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Geron's vision: Less than 20/20

Working on the problems of aging seems to have dulled the vision of the scientific staff and associates of Geron, a biotechnology company attempting to develop diagnostics and therapeutics for cancer and age-related diseases based on the biology of telomeres and telomerase. Instead of the justifiable, albeit modest excitement that should have accompanied the publication of their benchmark paper (*Science* 279:349–352, 1998) reporting extension of the lifespan of normal human cells using cloned telomerase, executives and others associated with the company encouraged a truly shameless media blizzard, having either forgotten, or more likely and distressingly, chosen to ignore, the sobering lessons of the numerous past instances of biotechnology hyperbole.

This was especially apparent in the segment that *20/20*, a national US television newsmagazine, devoted to Geron and telomerase on January 16, coincidentally the same day their paper appeared in *Science*. By the end of the segment—after hallelujah testimonials by Geron scientists and investors (with one lonely exception, to preserve the fiction of balanced reporting)—co-anchors Barbara Walters and Hugh Downs burbled on as if there actually was, just around the corner, a telomerase-based therapy that could be used to prolong longevity in humans, with Downs saying, "Well, the most conservative estimate is 5 or 10 years before it would be generally available. . . ." and Walters following on, "You mean that within 5 to 10 years there will be people like you and me who can live to be 150?" and Downs bringing up the rear with "And the hope is that at 150 you'd be like somebody at 75 or 80. . . ."

As the blizzard reached full fury, various Geron collaborators and spokespeople came forward to backpedal on the imminent practical applications of the work that they have actually undertaken and published over the last year. And predictably, Geron representatives protested that the media overstated their claims. This is too easy: The media was working from press releases approved and sanctioned by the company itself. If, for example, Geron was truly distressed by the turn the *20/20* segment was taking, they could have withdrawn their cooperation.

In some quarters, all the media coverage Geron received would be considered a coup. Not in this one. Since whatever scientific value Geron's research may really have was discounted or overlooked in the "live to be 150" blitz, and even the resulting jump in their stock prices after the *20/20* program was predictably transient, we are left having to pose the awkward question: "Who actually benefited?" Sadly, it would seem that the only potential beneficiaries of this disgraceful alliance of corporate biotechnology and big media are those market speculators savvy enough or lucky enough to have gotten wind of the "big news" through various online services that carried a "broken embargo" version of the press release issued by *Science*, or with access to programming details at ABC.

Even more disturbing, by endorsing and advertising this caricature of their research, Geron executives and their friends in the mass media have contributed to creating a dangerously schizophrenic public conditioned to see biotechnology through lenses that distort its true objectives and potentials and present instead fanciful scenarios that mix a potent combination of unreal hopes and exaggerated fears. Such a public would be biotechnology's worst nightmare come true, and if we continue along the present road we will not need pills that turn on telomerase to live long enough to see it.

Genomics and developmental biology

Nature Biotechnology's conference, "PharmacoGenesis: Postgenomic Drug Discovery through Developmental Biology," to be held March 26–27 in Boston, MA, may be a harbinger of a future method of drug design that will join the tool sets of genomics for discovering and validating therapeutic targets with the science of developmental biology.

Genome sequencing projects deliver raw data from which clues about cross-species conservation of structure and function will arise. As bioinformatics matures, ideally these data will be correlated with specific developmental stages. Once a correlation is made that defines a control point in a developmental pathway, the gene or genes involved can be altered—whether in fish, worms, flies, or mice—to test a hypothesis and look for redundant pathways that allow an organism to compensate for the failure of what may appear to be a highly conserved functional freeway.

What one gets from using these tools to study development—versus using them on an isolated model system—is a movie of how organisms orchestrate their genomes to accomplish specific tasks over time rather than a snapshot of how this is accomplished at one specific developmental stage. And, as any movie buff knows, the more films you watch, the better you get at anticipating plot twists and surprise endings.

Such approaches may yield important therapeutic leads from transiently expressed proteins that play controlling roles in a particular environment. And when one considers that such major disease categories as cancer, cardiovascular, and autoimmune disease all involve a loss of differentiated function and what appears to be a reorganization of genetic programs to those of an earlier developmental stage, the rationale for our conference is clear.

Although these approaches have led to the formation of some new biotechnology companies and pharmaceutical R&D programs, what it will take to get to the next level is a new generation of undergraduate and graduate students picking developmental biology as the field that offers them the greatest opportunity to make a scientific contribution—whether to academic science or to medicine through the development of therapeutics. It is only by attracting the best minds to this area that rapid progress will be made. There are encouraging signs that this is in fact a trend. Nearly half of Harvard University's cellular and molecular biology faculty is focused on developmental biology as a primary research interest.