# Nanotechnology, Synthetic Biology, & Public Opinion

## A Report Of Findings

Based On A National Survey Among Adults

Conducted On Behalf Of:

**Project On Emerging Nanotechnologies**

**The Woodrow Wilson International Center For Scholars**

**By Hart Research Associates**

September 22, 2009

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# Hart Research Associates

*From September 9 to 13, 2009, Hart Research Associates conducted a nationwide survey among 1,001 adults about attitudes toward the entities involved in the oversight of new scientific and technological advances, awareness of nanotechnology, and awareness of and attitudes toward synthetic biology and its application to create synthetic biofuels. This is the fourth consecutive year that questions have been asked about nanotechnology and the second year that questions have been asked about synthetic biology. At the 95% confidence level, the data's margin of error is ±3.1 percentage points.*

*Two focus group sessions were conducted in Baltimore, Maryland, on August 16, 2009, among adults—one among individuals with a four-year college degree and one among those with less than a four-year college degree—to explore both unaided and informed impressions of synthetic biology, with a specific focus on the use of this research to make synthetic biofuels. This qualitative research provides context for better understanding some of the survey findings about synthetic biology and synthetic biofuels.*

## Overview

### While public awareness of synthetic biology remains lower than that of nanotechnology, the proportion of adults who say they have heard at least something about synthetic biology has more than doubled in the past year.

Awareness of nanotechnology has increased slightly in the past year, putting it back at the same level measured in 2006, with the large majority reporting little or no awareness. One in three (31%) adults has heard a lot (9%) or some (22%) about nanotechnology, while nearly seven in 10 (68%) have heard just a little or nothing about it. Nonetheless, the proportion who say they have not heard anything at all about nanotechnology (37%) is at the lowest level measured.

Today, 22% of Americans say they have heard a lot (5%) or some (17%) about synthetic biology. This is more than twice the proportion who said they had heard a lot or some about it in 2008 (9%). The proportion of Americans who say they have heard nothing about synthetic biology has declined 19 points from 67% in 2008 to 48% today.

### Among Americans who make an initial assessment of synthetic biology, the plurality think the risks and benefits will be about equal, and the remainder are divided evenly between benefits and risks. When potential risks and benefits of synthetic biology are outlined, however, the greatest shift in public opinion is toward risk.

Initially, nearly equal proportions of Americans think that the benefits of synthetic biology will outweigh the risks (18%) as think the risks will outweigh the benefits (19%), and 32% believe that the tradeoff will be equal. (Thirty-one percent do not express an opinion.)

Informed perceptions of the risk-benefit tradeoff of synthetic biology shift, however. After hearing a statement about potential risks and benefits of synthetic biology, a larger proportion of Americans think the risks will outweigh the benefits (35%) than think the benefits will outweigh the risks (25%). Thirty-four percent (34%) believe that the tradeoff will be an equal one.

**Despite concern about the risks of synthetic biology, by 52% to 38% Americans think we should encourage the development of synthetic biofuels rather than discourage it.**

Although public opinion about synthetic biology shifts more toward concern about risks than optimism about benefits, when read two statements about the development of synthetic biofuels—one about why we should *encourage* their development and one about why we should *discourage* their development—the majority of Americans think this area of science should be encouraged.

Of the possible risks in developing synthetic biofuels tested in the survey, the public is most concerned that this form of research could be used to create harmful things such as biological weapons and that it is morally wrong to create artificial life. A second-tier concern is that it could damage the environment.

**The public has a strong appetite for more information about synthetic biology—an area of science that generates both excitement and concern.**

The public's divided attitudes regarding synthetic biology are illustrated by the finding that, just as 47% of Americans say they are "excited by the promise of this research," 55% agree that "this research worries" them.

There is broad consensus, however, that "more should be done to inform the American public" about synthetic biology research. Fully nine in 10 adults agree with this statement, including 73% who strongly agree.

**The public desires more than just information, however. While federal government agencies that might oversee synthetic biology receive approval ratings lower than they were at the beginning of the decade, two-thirds of Americans agree that the federal government should regulate this research.**

The American public remains familiar with three federal agencies tested in previous surveys—the FDA, EPA, and USDA—that have the potential to play critical roles in the oversight and regulation of nanotechnology and synthetic biology. More than four in five Americans say they know what each of these entities does. Job approval ratings for the FDA, USDA, and EPA have held steady since 2007, as have the public's confidence in these organization's ability to maximize benefits and minimize risks of the products and industries they regulate.

