

Sequencing projects bring age-old wisdom to genomics

Helen 'Happy' Reichert died in September. She was a lifelong New Yorker, a former television talk show host and Cornell University's oldest alumna. She was 109. Despite her death, however, Reichert's memory may live on through her genome sequence.

On 26 October, the nonprofit X-Prize Foundation—best known for its attempt to spur the development of private spaceships—launched a \$10 million competition to accurately sequence 100 genomes from 100 centenarians over the course of one month, starting 3 January 2013.

According to Craig Venter, who sits on the X-Prize advisory board, next-generation sequencing technologies such as those from Illumina and 454 Life Sciences make systematic errors and are unsuitable for medical applications. The X-Prize, he hopes, will spur development of speedy so-called 'third generation' technologies that can compare with the accuracy of first-gen Sanger sequencing at a fraction of the cost. "My genome is the only one sequenced with Sanger sequencing," Venter told *Nature Medicine*. "What we're doing now is taking it to the next stage."

The announcement really marks a

refocusing of the Archon Genomics X-Prize, which was first created in 2006 but netted no winners under a scheme that required sequencing 100 genomes in ten days at a cost of less than \$10,000 per genome. The new competition which includes a partnership with pharmacy benefit manager Medco, has lowered the cost per genome to \$5,000 and requires an accuracy of no more than one error per 100,000 bases.

Coming of age

The X-Prize comes on the heels of a collaboration launched on 3 October between the Scripps Health system of La Jolla, California and Complete Genomics of Mountain View, California to sequence the genomes of 1,000 people who are at least 80 years old and free of major diseases and long-term medications. The two projects are only indirectly competing with each other, but the outcome is clear: over the next two years, biomedical researchers will have a wealth of new data for unraveling the origins of age-related diseases such as diabetes, heart disease and Alzheimer's.

"It's going to be extremely powerful," says Nir Barzilai, director of the Institute for

Aging Research at the Albert Einstein College of Medicine in New York who expects to provide DNA samples from 10–20 subjects to the X-Prize organizers, including one from Reichert. "Those who have reached our maximal life capacity as healthy 100-year-olds have the perfect genomes, and these people should be the gold standard for everybody else."

Barzilai believes that many genome-wide association studies, including his own, are flawed from their use of "imperfect genomes." For instance, researchers may study adults with and without hypertension at a snapshot in time, but many individuals in the control group are likely to develop hypertension eventually as they age.

Although the X-Prize is geared toward validating technologies, the chief aim of Scripps's so-called 'Welllderly Study' is to unravel the genetics of healthy aging, notes Eric Topol, the cardiologist leading the effort. "Modern medicine has kept people going to 100 without necessarily being free of chronic diseases," he says. "The public is much more interested in healthy aging than they are in lifespan."

Brendan Borrell

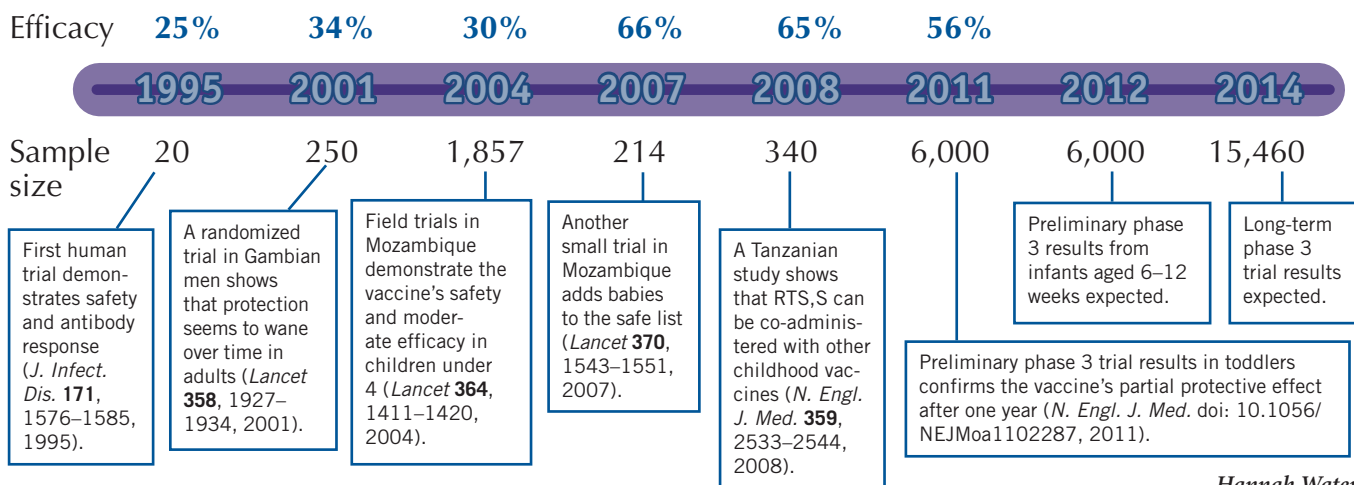
Malaria vaccine cuts risk in half in late-stage trial

After more than a decade of clinical research and \$300 million in investment, the world's leading experimental malaria vaccine passed an important milestone last month. On 18 October, researchers reported the first phase 3 trial data showing that the vaccine against the *Plasmodium falciparum* parasite—known as RTS,S or Mosquirix—cut the risk of malaria infection after one year by 56% in a study of

6,000 infants aged 5–17 months old (*N. Engl. J. Med.* doi:10.1056/NEJMoa1102287, 2011).

"It's a huge step forward," says study coauthor Pedro Alonso, director of the Barcelona Centre for International Health Research. "This is the first time that, truly, conclusively, one can show that one can produce protective immune responses in African children."

It's been a long and winding road for the RTS,S vaccine. GlaxoSmithKline's product first hit a few snags during early trials in adults. But, with the focus shifted to protecting the young, researchers are confident that the vaccine is well on its way to widespread use in children. Here we chronicle the major steps along the path of RTS,S's clinical development.



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