

BUSH UNDER FIRE OVER IRAQ ■ Q&A WITH BERLUSCONI

TIME

SUSIE, I'M SO
WORRIED... IS THIS CELL
PHONE FRYING MY BRAIN?
IS G.M. FOOD WARPING MY
DNA? IS MY BODY A
TOXIC-WASTE
DUMP?

TOXIC
BRAND
DETERGENTG.M.
TOMATO
SOUPG.M.
BROCCOLI
SOUP

LIVING WITH RISK

How to sort the hard science from the
empty scares—and keep your sanity



RISKY BUSINESS

Science can pinpoint potential dangers from GM foods, mobile phones and household chemicals—but can't tell us if those risks are real. What's a consumer to do? ■ By JAMES GEARY

LINDA WAS ECSTATIC LAST summer when she learned that she was pregnant again. But the 39-year-old mother of two was also worried, since the chances of giving birth to a baby with Down's syndrome increase dramatically with age. So at 12 weeks, Linda, who lives in London, decided to have the full battery of tests that determine the risk of Down's. An ultrasound scan measured the fluid within the neck of the fetus—the more fluid, the higher the risk—while a blood test tracked hormone levels crucial to fetal development. All the results came back normal except one. As a result, Linda was told, the chance that her baby had the syndrome was one in 130—a high enough risk to warrant more tests. If she wanted to know for sure, her gynecologist suggested amniocentesis, a procedure that involves drawing fluid from the amniotic sac around the fetus. But about one in 100 times, amnio triggers a spontaneous abortion. Should Linda take that risk in order to settle the Down's question? It was her call: the doctor would only present the alternatives, not give advice. "I wanted these tests because I thought they would be reassuring," Linda

says now. "But the choices they confronted me with only increased my uncertainty."

Linda eventually decided to skip the amnio, and she gave birth to a healthy baby girl. But her dilemma is becoming increasingly common as modern science pinpoints ever finer gradations of risk, but is unable to tell us whether those risks are real—and if so, whether they're worth taking. We can measure just about everything: the number of defective genes on a chromosome; the levels of radiation coming from our mobile phones; the amount of microbes in our drinking water. And when something's out of kilter, we demand a fix. But all too often there is no fix. Science can't eliminate the risks it's so skilled at identifying.

Over the past months and years we've endured the SARS crisis, the BSE scandal and the foot-and-mouth epidemic. We've been warned of deep-vein thrombosis from air travel, brain cancer from mobile-phone radiation, and mutations from genetically modified



organisms. We've been told that climate change threatens our coastlines, antibiotic-resistant viruses threaten our children, and wayward asteroids threaten our planet. Sometimes just getting out of bed in the morning seems too risky—especially when we consider that it could take decades before we know if these potential dangers are real.

How worried should we be? That depends on how much uncertainty we're prepared to live with. And these days we're prepared to live with less and less. As science, medicine and technology make life safer, healthier and more comfortable, our intolerance of risk is growing. Plenty of dangers have been eliminated—childhood mortality is way down, diseases that were once common have been eradicated, food is more plentiful and nutritious than ever. But these advances have made us even more sensitive to the risks that remain. "Before the umbrella, if it started to rain you got wet," says Raffaele De Giorgi, director of the Center for the Study of Risk at Italy's University of Lecce. "With the invention of the umbrella, the risk of getting wet was born."

Most Europeans, for example, are alarmed by the prospect of eating GM foods, but many will happily sit in a bar munching potato chips, smoking cigarettes and drinking alcohol—all of which together amount to a much clearer health risk than sipping a bowl of genetically modified tomato soup. Europeans are suspicious of GM foods despite the absence of any proof that they are actually unsafe. In contrast, everybody knows smoking can kill you—but 94 million people in the E.U. do it anyway. "There are discussions about health risks that are a luxury," says Irene Lukassowitz, spokeswoman for Berlin's Federal Institute for Risk Assessment. "By and large, we are very well-fed and have the time to worry about even the smallest risk. Consumers want to be protected, but prefer it if there is someone else to blame."

Helene Guldberg, a developmental psychologist at Britain's Open University, believes that our risk-aversion poses dangers of its own. Society's reluctance to accept the inevitable risks that accompany progress, she argues, could slow the pace of discovery and innovation. "There can never be a guarantee that anything is harmless," she says. "But un-

less there is evidence of harm, we shouldn't worry. Without risk taking there can be no experimentation, and therefore no progress."

