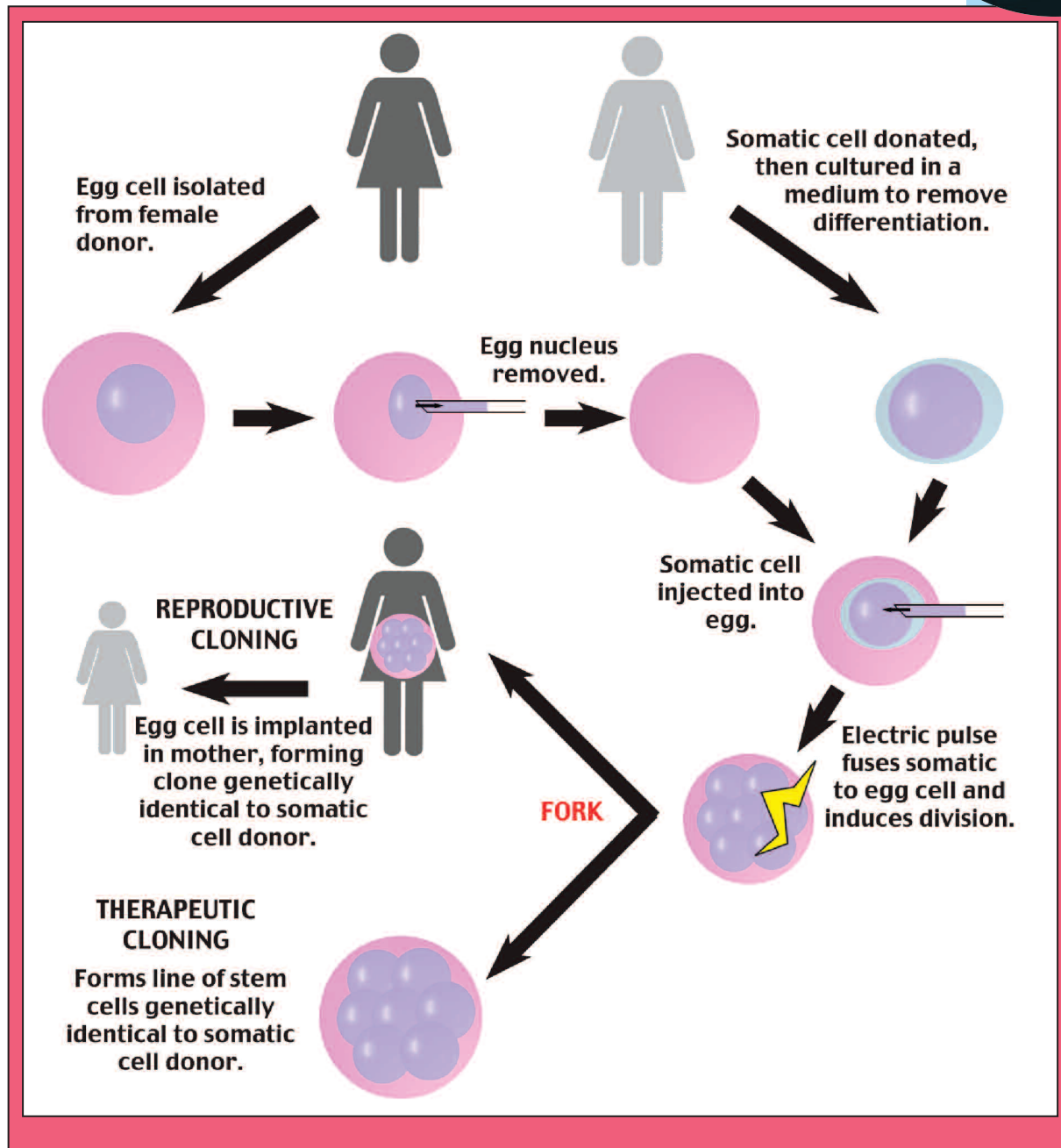
The most significant past legislation that reinforces students’ work in the “propose” phase (constructing and proposing arguments and rebuttals) is California’s recent Proposition 71, approved by voters in a statewide vote in 2004. Students can access the actual Proposition 71 arguments and rebuttals, published by the League of Women Voters in California. They may also conduct searches for the most recent legislation (or events in their state that indicate impending legislation in which they may be called to take an active role as a registered voter).



