



ARGA

Tricorders and Telomeres

Not Quite the Final Frontier

Mark S Dion, FALU FLMI

Vice President, Strategic Underwriting Innovations

July 30, 2018

Star Trek inspires

Since September 8, 1966 – The Man Trap



Qualcomm Tricorder xPrize

“Imagine a portable, wireless device in the palm of your hand that monitors and diagnoses your health conditions. That’s the technology envisioned by this competition, and it will allow unprecedented access to personal health metrics.” ~ xPrize announcement

Create a medical diagnostic device weighing less than 5 pounds that can diagnosis up to 16 diseases, **without a medical professional.**

xPrize announced January 10, 2012

312 teams from 38 countries

The xPrize was awarded April 12, 2017

Final Frontier Medical Devices – The Winner!



Now find the team as Basil Leaf Technologies
Lead by Basil Harris and his brother George

<https://tricorder.xprize.org/teams/final-frontier-medical-devices>



RG&A

Meet Your Tricorder: DxtER

DxtER

Total weight less than 5 lbs

iPad Mini

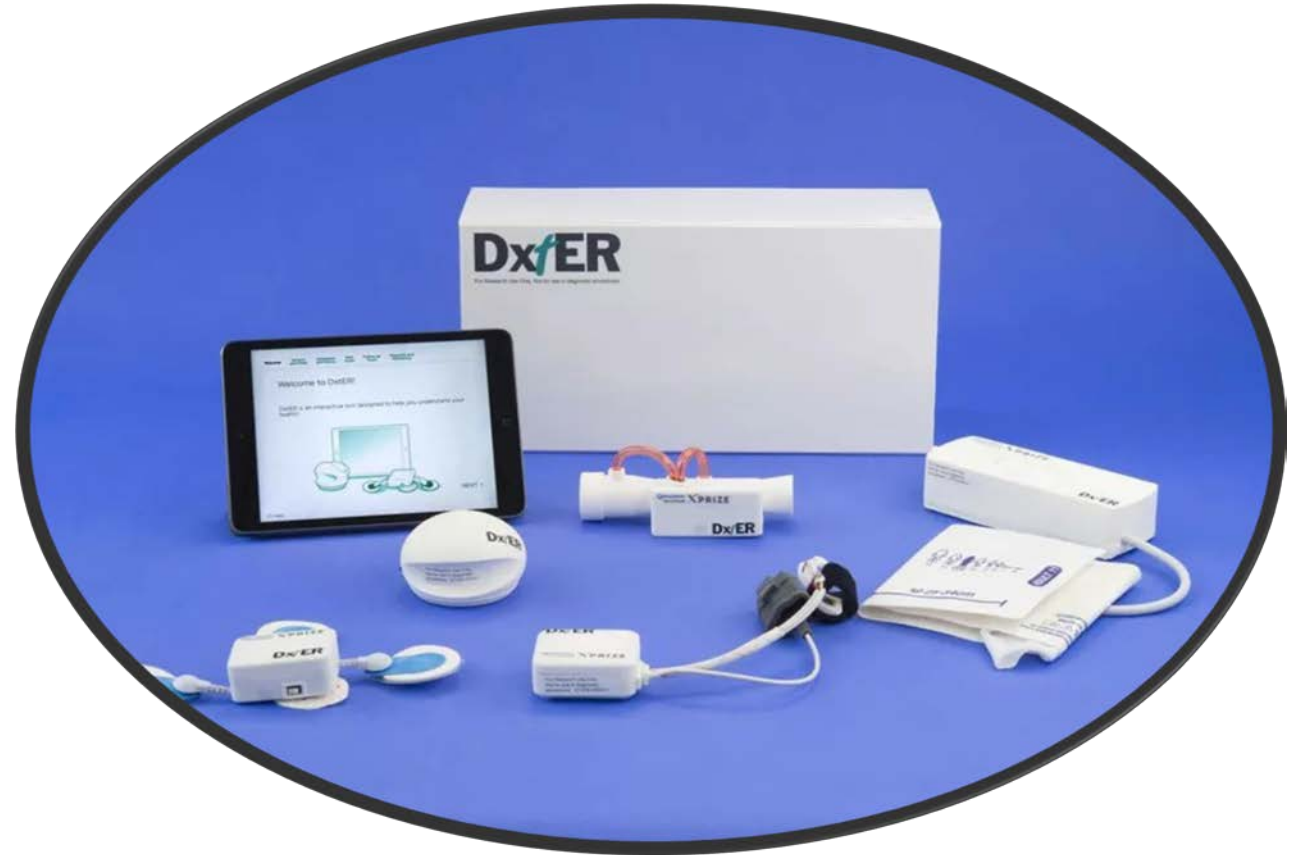
DxtER Chest Sensor

DxtER Wrist Sensor

DxtER Orb

DxtER Blood Pressure Unit

DxtER Spirometer



Why the interest for our industry?

The ongoing democratization of medicine, you can now do this at home

- Vital Signs
 - Blood pressure
 - Electrocardiography
 - Respiratory rate
 - Body temperature
 - Oxygen saturation

- Diseases
 - Otitis media, Sleep apnea, Atrial fibrillation, Chronic obstructive pulmonary disease, Pneumonia, Leukocytosis, Urinary tract infection, Anemia, Absence of condition
 - Mononucleosis, Pertussis (Whooping cough), Hypertension

What is to come? Before we invent the Warp Drive...

Technologies involved include AI, Bluetooth, various testing protocols

34 diseases, planning for up to 75

Including diabetes

Still working on FDA approvals