Familiarity with the U.S. Department of Energy, a major funder of synthetic biology research, is slightly lower than that of the other agencies tested, with three-fourths of the public professing awareness of what it does. DOE also earns slightly lower job approval ratings and confidence levels than do the FDA, EPA, and USDA.

The public is divided in its confidence in businesses' ability to manage the risk associated with new advances in science and technology and remains more confident in federal government agencies' ability to play an oversight role and manage the risk.

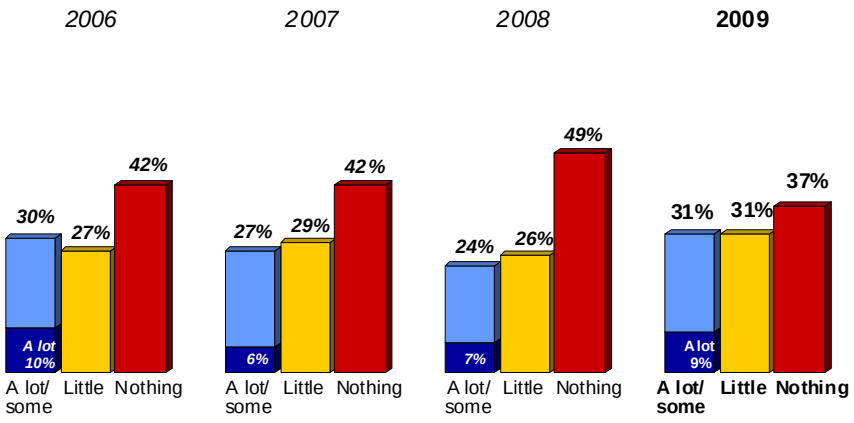
Despite these lukewarm approval ratings, two-thirds of Americans agree that the federal government should regulate this research, including 44% who strongly agree. Only 11% of the public strongly disagrees.

## Key Findings

**There have been only minor shifts in awareness of nanotechnology over the past four years. Today, three in 10 Americans say they have heard a lot or some about nanotechnology—the same proportion measured in 2006.** While the proportion of adults who say they have heard nothing at all about nanotechnology is at the lowest level measured (37%), fully 68% say they have heard just a little or nothing at all. Three in 10 Americans (31%) say they have heard a lot or some about nanotechnology, including just 9% who say they have heard a lot. This represents a slight increase in awareness over the past two years (24% said they had heard a lot or some in 2008; 27% said they had heard a lot or some in 2007), but is back to the level measured in 2006 (30% said they had heard a lot or some in 2006). Nonetheless, the proportion who say they have not heard anything at all about nanotechnology (37%) is at the lowest level measured.

### Little Change In Public Awareness Of Nanotechnology

*How much have you heard about nanotechnology?*

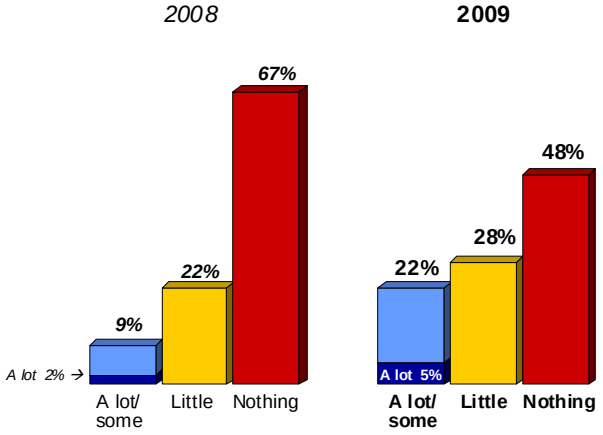


As in previous years, men (42% heard a lot or some), especially men under 50 (48%), college graduates (45%), and individuals with an annual household income over $75,000 (46%) report the highest levels of awareness of nanotechnology. Conversely, women, (20%), adults with a high school education or less (13%), those with an annual household income below $30,000 (17%), and African Americans (15%) are the demographic groups least likely to say they have heard a lot or some about it.

**Public awareness of synthetic biology has increased notably in the past year, with the proportion of Americans saying that they have heard a lot or some more than doubling from 9% to 22%. Furthermore, whereas fully 67% of adults said they had heard nothing at all about this area of science in 2008, fewer than half (48%) say this today.** Overall, 22% of Americans say that they have heard a lot (5%) or some (17%) about synthetic biology, while 76% say they have heard just a little (28%) or nothing at all (48%).

## Public Awareness Of Synthetic Biology Has More Than Doubled

*How much have you heard about synthetic biology?*




Just as with nanotechnology, men (26% heard a lot or some), college graduates (35%), and individuals with an annual household income of $75,000 or more (33%) report higher awareness levels than do women (19%), individuals with a high school education or less (11%), and those with an annual household income below $30,000 (17%).