Cloning: The Science and the Controversy



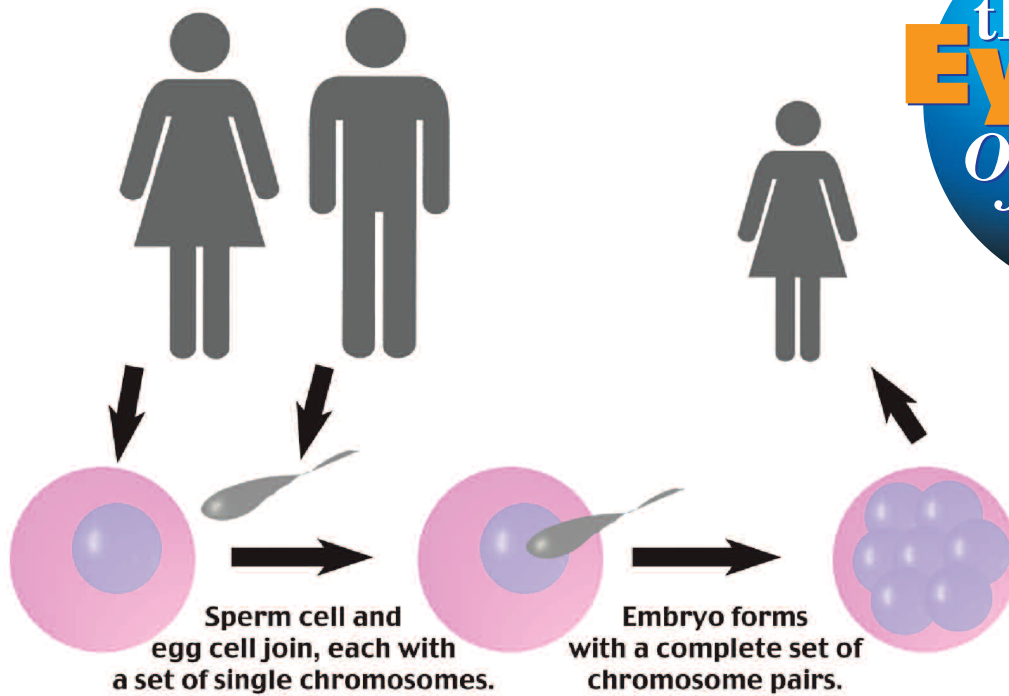
Process of Cloning (Transparency T-CP)



Normal Reproduction (Transparency T-NR)

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the
Eyes
of
Nye



Cloning Arguments and Counters

Reproductive cloning

Advantages

- Saves time by creation of stock of “model” animals for disease research, access to naturally produced substances that are useful in medicine, or improvement of breeding processes.
- Prevention or reversal of extinction of certain species of animals.
- Replacement of lost (deceased) pet.
- Assistance for couples with difficulties having children.

Disadvantages

- The time lost by the unsuccessful attempts (98 or 99 out of 100) in the short run offsets the time lost by normal breeding processes in the long run, not the mention the cost involved in the unsuccessful attempts.
- The cells are seldom preserved in a usable state. Many animals that have died are also old, and as animals age the DNA telomeres shorten, so use of adult stem cells may result in shortened life spans.
- Moral or ethical dilemma. There is also no indication that because a cloned living organism is genetically identical that it will be the same as the original organism.
- There are other options for these couples that are more tried and tested, and more economically feasible.