Learning to live with risk is one of those quintessentially modern skills—like learning to order a venti-skim latte or buy groceries online—but a whole lot more difficult and important. To manage our fear of risk, we have to come to terms with some very tricky issues. Can we trust scientists, politicians and the media to interpret the dangers and benefits of new technologies? When they dump the choices back in our laps and tell us to make the decisions—test the fetus or not; eat the food or not; use the phone or not—how do we do it? Should we just stop worrying and be happy? To find out, *TIME* examined the science and the hype around three controversial issues—GM foods, mobile phones and household chemicals. Here's our anatomy of risk.

TO EAT OR NOT TO EAT?

LOOKING OUT OVER A FIELD OF GENETICALLY modified oilseed rape on his 810-hectare farm in Oxfordshire, 85 km northwest of London, Christopher Lewis recalls the warm, sunny day last summer when an Oxford University scientist came to visit. Lewis, a thoughtful man who's been a farmer for 44 of his 69 years, has been growing GM crops for the past 36 months as part of a U.K. government study to track the impact of genetically modified organisms on the environment. He took the researcher down to one of the maize test fields. Conventional maize was growing on one side; on the other, the plants were genetically modified to be resistant to glyphosate, a herbicide found in every garden store, which kills plants while leaving the soil undamaged.

On the GM side, treated with the relatively mild glyphosate, there were occasional clumps of small, stunted weeds as well as "midges, bees, beetles and a pair of partridges feeding their young," Lewis remembers. On the non-GM side—which was treated with simazine, a stronger conventional herbicide that clears weeds but can render the soil sterile—there was nothing; no weeds, no insects, no birds. "How can these anti-GM protesters continue

down this route?" Lewis wonders. "What more assurance do they want?"

Few Europeans share Lewis' conviction. A Eurobarometer survey carried out in 2001 found that 94% of respondents wanted the right to choose whether to consume GM foods—and 70% don't want to eat the stuff at all. And Lewis has paid a high price for his willingness to experiment. Anti-GM activists ripped up his crops seven times, intimidating him and his family; and some of his neighbors have shunned him for "meddling with nature."

Opponents of such meddling fear that the genes inserted into crops could confer new and undesirable traits on wild species, damaging biodiversity and creating "superweeds." They also worry that GM foods could affect human health in unpre-

Christopher Lewis' farm, where he has been testing genetically modified crops for the past three years, has been attacked seven times by ecowarriors, who fear health dangers from GM foods



dictable ways. "We need to be extremely cautious, because once the GM genie gets out of the bottle, it's going to be very difficult to put back in," says Mike Grenville, 53, a mobile-phone industry consultant who, last month, led a protest against GM crops in Forest Row in East Sussex.

Opponents of gene modification also allege that GM crops are being foisted on the public by agro-chemical conglomerates interested in nothing but profit. It's true that multinationals stand to gain. These firms

often control the rights to genetically modified seeds as well as the pesticides to which the crops are made resistant. Monsanto sells glyphosate under the name Roundup and a variety of seeds resistant to the weedkiller as Roundup Ready. But GM crops could benefit others too, especially farmers in the developing world. In many countries, supplies of arable land and water are diminishing as the demand for food increases. The U.K.'s Nuffield Council on Bioethics, an independent think tank, recently suggested that gene technology could improve the livelihoods of poor people in developing countries by enabling

them to increase crop yields, grow drought-resistant plants and cultivate salinated soil.

The economic impact in the U.K., however, is likely to be minimal in the short term, according to a new report by the Cabinet Office Strategy Unit. Only a few GM crops so far are suited to the British climate, and public mistrust of GM will probably ensure that the market for it is small. The government's review of GM science, published this week, concluded that the health risks from current products were "very low" but some uncertainties remained, and that crop approval should be granted on a case-by-case basis.

So are GM foods safe? The results of a recent Danish trial, published by Denmark's National Environmental Research Institute (NERI), suggest they are. For three years, researchers at the NERI monitored

fields of conventional and GM sugar beet, the latter genetically altered to be resistant to glyphosate. They found that the GM plots supported more plant species and insects than the conventional plots, thus providing more food for birds and other types of wildlife. And in May, Britain's Royal Society produced a GM science review that "found nothing to indicate that GM foods are inherently unsafe."

That's not good enough for Pete Riley, senior food campaigner for Friends of the Earth. His organization's study of the chemical constituents of genetically modified maize indicates GM foods show increases in amino acids, the building blocks of proteins that control bodily processes. "That could be significant in the long term," Riley says, arguing that years of exposure to GM foods could affect muscle and organ growth.