There is some overlap in awareness of new technologies, as illustrated by the finding that among those who have heard a lot about nanotechnology, fully 62% say they have heard a lot or some about synthetic biology.

**Even though the public has low levels of awareness of synthetic biology, the large majority of Americans express some sense or idea about what they think it involves. Their perceptions of it are focused mostly around the concept that it is man-made and artificial.** When asked what they think synthetic biology is and what ideas, images, words, or phrases they associate with it, 29% offer some comment indicating that it is man-made, artificial, fake, not natural, or not real. Three in 10 are unable to offer any thoughts on what they think synthetic biology is. The following table reveals the public's top volunteered responses to this question.

## What Do You Think Synthetic Biology Is?

*Volunteered Comments*

| | |
|---|---|
| Something man-made, artificial, fake, not natural, not real | 29% |
| Has to do with cloning, genetic manipulation | 13% |
| Has to do with biology, altering the biological makeup | 7% |
| Used in medical research to develop new medicines, treatments | 6% |
| Used to develop better, safer plants, sources of food | 6% |
| Attempt to create life, artificial life | 5% |
| Some kind of material, synthetic material | 5% |
| Don't know; no response | 28% |

Focus groups allowed us to explore in greater detail individuals' impressions of synthetic biology and the associations that they make with it. While we conducted only two sessions, impressions of synthetic biology mirror survey responses.

**"I think of laboratory growth via artificial lighting. A test tube comes to mind."**

**–Baltimore college-educated adult**

**"What the term makes me think of is something human-made to mimic nature. It is about molecular compounds and playing God."**

**–Baltimore college-educated adult**

**"The term 'synthetic biology' makes me think of genetic engineering and something lab-grown."**

**–Baltimore college-educated adult**

**"Cloning is the image I think of. I think of something man-made and artificial"**

**–Baltimore non-college-educated adult**

**"Growing human replacement parts comes to mind. I think of mice with human ears growing out of them, and of artificial works."**
**–Baltimore non-college-educated adult**

**"I think of constructing animals or plants in a lab setting with materials not typically associated with the process. Frankenstein comes to mind."**
**–Baltimore non-college-educated adult**

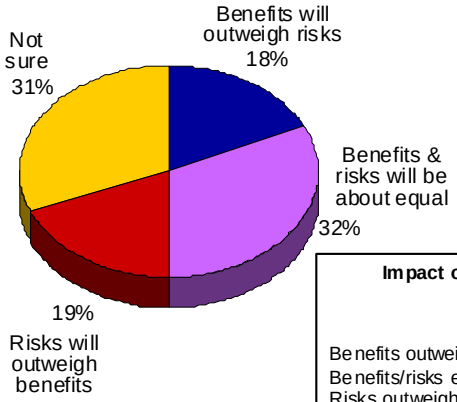
**"I initially thought of like fake pearls and diamonds, like creating just things that used to come naturally but now we can just do it without doing it naturally."**
**–Baltimore non-college-educated adult**

**"I think of taking a drug that comes from a plant and making it without having to use the plant anymore."**
**–Baltimore non-college-educated adult**

**"I think of things being created, chemical reactions, and scientists in a lab playing God."**
**–Baltimore non-college-educated adult**

**Nearly seven in 10 Americans have an initial opinion about synthetic biology's risk-benefit tradeoff. The plurality believe that risks and benefits will be about equal (32%), and the rest are divided evenly between thinking the benefits will outweigh the risks (18%) and the risks will outweigh the benefits (19%).**

## Initial Impression Of Risks And Benefits Of Synthetic Biology




**Impact of Familiarity Prior to Survey**

| | Heard a lot | Heard some | Heard a little | Heard nothing |
|---|---|---|---|---|
| Benefits outweigh | **44%** | **31%** | 21% | 10% |
| Benefits/risks equal | 33% | 33% | **38%** | 28% |
| Risks outweigh | 16% | **25%** | 17% | 18% |
| Not sure | 7% | 11% | 24% | **44%** |

Most optimistic about the potential benefits of this type of research are men, college graduates, and individuals with an annual household income over $75,000—those most likely to report hearing at least some about it. Indeed, just as was revealed in findings on the risk-benefit tradeoff associated with nanotechnology from previous surveys, those who have heard more about synthetic biology are more likely to think that the benefits will outweigh the risks. Among those who say they have heard a lot about synthetic biology, more than two in five (43%) think that the benefits will outweigh the risks, compared with 31% among those who say they have heard some, 21% among those who have heard just a little, and only 10% among those who have heard nothing at all about this scientific area of study. Those who have not heard anything about it are not overwhelmingly pessimistic about it, however: 44% do not express an opinion, 10% think the benefits will outweigh the risks, 18% think the risks will outweigh the benefits, and 28% think the risks and benefits will be about equal.