Therapeutic cloning

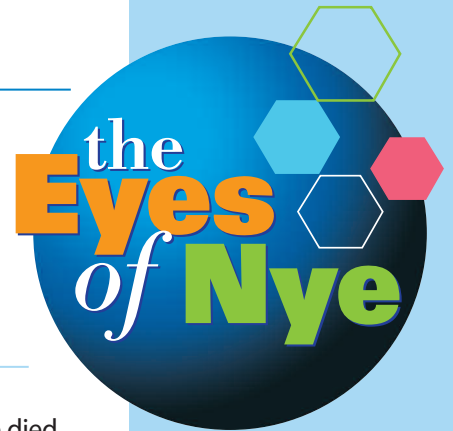
Advantages

- Adult and embryonic stem cell research and applications offer unique opportunities for treatment of disease or repair of damaged tissues or limbs that could perhaps not be otherwise cured or treated.
- Stem cells replicate and can be kept for indefinite periods of time in the right conditions, ensuring lasting numbers of usable cells from small initial collections.
- Stem cells are readily available.

Disadvantages

- Stem cell treatments are relatively new and untested, primarily only on certain non-human test animals, with low success rates and high costs, and almost no long-term (longitudinal) data on effects or results.
- Maintenance of cells is expensive and time consuming, and a security concern, as these cells represent ways to produce a clone of the donor or from an embryo.
- Obtaining embryonic stem cells involves using embryonic remains or harvesting procedures, therefore destroying an embryo. Obtaining adult stem cells can involve intrusive surgical procedures (e.g., extracting stem cells from bone marrow).

Disney
Presents



Proposition 33 Prep Cards

Community member

A community member may be one of any number of individuals much like those you see and speak with every day. Parents, teachers, retired persons, and local workers at stores or construction sites are all community members.

Concerns that you may or may not have are largely determined by the particular role you choose. The primary concerns of a mother or father (parent) would likely be your children, including possibly their health or an injury a child may have, or an impressionable daughter who has begun producing eggs. A retired person may be concerned with the effect of additional bonds and taxes on his fixed income. Create your character, and think like him/her.

You are likely to direct your arguments toward members in the community that can relate with you or have similar situations or concerns.

Research scientist

A research scientist may be involved either directly or indirectly with researching stem cells, reproductive cloning, or related specialty areas. Scientists at universities, research institutes, or biotechnology firms are all good examples that fit the role.

Your concerns are largely scientific—you want to see (and show) the evidence, and to back that up with data, claims from other reputable scientists, and outside theory where possible. However, you are also a person, and you have social interests; these range from adhering to the policy and position of the organization for which you work to your own moral opinions, as well as the well-being of your fellow man. Construct your character's situation, qualifications, and view, and assemble your thoughts and points of argument as would that character.

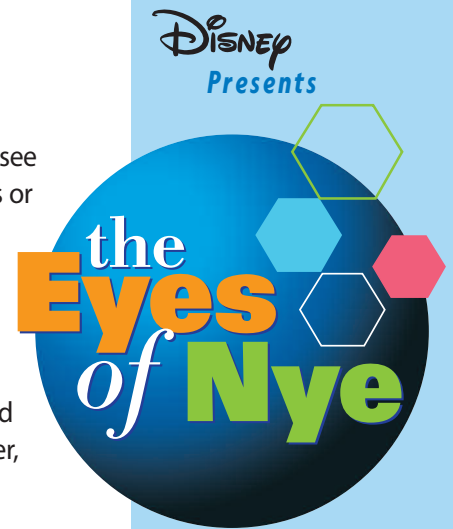
Though your opinions and situation influence your own view and possibly what you intend to propose, you are likely to direct your arguments to science and evidence, because that is your specialty as well as the expectation of those around you.

Politician

A politician may be a state senator, representative, or even an elected judge or local city official. He/she may also be of any of several party affiliations, or an independent.

Your concerns are partly those of your voting constituency, and partly a result of your own beliefs. You may have a variety of positions, and these are influenced greatly by the viewpoints of voters in your state, region or city/county. Your concerns are also influenced by timing—a vote is around the corner.

You are likely to select and use arguments that are as close as possible to both your own personal views and those of the voting public on whom you depend for re-election. You choose language carefully, you respect science but are very attuned to the impact of morals and beliefs, one way or the other, on final decisions that are made upon voting.