There's been little research into how GM foods behave inside the human body. But one study, commissioned from Newcastle University by Britain's Food Standards Agency, found evidence that low levels of antibiotic-resistant genes inserted into GM soya can pass into the bacteria that live inside the gut. That's worrying, says Emily Diamand, senior food research officer for Friends of the Earth, because "if you insert an antibiotic-resistant gene into a crop, and then the food is broken down in your stomach, other bacteria can pick up the gene and use it in unpredictable ways." Those concerns were backed up last month when the U.N.'s Food and Agriculture Organization and the WHO warned that a failure to rigorously study the health effects of GM foods could prevent us from identifying GM-induced toxic reactions, allergies and resistance to antibiotics.

"I am astonished and appalled that there have been no systematic clinical tests of the long-term health impact of people eating GM foods," says Michael Meacher,



Janine Le Calvez leads a French group campaigning for a say in where phone masts are built; in Killarney, Ireland, above, they just pull them down



"I'm not fighting against the masts; I'm fighting against the impunity that allows them to be placed anywhere"

JANINE LE CALVEZ, HEAD OF FRENCH GRASSROOTS GROUP PRIARTEM

the former British Environment Minister who launched the trials in which Christopher Lewis is taking part. "I am not against GM," he says, "but I don't think anything like the right amount of testing has been done."

The bottom line is, there is no bottom line: no definitive proof that GM foods damage your health, no definitive proof that they're safe. And this is a handy point to keep

in mind when trying to interpret research results: absolute certainty is a myth.

"Science can never say there is no chance of something happening," says Colin Blakemore, a professor of physiology at Oxford University. "All you can do is gradually accumulate evidence that reduces the probability." Most scientists agree that the balance of probability is that GM foods are safe.

But most will also admit they can't be sure.

What we can be sure about, though, is that Europeans want to decide for themselves whether to eat the stuff. So in the absence of scientific certainty, the E.U. is providing the next best thing: freedom of choice. By the end of this year, any product with more than 0.9% of GM content must be identified as such. Hundreds of foodstuffs—ranging from mayonnaise to cooking oil to peanut butter and coming mostly from the U.S. and Canada—will now require labels.

Neither side of the GM divide is likely to accept the other's results, so the arguments both for and against are sure to continue. There is one thing, however, on which they can agree: the customer is always right. But for consumers who have to make their deci-

sions without the benefit of conclusive science, the question is simple: Feeling lucky?

NOT ON MY ROOF, S'IL VOUS PLAÎT

EVERY SEASON SEEMS TO BRING ANOTHER scary but speculative story about purported links between mobile-phone radiation and brain damage. MOBILE USE MAY TRIGGER PREMATURE ALZHEIMER'S, warned Britain's *Daily Mail* in February, though the study in question looked at the effect of electromagnetic radiation on rats, not people. None of those stories has dented the popularity of mobile handsets. Instead, what's freaking Europeans out is the idea of electromag-

netic radiation from phone masts. Marie, who asks that her real name not be used, is a 35-year-old mother of four whose east Paris duplex has a mast on its roof—and she's hopping mad about it. "It's just above the older children's room," Marie says, "and they started getting headaches several months after we moved in."

The furor over masts is strange. Mobile-phone users tend to be exposed to much higher levels of radiation from their handsets than they are from masts, because they are so much closer to the source. But that hasn't stopped 320 million Europeans from buying mobile phones, or dissuaded activists from organizing to prevent the installation of transmitters. In March, opponents of the technology in Tiverton, Devon, used an industrial saw to shear off bolts securing a 14-m, 2.7-ton mast to the ground. Then they tied a rope to it and used a vehicle to pull it down.

Why all the fuss? In April, the French Environmental Health and Safety Agency (AFSSE) released a report declaring that no health risks can be linked to mobile phones or base stations. But a month earlier, the Scientific Committee on Electromagnetic Fields (CSF-CEM) published a report stating that antennas could cause sleep disturbance and headaches and weaken the immune system. Though the AFSSE report cleared mobile technology of any health risks, the independent experts who compiled it called for more research into the effect of mobile-phone radiation on children and conceded that other effects had yet to be sufficiently explored. In other words, new evidence might make the experts change their minds.

We can't wait for a final safety verdict; we need to decide now whether the convenience of a mobile phone is worth the potential hazard. And we need ways to make the risk feel acceptable. That's what is driving the popularity of earpieces that let us move the handsets away from our heads. And Blakemore argues for giving people a

CHRONOLOGY OF A CRISIS

WHATEVER HAPPENED TO MAD COW DISEASE?