Planning on roll-out through Lowes

Estimated DxtER retail price: **\$200 or less**

- **How big is the potential market?**
- For some sense of scale for the direct-to-consumer market: 20 million pregnancy and ovulation tests per year, for a single condition, and a specific age-gender demographic

**Should our examiners
start carrying DxtER?**

What about 2nd place?

Dynamical Biomarkers Group from Taiwan

- **DeepQ Kit:** Smartphone, Scope tests, Blood tests, Urine test, Breath test, Glucose test, Exam tray, Monitoring set, Calibration set
- Otitis media, Sleep apnea, Atrial fibrillation, Chronic obstructive pulmonary disease, Pneumonia, Leukocytosis, Urinary tract infection, Anemia, Absence of condition
- Melanoma, Shingles, **Hypertension**

Post Competition Initiatives:

- Facilitating the testing and R&D for continued Tricorder device development, including continuing the FDA support.
- Securing relationships with global leaders in retail and supporting demand in the marketplace so that, upon proper regulatory approvals, the Tricorder device will swiftly be given international retail distribution.
- Creating an educational feature-length documentary with an Oscar®-nominated director, and establish a museum.
- The Qualcomm Foundation has committed \$3.8 million towards promotion of the digital health ecosystem.
- The Roddenberry Foundation to contribute \$1.6 million towards the adaptation of the teams' Tricorder devices for use in hospitals and communities in the developing world.
- A specific collaboration to provide the devices for use to a hospital in Mozambique, Africa.



RGGA

Telomeres

30 years of searching for answers

TTAGGG

Nobel Prize 2009

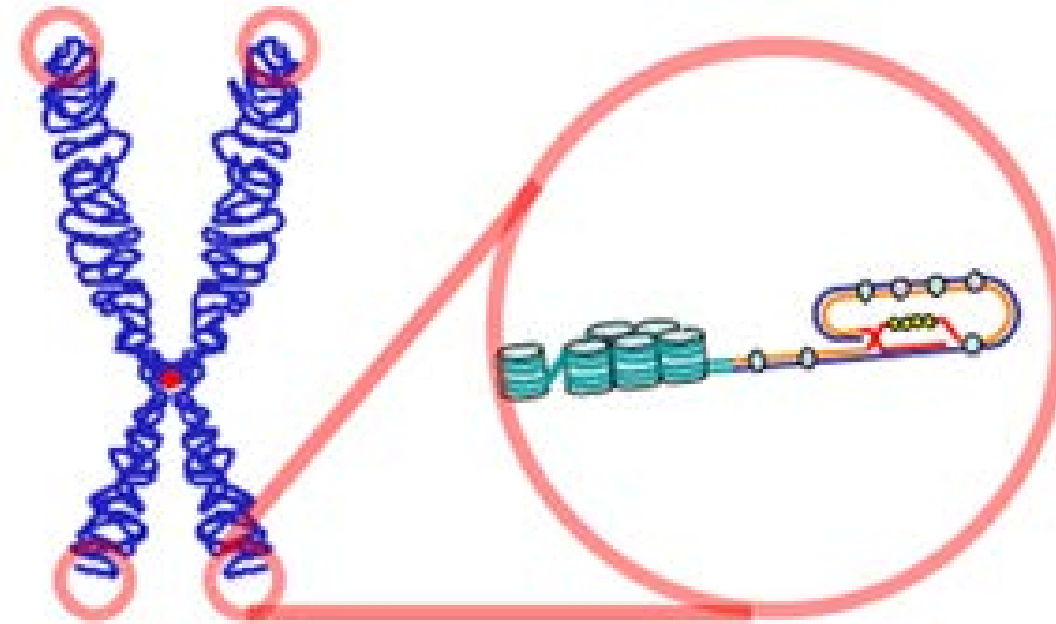
"for the discovery of how chromosomes are protected by telomeres and the enzyme telomerase".