ARGUMENTS AND REBUTTALS

Proposition 71

Stem Cell Research. Funding. Bonds. Initiative Constitutional Amendment and Statute.

2004 argument published by the CA Secretary of State
<http://www.voterguide.ss.ca.gov/propositions/prop71-arguments.htm>

ARGUMENT in Favor of Proposition 71

PROPOSITION 71 IS ABOUT CURING DISEASES AND SAVING LIVES.

Stem cells are unique cells that generate healthy new cells, tissues, and organs. Medical researchers believe stem cell research could lead to treatments and cures for many diseases and injuries, including: Cancer, heart disease, diabetes, Alzheimer's, Parkinson's, HIV/AIDS, multiple sclerosis, lung diseases, and spinal injuries. *In fact, medical problems that could benefit from stem cell research affect 128 million Americans-including a child or adult in nearly half of all California families.*

71 CLOSES THE RESEARCH GAP.

Unfortunately, political squabbling has severely limited funding for the most promising areas of stem cell research. *Meanwhile, millions of people are suffering and dying.*

Prop. 71, the California Stem Cell Research and Cures Initiative, is an affordable solution that closes the research gap, so new treatments and cures can be found. That's why a YES vote on 71 is endorsed by a broad coalition that includes OVER 20 NOBEL PRIZE WINNING SCIENTISTS, doctors, nurses, Democrats, Republicans, and dozens of organizations, including:

- Alzheimer's Association, California Council
- American Nurses Association of California
- California Medical Association (representing 35,000 doctors)
- Cancer Research and Prevention Foundation
- Christopher Reeve Paralysis Foundation
- Cystic Fibrosis Research, Inc.
- Elizabeth Glaser Pediatric AIDS Foundation
- Juvenile Diabetes Research Foundation
- Michael J. Fox Foundation for Parkinson's Research
- Prostate Cancer Foundation
- Sickle Cell Disease Foundation of California

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71 PROTECTS CALIFORNIA'S TAXPAYERS AND BUDGET.

Prop. 71 doesn't create or increase any taxes.

It authorizes tax-free state bonds that will provide a maximum of \$350 million per year over ten years to support stem cell research at California universities, medical schools, hospitals, and research facilities.

- These bonds are self-financing during the first five years, so there's no cost to the State's General Fund during this period of economic recovery.
- By making California a leader in stem cell research and giving our State an opportunity to share in royalties from the research, 71 will generate thousands of new jobs and millions in new state revenues.

That's why California's Chief Financial Officers, State Controller Steve Westly and State Treasurer Phil Angelides, endorse Prop. 71.

STRICT FINANCIAL AND ETHICAL CONTROLS.

Research grants will be allocated by an Independent Citizen's Oversight Committee, guided by medical experts, representatives of disease groups, and financial experts- and subject to independent audits, public hearings, and annual public reports. *Prop. 71 also prohibits any funding for cloning to create babies, reinforcing existing state law banning human reproductive cloning. It's totally focused on finding medical cures.*

71 COULD REDUCE HEALTH CARE COSTS BY BILLIONS.

California has the nation's highest total health care spending costs-over \$110 billion annually. A huge share of those costs is caused by diseases that could be treated or cured with stem cell therapies.

- If Prop. 71 leads to cures that reduce our health care costs by only 1%, it will pay for itself-and it could cut health care costs by tens of billions of dollars in future decades.

For more information visit www.YESon71.com.

Vote YES on 71-IT COULD SAVE THE LIFE OF SOMEONE YOU LOVE.

ALAN D. CHERRINGTON, Ph.D., *President, American Diabetes Association*

CAROLYN ALDIGE, *President, National Coalition for Cancer Research (NCCR)*

JOAN SAMUELSON, *President, Parkinson's Action Network*

REBUTTAL to Argument in Favor of Proposition 71

Stem Cell Research? YES! Human Embryo Cloning? NO!