**Upon hearing a statement describing synthetic biology and outlining some of its potential benefits and risks, public opinion shifts more toward risks than benefits. A notable proportion believe that the risks and benefits will be equal, however.** Adults were read the following statement about synthetic biology, and were asked to reassess the risk-benefit tradeoff.

**Synthetic biology is the use of advanced science and engineering to make or re-design living organisms, such as bacteria, so that they can carry out specific functions. Synthetic biology involves making new genetic code, also known as DNA, that does not already exist in nature.**

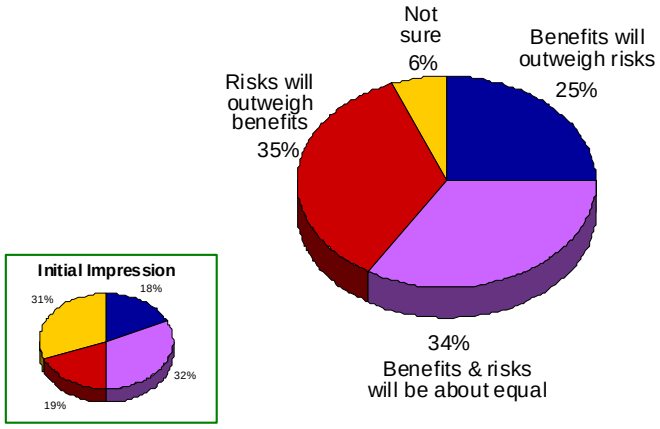
**I would like to read you statements about the potential benefits and potential risks of synthetic biology and get your reaction.**

**The potential BENEFITS of synthetic biology include developing new micro-organisms to treat disease, including cancer, more effectively and to create new and less expensive medications. It also could be used to make new organisms that could provide cheaper and cleaner sources of energy than today's oil-based fuels, and to detect and break down environmental pollutants in the soil, air, and water.**

**While the potential RISKS of synthetic biology are not known, there are concerns that man-made organisms might behave in unexpected and possibly harmful ways and that they could cause harm to the environment. There also are concerns that, if these organisms fall into the wrong hands, they could be used as weapons. Additionally, the ability to create artificial life has raised moral and ethical questions about how life is defined.**

After hearing this information, 34% of adults say that the risks and benefits are equal (up just two points from the initial question), 25% believe that benefits outweigh risks (a seven-point increase), and 35% think that risks outweigh benefits (a 16-point increase). Just 6% continue to abstain from making a judgment.

## Informed Impression Of Risks And Benefits Of Synthetic Biology




Americans who report the greatest awareness of synthetic biology are the most optimistic after hearing about the potential risks and benefits: among those who say they have heard a lot about it, 51% think the benefits will outweigh the risks, 20% think the risks will outweigh the benefits, and 25% think they will be about equal. Among those who say they have not heard anything at all about synthetic biology, just 18% think the benefits will outweigh the risks, while 44% think the risks will outweigh the benefits, and 32% think they will be about equal.

As illustrated in the following table, those who report the greatest familiarity with synthetic biology are evenly divided about the risks vs. benefits, while most others lean toward risks. Men and college graduates are divided evenly about whether benefits will outweigh risks or vice versa, and a plurality of those with higher incomes believe the benefits will outweigh the risks.

Those most likely to think that the risks of synthetic biology will outweigh the benefits include evangelicals, individuals who regularly attend religious services, women, and lower-income and less-educated individuals.

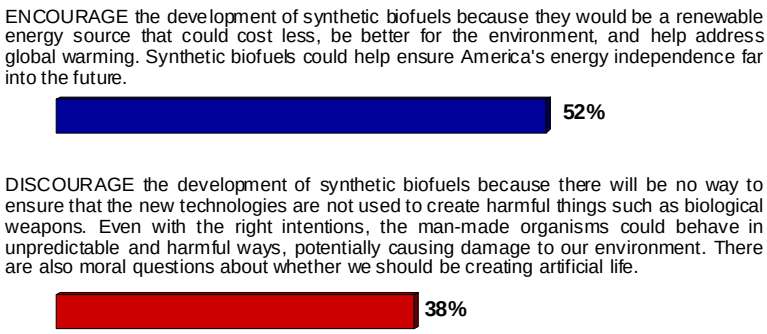
## Initial And Informed Impressions Of Synthetic Biology