Elizabeth H Blackburn

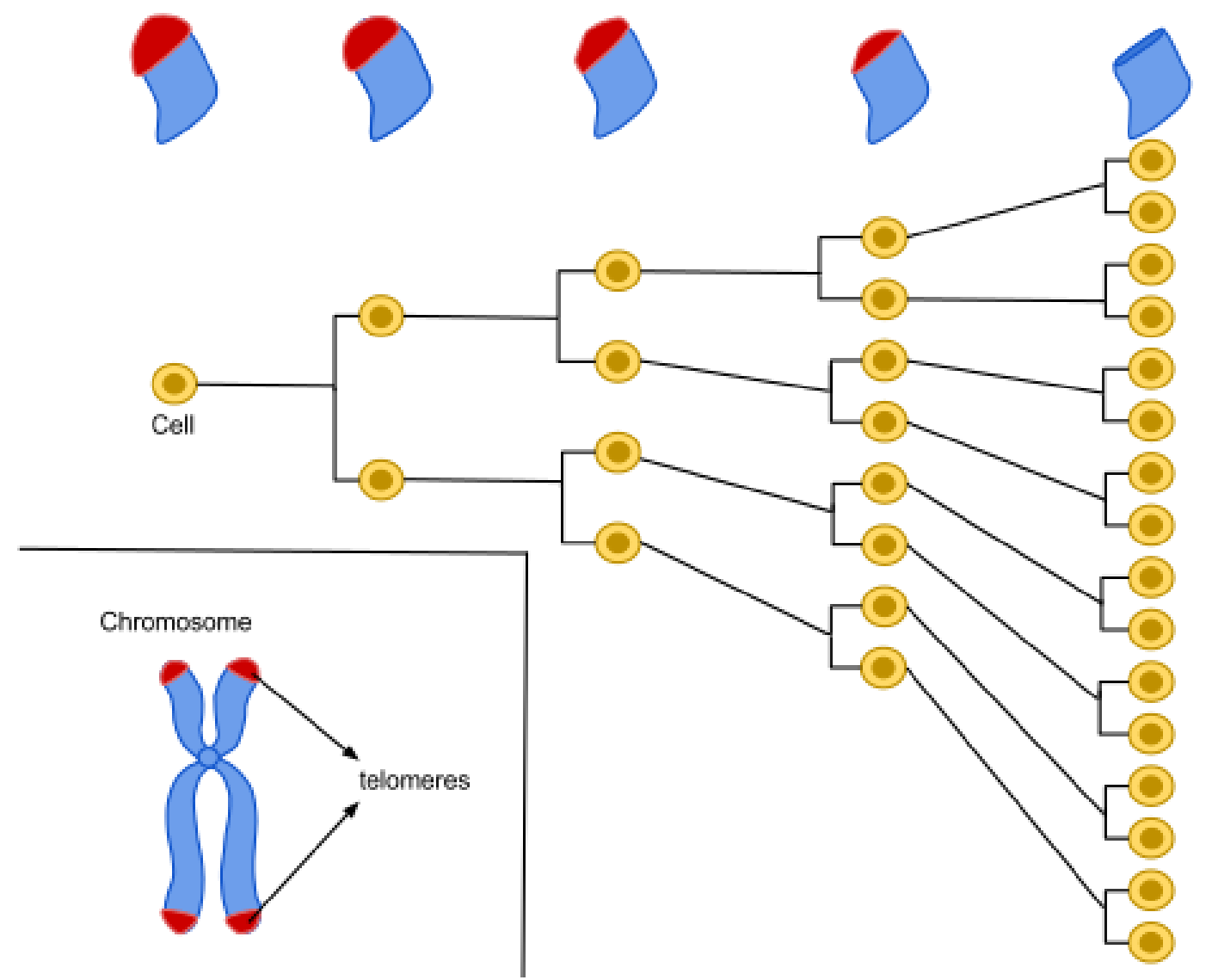
Carol W Greider

Jack W Szostak

What are they?



Telomeres and the Hayflick Limit



Telomerase

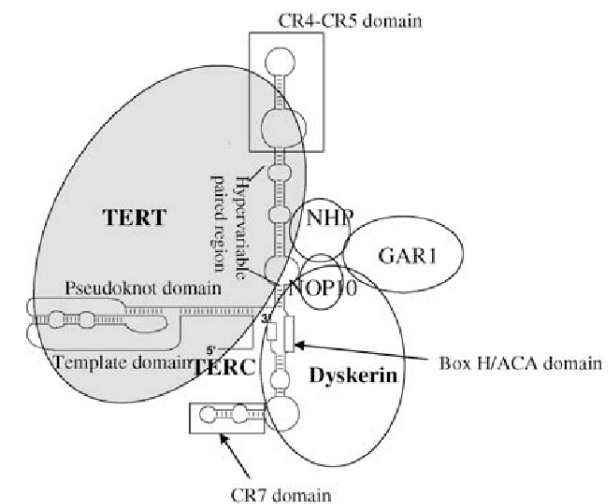
AKA: terminal transferase

Ribonucleoprotein that adds telomere repeat sequences to the 3' end of telomeres. A form of reverse transcriptase (RNA->DNA). In humans, telomeres are coded: TTAGGG

Telomerase is found most abundantly: germ cells, stem cells, and cancer cells

HeLa (Henrietta Lacks) cells: produce telomerase, and have been growing and reproducing since 1951.

Roughly 90% of human tumors exhibit increased telomerase activity. Note: Telomeres are not an oncogene!



A cellular explanation of why “good living” promotes longevity and health

Disease span versus life span. Telomere shortening accelerates disease span

Aging and longevity is much more complicated than this ... but the science is “fascinating”

Long telomeres – good

Short telomeres – not so good

What shortens telomeres: **Age**, Stress, Cytomegalovirus (CMV), Smoking, having children

What lengthens telomeres: Proper diet with whole foods and low fat, exercise, being married, omega-3 fatty acids (oily fish and flaxseeds)

Possible good conditions: having children (hmmm), vitamin D

A few science headlines:

Researchers target telomerase for killing NRAS-mutant melanoma cells