Here are just some of the many problems with Proposition 71:

- It specifically supports "embryo cloning" research- also called "somatic cell nuclear transfer"-which poses risks to women and unique ethical problems. To provide scientists with eggs for embryo cloning, at least initially, thousands of women may be subjected to the substantial risks of high dose hormones and egg extraction procedures *just* for the



purposes of research. In addition, the perfection of embryo cloning technology- even if initially for medical therapies only-will increase the likelihood that human clones will be produced.

- Why privilege this research over other important research and medical needs, especially given the limits on how much California can invest? Why not issue bonds for programs that ALREADY have proven their cost effectiveness? Embryo stem cell research in nonhuman animals has produced only limited results. More compelling evidence of its efficacy should be required before a large commitment of public resources to study it in humans.
- Proponents are manipulating those seeking cures, building false hopes with exaggerated claims, and creating a costly program without adequate oversight or accountability.

Stem cell research *should* be supported, but not this way. And don't be fooled by those who say that the opponents of Proposition 71 are all opposed to abortion and embryo stem cell research. Many of us are pro-choice, do not oppose all embryo stem cell research, and still oppose this initiative.

Vote "No" on Proposition 71.

JUDY NORSIGIAN, *Executive Director, Our Bodies Ourselves*

FRANCINE COEYTAUX, *Founder, Pacific Institute for Women's Health*

TINA STEVENS, *Ph.D., Author, Bioethics in America: Origins and Cultural Politics*

ARGUMENT Against Proposition 71

WE SUPPORT STEM CELL RESEARCH, NOT CORPORATE WELFARE

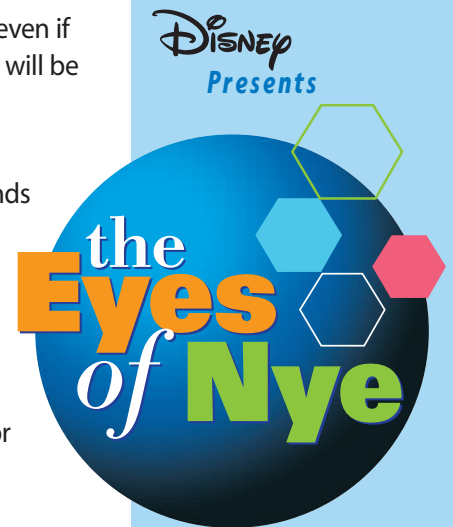
It's wrong to launch a costly new state bureaucracy when vital programs for health, education, and police and fire services are being cut. We cannot afford to pile another \$3 billion in bonded debt on top of a state budget teetering on the edge of financial ruin. General Fund bond debt will grow from \$33 Billion on May 1, 2004, to a Legislative Accounting Office projection of \$50.75 Billion in debt by June 30, 2005-*a staggering 54% increase* in just 14 months!

WHO BENEFITS?

Backers will cynically use images of suffering children and people with disabilities in their commercials, but pharmaceutical company executives and venture capitalists contributed \$2.6 million to put this measure on the ballot. By getting taxpayers to fund their corporate research, they stand to make billions with little risk.

NO ACCOUNTABILITY

And who will oversee how this money is spent? According to the fine print, the proponents give themselves power to exempt their "Institute for Regenerative Medicine" from aspects of our California "open meeting" law (specifically passed to *stop* this kind of backroom deal-making).



Why do proponents want to keep what they are doing a secret? If we're being asked to pay for this research, then it should be freely available to all, not just to those who will be "awarded" special contracts by the "Institute." The initiative also grants the "Institute" power to rewrite California's medical informed consent safeguards.

Most importantly, the fine print specifically prohibits the Governor and Legislature from exercising oversight and control over how this money is spent-or misspent. Even if the state teeters on the brink of financial ruin, our elected representatives will still have to borrow and spend this money, because the proponents are putting this money grab into our Constitution.

BAD MEDICINE

Opponents of this boondoggle include liberals, conservatives, Republicans, Democrats, Independents, medical professionals, and stem cell researchers. We all strongly support Stem Cell Research, but *oppose* this blatant taxpayer rip-off that lines the pockets of a few large corporations.