| | Initial Impressions | | | Informed Impressions | | |
|---|---|---|---|---|---|---|
| | Benefits Outweigh Risks % | Risks Outweigh Benefits % | Risks And Benefits About Equal % | Benefits Outweigh Risks % | Risks Outweigh Benefits % | Risks And Benefits About Equal % |
| **All adults** | **18** | **19** | **32** | **25** | **35** | **34** |
| Men | 25 | 16 | 33 | 31 | 31 | 34 |
| **Women** | **13** | **21** | **31** | **20** | **40** | **33** |
| Age 18 to 34 | 22 | 18 | 35 | 26 | 31 | 39 |
| Age 35 to 49 | 19 | 21 | 29 | 22 | 40 | 36 |
| Age 50 to 64 | 19 | 20 | 34 | 26 | 35 | 31 |
| Age 65 and over | 13 | 15 | 29 | 25 | 37 | 29 |
| Men 18 to 49 | 25 | 20 | 31 | 28 | 32 | 38 |
| Men 50 and over | 25 | 12 | 36 | 33 | 30 | 31 |
| Women 18 to 49 | 16 | 19 | 33 | 20 | 39 | 37 |
| **Women 50 and over** | **9** | **23** | **29** | **19** | **42** | **29** |
| **High school or less** | **9** | **18** | **33** | **15** | **39** | **38** |
| Some college/tech | 17 | 22 | 33 | 25 | 37 | 33 |
| College grad or more | 27 | 18 | 30 | 33 | 32 | 31 |
| **Less than $30,000** | **13** | **17** | **36** | **18** | **40** | **36** |
| $30,000-50,000 | 16 | 19 | 31 | 21 | 35 | 41 |
| $50,000-$75,000 | 18 | 21 | 32 | 27 | 38 | 31 |
| More than $75,000 | 29 | 16 | 32 | 36 | 29 | 30 |
| Whites | 21 | 19 | 31 | 26 | 36 | 33 |
| African Americans | 11 | 20 | 32 | 17 | 39 | 33 |
| Hispanics | 11 | 15 | 47 | 22 | 33 | 40 |
| **Attend religious services weekly** | **14** | **25** | **30** | **19** | **44** | **31** |
| Attend religious services less often | 21 | 15 | 35 | 27 | 33 | 35 |
| Rarely/never attend religious services | 23 | 15 | 35 | 29 | 29 | 37 |
| Protestants | 18 | 22 | 29 | 23 | 38 | 33 |
| Catholics | 15 | 21 | 37 | 24 | 37 | 34 |
| Other religion | 23 | 11 | 38 | 30 | 32 | 32 |
| No religion | 23 | 14 | 30 | 34 | 27 | 35 |
| **Evangelicals** | **17** | **24** | **27** | **18** | **46** | **30** |
| Heard a lot/some | 34 | 23 | 33 | 39 | 28 | 29 |
| Heard just a little | 20 | 17 | 38 | 26 | 29 | 39 |
| **Heard nothing** | **10** | **18** | **29** | **18** | **43** | **32** |

**While many Americans are concerned about the risks of synthetic biology, they believe by 14 points that we should encourage the development of synthetic biofuels rather than discourage it.** When read two statements about the development of synthetic biofuels—one about why we should *encourage* their development and one about why we should *discourage* their development—the majority of Americans think this area of science should be encouraged. Indeed, by 52% to 38%, the public says we should encourage the development of synthetic biofuels rather than discourage it. This finding is notable given the previous finding that, upon hearing about both potential benefits and potential risks of synthetic biology, just 25% of the public believes that the benefits of this type of research outweigh the risks.

## Majority Support Using Synthetic Biology To Develop Synthetic Biofuels

*Which comes closer to your point of view?*




Notably, among those whose informed assessment of synthetic biology is that the risks and benefits are about equal, nearly two-thirds (65%) think we should encourage the development of synthetic biofuels. Just 22% think we should discourage their development. Not surprisingly, most of those who think the benefits of synthetic biology will outweigh the risks believe we should encourage the development of synthetic biofuels (82%), while most of those who lean toward risks think we should discourage it (71%).