In 1996, BSE—or mad cow disease—spread hysteria across the Continent, as 10 people died from a new form of Creutzfeldt-Jakob disease that was linked to contaminated beef. At one point, epidemiologists from Imperial College, London, predicted that vCJD could kill millions. So far, 139 have died, just a handful of them outside the U.K. The crisis is one of the most potent examples of how science can get risk wrong. A timeline:

1986

Bovine spongiform encephalopathy (BSE), an infection that riddles the brain full of holes, is identified in cattle at a farm in West Sussex, England.

1987

The British government announces that large numbers of cattle are infected with BSE. The probable cause: feed that con-



tained meat or bone of sheep infected with scrapie.

1988

The government orders the slaughter of all BSE-infected cattle, above, and bans meat and bone meal in cattle feed.

1989

Britain bans human consumption of cattle brains,

spinal cords and other body parts that some scientists suspect could affect human health.

1990

Donald Acheson, the Chief Medical Officer, assures the public that beef is safe to eat. To prove the point, Agriculture Minister John Gummer publicly shares a hamburger with his daughter, left.

1992

The infection peaks: three cows in every 1,000 have the disease.



1994

A new form of Creutzfeldt-Jakob disease (vCJD) is identified. The use of meat and bone in animal feed is banned in all E.U. countries, except Denmark. Six cases of vCJD.

1995

Stephen Churchill dies. He is the first confirmed vCJD fatality.

1996

Scientists conclude that vCJD is linked to exposure to BSE. The E.U. bans

exports of British beef. Ten people die from vCJD. Mad cow mania is born.

1997

Scientists from London's Imperial College predict that up to 10 million people could die from vCJD. Ten more deaths from vCJD.

1998

Imperial College scientists predict that some 500,000 people will die in the epidemic. An enquiry into the BSE crisis hears from the father of Clare Tomkins, a



vegetarian for 12 years and one of 18 to die from vCJD.

2000

Scientists predict up to 136,000 deaths from vCJD, while 28 people actually die from the disease. Since 1996, 4.5 million

cattle have been slaughtered, left, at a cost of almost €3 billion.

2001

A team from the London School of Hygiene and Tropical Medicine says deaths from vCJD may number only a few thousand. Scientists investigating whether sheep could have BSE admit that for five years they had unwittingly tested cow brains, not sheep. Twenty more deaths from vCJD.

By May, they say a maximum of 540, possibly as few as 40. Ten have died so far this year from vCJD, with four suspected cases.

2002

Scientists predict that there will be 32 deaths from vCJD this year, and that fatalities will increase by 20% a year. Seventeen people die from the disease.

2003

In February, epidemiologists predict 7,000 will die from vCJD by 2080. By May, they say a maximum of 540, possibly as few as 40. Ten have died so far this year from vCJD, with four suspected cases.

—By Kate Noble

say over other controllable risks—like the location of masts. Blakemore was a member of Britain's Independent Expert Group on Mobile Phones, a review body set up by the government in 1999 to investigate health risks from the technology. During the preparation of the report, the committee held a series of meetings for the general public. To Blakemore's surprise, practically nobody complained about mobile phones—they all complained about masts. Why? Because the benefits of mobile phones are much clearer than the benefits of masts.

"Virtually everyone capable of lifting a mobile phone to their head has got one," Blakemore says, "so presumably they must be making some kind of analysis of the cost and the benefit—and they're willing to take whatever risk they perceive. Yet when they see a mast at the end of their garden, they see no immediate benefit. The crucial differences are psychological, not physical." Marie disagrees. "My kids aren't aware of any media coverage or other kinds of reports," she says. "All they know is that they started having headaches and sleeping problems."

Janine Le Calvez, the president of the French grassroots group PRIARTEM (For the Regulation of Mobile Telephone Base Station Implementations), objects to having no say in where the masts are placed. "These systems were installed without the least bit of study of their impact on health or the environment," says Le Calvez, 53, who uses her mobile phone sparingly. "I'm not fighting against the masts; I'm fighting against the impunity that allows them to be placed anywhere, at any power output level." PRIARTEM claims that there are many more people out there like Marie's kids, otherwise healthy folks who live around the antennas and complain of insomnia, headaches and fatigue. The AFSSe report does not dismiss these claims, but attributes them to the anxiety produced by the masts rather than the radiation they emit. That doesn't help Marie's kids sleep at night.

THE HOME FRONT

ELIZABETH SALTER-GREEN'S TWO-STORY brick home in west London seems normal enough. A pair of comfortable sofas face the living room fireplace, bright yellow chairs surround the dining table, and a homey kitchen opens onto a patio garden. But the place is unusual in at least one respect: there are no super-strength cleaners in the house, no flame-retardant textiles or upholstery, no dry-cleaned clothing, no fragranced bath products, and baby Florence usually plays only with wooden toys. That's because

nearly three years ago, when she was contemplating having a child, Salter-Green—the 39-year-old director of the WWF's U.K. toxics program—decided to detoxify her life.

