Edited by **Jennifer Sills**

Hidden effects of mouse chow

IN HER 3 OCTOBER News Features "The littlest patient" (p. 24) and "Hope in a mouse" (p. 28), J. Couzin-Frankel discusses the utility of mouse genetic cancer models for testing the efficacy of chemotherapeutic drugs [also discussed in (*1*)]. She omits the importance of mouse diet.

Standard chow diets vary between batches in both macro and micro nutrients (*2*). These diets can elevate biochemically powerful phytoestrogens to mouse serum levels 50,000 times as high as those of endogenous estrogen (*3*). Standard chow diets also provide high levels of vitamin D3, a hormone with wide-ranging effects on genes and pathways affecting growth and differentiation in multiple tissues (*4*). As a result, vitamin D serum levels are elevated (*5*, *6*) to levels far exceeding the range in the U.S. human population (*7*). Yet, vitamin D signaling in the stroma profoundly influences chemotherapeutic efficacy for pancreatic cancer (*8*).

Many other nutrients also substantially alter tumor development and phenotype. It seems foolish to believe that even the most elegant mouse genetic models will be highly useful without paying attention to nutrient intake. Newmark and Lipkin conducted pioneering work on rodent diets that reflect nutrient intake common in populations at risk for tumor development (*9*–*11*). Unfortunately, these lessons and a tremendous body of literature in epidemiology, carcinogenesis, and chemoprevention are routinely ignored in high-profile work on the molecular biology and genetics of cancer.

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Earthshaking energy development plans

PARTNERSHIPS BETWEEN scientists, engineers, legislators, and local communities can substantially enhance earthquake resilience ("'Epicenters' of resilience," M. L. Zoback, Editorial, 17 October, p. 283). Such resilience must not be compromised by energy development.

Reducing greenhouse gas emissions by developing low-carbon and renewable energy including hydropower, geothermal power, and natural gas is now a global priority. These options are not without risks. Changing reservoir water levels can induce shallow earthquakes, and water injection, common in the geothermal and gas industries, increases pore pressures, potentially inducing seismic events (*1*). There is a clear association between seismicity and active injection at the Geysers geothermal plant north of San Francisco (*1*). Injection of wastewater from unconventional gas fracking has been reported as the reason for the sharp increase in seismicity in Oklahoma (*2*).

Such enhanced seismicity is of particular concern in regions with poorly developed infrastructure and limited community resilience to earthquakes. China has the world's largest shale-gas reserves (about 36 trillion m^3), with many located near earthquake fault zones (*3*). The 12th Five-Year Plan (2011–2015) includes proposals to exploit these reserves, especially in

ONLINE BUZZ: CLINICAL TRIALS

Nonadherence takes its toll

IN HER IN DEPTH NEWS story "'Nonadherence': A bitter pill for drug trials" (17 October, p. 288), K. Servick explored a crucial confounding variable in drug trials: patients who stop taking the drug as prescribed. Readers added their own views about the causes and effects of nonadherence in the online comments section. Excerpts from their comments are below. Read the comments, and add your own, at http://comments.sciencemag.org/content/10.1126/science.346.6207.288.

A selection of your thoughts:

…This issue was less of a problem before clinical trials morphed into a business model as distinct from a clinical model. Patients who present through the clinical referral stream are less likely to be problematic concerning adherence. Pharma became impatient with the slowness of recruitment under the clinical model, and they traded speed for quality. Now they are reaping what they sowed.

Bernard Carroll

Another negative fallout from drug trials is the nature of the side effects that, once a drug makes it to market, must be described on the label or in the advertising. When we must sit through some of those drug ads, I've noted some of the side effects include those symptoms the drug is supposed to alleviate. Of course, some of these observations may be due to the fact that the drug did not work adequately for some patients, but it could also be fallout from abuses of the system described here.

Robert Buntrock

PHOTO: RAMA/WIKIMEDIA COMMONS

Sichuan and Chongqing (*4*). The population of these areas exceeds 110 million, and water injection has already induced 14 earthquakes of at least magnitude 4.0 in Chongqing's Rongchang conventional gas field (*5*, *6*). Furthermore, management actions for major hydropower dams, such as Three Gorges, need to be better informed so that seismic events can be better managed and risks minimized (*7*).

Earthquakes induced by the energy sectors are generally low in magnitude. However, effects could be deadly if they trigger release of accumulated tectonic strain in a large fault. Building partnerships based on the San Francisco model is necessary for all populous regions, and resilience enhancement is especially important where ground-source energy development is expanding rapidly.

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Give young scientists a level playing field

AS A PH.D. STUDENT who has worked in multiple institutions, I have observed and experienced the disparity in rigor, pedagogy, and professional development in the training of new scientists. Candidacy standards, graduation benchmarks, and preparation for independent scientific careers were markedly different between universities. Public speaking skills preparation, visits from career counseling experts, and presentations on the options available to Ph.D.s besides research professorships also varied. This largely unrecognized disparity, driven by a decreasing funding rate for grants, is not sustainable if the United States is to remain globally competitive in the sciences.

Graduate students in the United States receive disparate levels of professional development, networking opportunities, and assessments of basic levels of competency depending on where and with whom they train. For example, industrial scientists may regularly present research and recruit at high-level institutions because a funded seminar series exists. Meanwhile, Ph.D. students at other institutions may never see an industrial scientist on their campus over an entire doctoral degree. This phenomenon is not new, but the standards expected from newly minted Ph.D.s have evolved as research has become increasingly competitive, globally collaborative (*1*), and fast paced. The inequality between institutions places a minority of new Ph.D.s on a track with the best toolbox and a majority to pick up the crumbs.

For the U.S. scientific output to sustain its current pace, funding agencies must invest in a strategic plan for the development of younger scientists. These investments should have priorities established by scientists-in-training. A multiregional steering committee should set structured goals and benchmarks to address the heterogeneity in educational and professional development between institutions.

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NEXTGEN VOICES

Missing classes: Last call

You have one more week to respond to the NextGen VOICES survey! Share your thoughts about this question:

What was missing from your science education? Name and describe a course that would have better prepared you for your science career.

Your course can be as serious ("Preventing Plagiarism 239") or as quirky ("Handwriting for Physicians 101") as you choose.

To submit, go to http://scim.ag/NG_13

Deadline for submissions is 14 November. A selection of the best responses will be published in the 2 January 2015 issue of *Science*. Submissions should be 100 words or less. Anonymous submissions will not be considered.