Thus, the demographic groups that are most optimistic about the benefits of synthetic biology throughout the survey are the most likely to feel that we should encourage the development of synthetic biofuels: college graduates, individuals with an annual household income over $75,000, and men. The groups who express the most caution about encouraging this research include regular churchgoers, evangelicals, women (especially those 50 and over), less-educated and lower-income individuals.

| Should We Encourage Or Discourage The Development Of Synthetic Biofuels? | Encourage % | Discourage % |
|---|---|---|
| **All adults** | **52** | **38** |
| Men | 59 | 33 |
| Women | 46 | 42 |
| Age 18 to 34 | 60 | 32 |
| Age 35 to 49 | 48 | 43 |
| Age 50 to 64 | 53 | 36 |
| Age 65 and over | 46 | 41 |
| Men 18 to 49 | 58 | 33 |
| Men 50 and over | 60 | 33 |
| Women 18 to 49 | 50 | 42 |
| Women 50 and over | 42 | 42 |
| High school or less | 45 | 43 |
| Some college/tech | 47 | 43 |
| College grad or more | 62 | 30 |
| Less than $30,000 | 48 | 40 |
| $30,000-50,000 | 48 | 41 |
| $50,000-$75,000 | 55 | 39 |
| More than $75,000 | 64 | 31 |
| Whites | 53 | 37 |
| African Americans | 42 | 40 |
| Hispanics | 54 | 42 |
| Attend religious services weekly | 42 | 48 |
| Attend religious services less often | 58 | 32 |
| Rarely/never attend religious services | 59 | 32 |
| Protestants | 47 | 42 |
| Catholics | 55 | 36 |
| Other religion | 57 | 35 |
| No religion | 67 | 26 |
| Evangelicals | 44 | 45 |
| Heard a lot/some | 63 | 31 |
| Heard just a little | 53 | 36 |
| Heard nothing | 46 | 43 |
| Informed opinion: benefits outweigh risks | 82 | 14 |
| Informed opinion: risks outweigh benefits | 22 | 71 |
| Informed opinion: risks and benefits equal | 65 | 22 |

Many focus group participants expressed a sense of cautious optimism about the potential benefits of using synthetic biology to create biofuels. They were not without concerns about synthetic biology in general or synthetic biofuels specifically, however.

**"I am not sure I love the idea of creating new plants and organisms and messing with nature. But the benefits warrant further investigation."**
**–Baltimore college-educated adult**

**"I am hopeful with reservations."**
**–Baltimore college-educated adult**

**"I am skeptical but hopeful."**
**–Baltimore college-educated adult**

**"If this is truly possible and not pie-in-the-sky dreaming, it would be great. Again, control will be key."**
**–Baltimore non-college-educated adult**

**"It makes me hopeful, if enough research is done on the negative side and dangers."**
**–Baltimore non-college-educated adult**

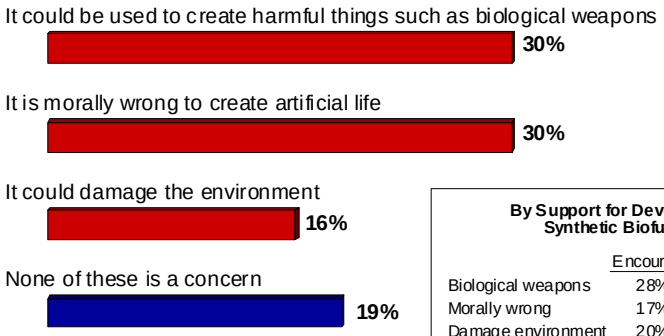
**"I am a little more hopeful after reading this. If it is regulated properly and used positively, it could be good for our planet."**
**–Baltimore non-college-educated adult**

**"These are all really good ideas, but they are the kind of really good ideas that could easily go awry. This sounds risky."**
**–Baltimore non-college-educated adult**

**Of the three concerns about using synthetic biology to create fuels tested, equal proportions of Americans say their greatest personal concerns are that it could be used to create harmful things (e.g., biological weapons) and that it is morally wrong to create artificial life. The latter, however, is of the greatest concern among those who think we should discourage the development of synthetic biofuels.** After being informed of the risks and benefits of synthetic biology and then hearing opposing statements about whether we should encourage or discourage the development of synthetic biofuels, adults were read three of the main concerns that have been raised about synthetic biofuels and asked which, if any, personally concerns them the most. Equal proportions selected the possibility of it being used to create harmful things such as biological weapons (30%) and that it is morally wrong to create artificial life (30%). Half as many cite that it could damage the environment (16%). One in five (19%) says that none of them is a concern.