Telomere extension turns back aging clock in cultured human cells

Birds with older fathers have shorter telomeres and shorter life expectancy

Exercise boosts telomere transcription

Early-life stress affects telomeres later

Telomerase isn't necessary to maintain telomere length
-- some species have elaborate telomere maintenance genes

Women with multiple pregnancies tend to age quickly

Can you hear the ads coming?

“We can grow & lengthen your telomeres!”

Dr. McCoy must have had telomeres figured out

Dr. Leonard McCoy, Branch Admiral Star Fleet, visited the newly launched Enterprise D at the ripe old age of 137 years old.

Encounter at Farpoint, Star Trek, the Next Generation, 2364

~ September 28, 1987

Live Long and Prosper #LLAP



RGA

©2017 RGA. All rights reserved.

No part of this publication may be reproduced in any form without the prior permission of RGA.

The information in this publication is for the exclusive, internal use of the recipient and may not be relied upon by any other party other than the recipient and its affiliates, or published, quoted or disseminated to any party other than the recipient without the prior written consent of RGA.

References

- [Open Med \(Wars\)](#). 2015; 10(1): 294–296. Published online 2015 May 27. doi: [10.1515/med-2015-0042](#)
- <http://www.fasebj.org/content/early/2015/01/21/fj.14-259531.abstract>
- <https://www.news-medical.net/?tag=/Telomere>