In October 2000, Salter-Green underwent a fat-cell test, in which a sample of her body fat was analyzed for the presence of 14 different toxic chemicals. The results shocked her. Salter-Green's fat showed above-normal levels of DDT and PCBs, organic pollutants that began to be phased out in the 1970s because of their toxicity; lindane, a possibly carcinogenic insecticide that's been outlawed in several European countries, but not in the U.K.; and a cocktail of other insecticides, fungicides and industrial chemicals.

Concerned about the presence of these chemicals in her body during pregnancy, Salter-Green decided to make a change. Heavy-duty cleaners and disinfectants were out. Dry cleaning was stopped because of chemicals used in the process, particularly the solvent perchloroethylene, a possible human carcinogen with suspected links to neurological and reproductive problems. And Florence plays mostly with wooden toys because some plastic ones are made with phthalates, which are suspected of interfering with the normal functioning of the hormonal system. Salter-Green had a second fat-cell test last July, three weeks before Florence was born. It showed her contaminant levels were back within the average range. "I was motivated from a professional point of view as well as a personal one," she says. "Half the time I don't know if I'm doing the right thing in buying what I buy and doing what I do. It gets so much more personal when you have kids."

Household chemicals are about as personal as modern science gets. We are surrounded by hundreds of them every day—they're in our furnishings, our cosmetics, our vinyl floor tiles and plastic baby bottles—but most of us rarely think about them. We breathe them, we eat them, we absorb them through our skin. Are they too much of a good thing?

"We have a great deal of sympathy for confused consumers who are being frightened into believing that their health and our environment are being threatened by chemicals," says Tim Edgar, deputy director of the

European Council for Plasticizers and Intermediates (ECPi), a Brussels-based trade association. He cites phthalates—the world's most widely used plasticizer, which helps soften the flexible plastics in car interiors, medical tubes and, yes, toys—as a case in point. Because of their loose molecular structure, some phthalate particles migrate over time. So it is possible that they could end up in the home environment. But Edgar argues that the amounts are "minuscule, and in many cases so low as to be immeasurable. The problem is that studies infer a public health risk without indicating whether the levels found actually pose any risk."

So what's a mother to do? As a first step, consider the evidence. The U.S. Consumer Product Safety Commission (CPSC) decided in February not to ban PVC—which contains phthalates—in toys, stating there is "no demonstrated health risk." Don't trust the



Elizabeth Salter-Green detoxified her lifestyle when she decided to have Florence, now almost 1 year old, and cleared her cupboards of chemical cleaners and disinfectants



“We want a reversal of the burden of proof, where they have to prove their products are safe.”

ELIZABETH SALTER-GREEN, WWF'S U.K. TOXICS PROGRAM DIRECTOR

CPSC? Then do as Salter-Green did: stay away from products that may contain chemicals you want to avoid. To give consumers the information they need to make such decisions, the European Commission is set to propose new rules that will require mandatory testing for all chemicals, including those found in household products. Under the new system, manufacturers would be responsible for proving the safety of any substance they produce. WWF U.K. argues that the draft legislation should also

require the industry to phase out potentially harmful chemicals. "The chemical industry is a great generator of jobs," says Salter-Green. "We don't want to put them out of business. We want a reversal of the burden of proof, where they have to prove beyond reasonable doubt that their products are safe."

When it comes to calculating risk, reasonable doubt can be the consumer's best friend. It's perfectly reasonable to doubt what scientists, activists, businessmen and politicians say; to doubt hyped-up headlines

that exaggerate the benefits or dangers of new technologies. But doubt is not enough. To take control of decisions that can affect your health, you have to do your homework—by using the library or the Web to get more information, and finding out whether the people praising or blaming some new advance have a vested interest in the result. But be warned: even after you've done the research, you still won't know for sure if GM foods, mobile phones or household chemicals are safe. So the first step is to accept the fact that, despite our scientific prowess, 100% certainty has gone the way of the new economy and the free lunch. There's no such thing as total proof, no such thing as zero risk. Better learn to live with it. —Reported by Maryann Bird, Michael Brunton, Kate Noble and Adam Smith/London, Bruce Crumley and Grant Rosenberg/Paris, Joe Kirwin/Brussels, Mimi Murphy/Rome and Ursula Sautter/Bonn