## Top Concerns About Using Synthetic Biology To Create Synthetic Biofuels

*Which ONE of these concerns you most?*




**By Support for Developing Synthetic Biofuels**

| | Encourage | Discourage |
|---|---|---|
| Biological weapons | 28% | 33% |
| Morally wrong | 17% | **49%** |
| Damage environment | 20% | 12% |
| No concern | 31% | 4% |

Among the majority who believe that we should encourage the development of biofuels, 31% say none of the three issues is a concern, 28% select the possibility that it could be used to create harmful things as most concerning, 20% are most concerned about the damage it could do the environment, and 17% say their biggest concern is that it is morally wrong to create artificial life. Those who think we should discourage the development of synthetic biology are nearly three times as likely to cite moral concern about creating artificial life as their top concern (49%). This concern outstrips all others among this group: 33% select the potential that it could be used to create harmful things, 12% are concerned it could damage the environment.

Focus group participants recognize the possible benefits of synthetic biofuels, but hold serious concerns about the risk of unanticipated or undesirable consequences.

**"I said scared. Because I felt like while this, the second page sounded like a good use for it, once you start doing this, you open a Pandora 's box that you're not going to be able to close. And then we'll be doing it for things I no longer approve of."**

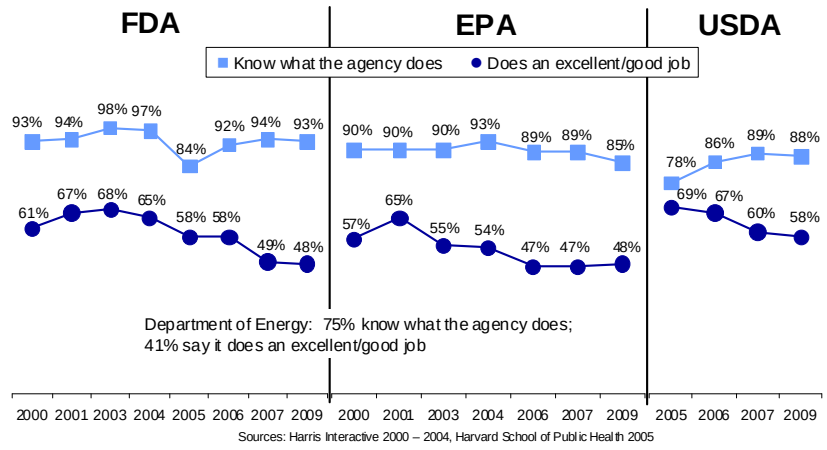
**–Baltimore college-educated adult**

**"All the things that are positive that can be done with it are wonderful, absolutely wonderful. My concern is that maybe by doing this we'll create something that we can't control, like somebody mentioned like a bacteria or super anthrax or something, that we will have no control over it. And that's possible . . ."**

**–Baltimore non-college-educated adult**

**There has not been a notable change in the public's familiarity with, approval of, and confidence in the FDA, EPA, and USDA since 2007. The job approval of these agencies, which have the potential to play important roles in the oversight and regulation of these new technologies, including nanotechnology and synthetic biology, remains lower than it was earlier in the decade. The survey reveals that the U.S. Department of Energy is less well known and earns lower ratings than the other three entities.** The American public remains familiar with three federal agencies tested in previous surveys—the FDA, EPA, and USDA. More than four in five say they know what each of these entities does. Job approval ratings for the FDA, USDA, and EPA have held steady since 2007, as have the public's confidence in these organization's ability to maximize benefits and minimize risks of the products and industries they regulate.

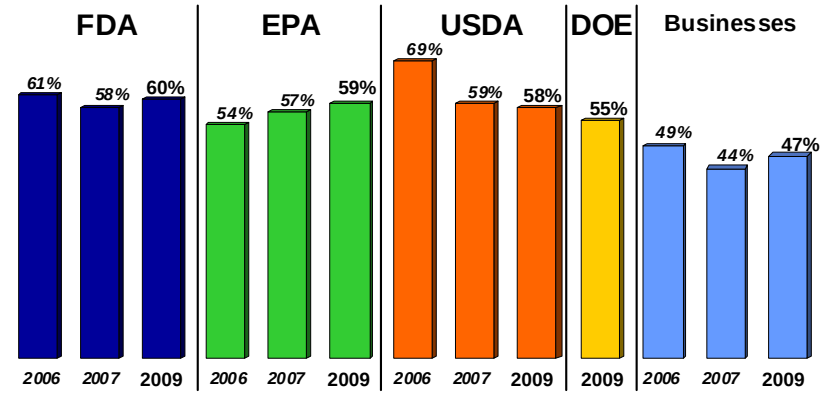
## Familiarity And Approval Ratings Of Agencies



Sources: Harris Interactive 2000 – 2004, Harvard School of Public Health 2005

Self-reported awareness of the U.S. Department of Energy, a major funder of synthetic biology research, is slightly lower than that of the other agencies tested, with three in four of the public professing awareness of what it does. DOE also earns slightly lower job approval ratings and confidence levels than do the FDA, EPA, and USDA.