If there was any doubt about the true motives of the corporate promoters of this bond debt, one need only look at what it *doesn't* fund. The fine print does not initially fund adult and cord blood stem cell research. Adult and cord blood stem cell research has already produced more than 74 major medical breakthroughs, but this measure excludes support for these proven areas of research, without a two-thirds vote of the Institute's "working group."

Consider just one example: Cord blood stem cells are being used to treat sickle cell anemia with a staggering success rate of 90%. That's real progress, helping real people, but it may not receive one penny from this initiative.

Join with millions of your fellow citizens in demanding an end to "corporate welfare" and bonded debt. This is no time to spend billions we don't have on a self-serving sham.

Vote "NO" on Proposition 71. It's not what they say it is.

www.NoOn71.com

TOM McCLINTOCK, California State Senator

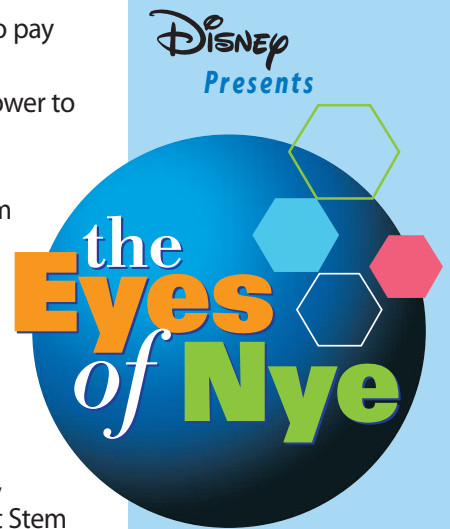
JOHN M.W. MOORLACH, C.P.A., Orange County Treasurer

H. REX GREENE, M.D., Cancer Center Director and Bioethics Consultant

REBUTTAL to Argument Against Proposition 71

NOBEL PRIZE WINNING MEDICAL RESEARCHERS, DOCTORS, AND PATIENT GROUPS HAVE STUDIED THIS MEASURE AND URGE: YES on 71.

- Stem cell research is the most promising area of research aimed at finding breakthrough cures for currently incurable diseases and injuries affecting millions of people.
- 71 is a well-designed program to find those cures.
- It's vitally needed because stem cell research is being restricted by politics in Washington.



The claims by opponents are misleading political scare tactics.

71 SUPPORTS ALL TYPES OF STEM CELL RESEARCH - including adult and cord blood stem cell research.

71 FOCUSES ON RESEARCH BY NONPROFIT INSTITUTIONS - NOT CORPORATIONS.

- It's specifically designed to support the type of breakthrough research conducted by universities, medical schools, hospitals, and other nonprofit institutions.

71 REQUIRES PUBLIC ACCOUNTABILITY.

- 71 specifically identifies the institute overseeing the research.

MUST COMPLY WITH OPEN MEETING LAWS.

- It requires PUBLIC HEARINGS and INDEPENDENT AUDITS reviewed by the California State Controller and an independent oversight committee.

71 PROTECTS CALIFORNIA'S BUDGET.

Prop. 71 is a good investment. Studies led by a Stanford University economist project that 71 will generate millions in new state revenues from royalties and new jobs, and that new medical treatments and cures can REDUCE CALIFORNIANS' HEALTH CARE COSTS BY BILLIONS.

71 is endorsed by over 20 Nobel Prize Winning scientists, medical groups representing over 35,000 California doctors and nonprofit disease groups representing millions of suffering patients.

VOTE YES on 71-TO FIND CURES THAT WILL SAVE LIVES.

LEON THAL, M.D., Director Alzheimer's Disease Research Center, University of California at San Diego

PAUL BERG, Ph.D., Nobel Laureate Professor of Cancer Research, Stanford University

ROGER GUILLEMIN, M.D., Ph.D., Nobel Laureate Distinguished Professor, Salk Institute for Biological Studies

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