## Little Change In Public Confidence In Federal Agencies And Businesses

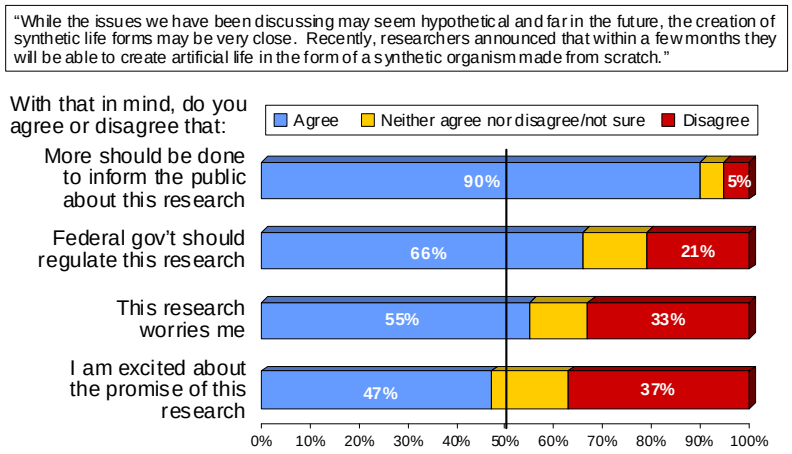



The public is divided in its confidence in businesses' ability to manage the risk associated with new advances in science and technology and remains more confident in federal government agencies' ability to play an oversight role and manage the risk.

**The public has a strong appetite for more information about synthetic biology, and a large majority believe the federal government should regulate this research, even though job approval ratings for federal government agencies have declined some since the beginning of the decade.**

The public's divided attitudes regarding synthetic biology are illustrated by the finding that, just as 47% of Americans say they are "excited by the promise of this research," 55% agree that "this research worries" them. Not surprisingly, those who express excitement at higher rates are those who have some awareness of synthetic biology (58% who have heard some or a lot agree they are excited about the research) and those who believe the benefits outweigh the risks (77% are excited by the promise of the research). And those who express concern at higher rates are those who have no awareness of synthetic biology (60% express worry) and those who believe the risks outweigh the benefits (75% express worry).

## Public Wants More Information And Federal Regulation




However, while the public is divided on whether to be worried or excited about this research, they express broad consensus about the desire to learn more about this area of research. Fully nine in 10 adults agree that "more should be done to inform the American public" about synthetic biology research, including 73% who strongly agree.

Two-thirds of Americans also agree that the federal government should regulate synthetic biology, including 44% who strongly agree. Only 11% of the public strongly disagrees. (Nine percent neither agree nor disagree, and 4% are not sure.)

Majorities of all demographic subgroups agree that "the federal government should regulate this research," whether they have heard a lot (66% agree) or nothing (65%) about it and regardless of whether they think the benefits will outweigh the risks (68%) or the risks will outweigh the benefits (62%).

Focus group participants express mixed sentiments about the effectiveness of government regulation. Nonetheless, most think that the government must play a role in the oversight of using synthetic biology to create biofuels.

**"I'm not against any of this at all. It's just the fact that the history of things that are regulated, if it's regulated by the government, the government is not, the FDA is regulated by the government. It's supposed to safeguard things for the public. But the FDA has blatantly said, yes, we know that these handfuls of things will kill you, and they're not even making it required to go in ingredients. I can't pick this up and say, oh, this has something in it that will kill me. I have no idea. And the FDA has said that's fine. That's our government."**

**–Baltimore college-educated adult**

**"Well, I think you have to have government regulation. And if you don't, then obviously, you know, you have no control over it. The same thing that happened in this economy, that there certainly was a lack of regulation as to why things got so out of control. And it's unfortunate, even in a democracy, that you have to have the government step in. But you've got to have somebody with the authority to create regulations, so people don't abuse it. That's all."**

**–Baltimore college-educated adult**

**"I mean, I even see like the EPA is a great agency unless it's a Monday or a Friday, because I've worked with government workers before. But I can see where they don't have, their wallet isn't attached to it, so they're not going to be easily corruptible or maybe as willing to shove it underneath the carpet."**

**–Baltimore non-college-educated adult**

**"It just seems to me whatever they [the government] get involved in they mess up a little bit more. So I'd rather, you know, just like the whole health care thing. For me personally I want them involved in as little as possible."**

**–Baltimore non-college-educated adult**