

# Maintaining the Genome



Johannes Walter

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## CURRENT RESEARCH

### Studying complicated DNA repair pathways in a test tube

To remain viable and healthy, our cells must maintain a pristine, uncorrupted genetic blueprint, which is composed of six billion units of DNA information. Alarming, our DNA is under constant attack by internal and external factors; during one hour, the cells in our body collectively experience trillions of chemical insults. For example, water, which is present in every cell, attacks and slowly degrades DNA; cosmic rays, to which we are constantly exposed, can break DNA strands in half; the UV light in the sun's rays chemically alters DNA. All this DNA damage has the potential to corrupt the genetic information and cause diseases such as premature aging and cancer. Dr. Johannes Walter, Professor of Biological Chemistry and Molecular Pharmacology at Harvard Medical School, and his laboratory study several of the multiple strategies or "pathways" that cells use to repair DNA damage. By examining how a broken DNA strand is stitched back together by proteins like BRCA1 and BRCA2, Dr. Walter hopes to lay the foundation for developing improved cancer therapies, particularly for breast and ovarian cancers which are often caused by mutations in BRCA1 and BRCA2.

To study DNA repair in the test tube, Dr. Walter's lab makes extracts from the eggs of the African clawed toad, *Xenopus laevis*. By collecting large numbers of eggs and breaking them open, the lab is able to generate an extract that contains all the proteins normally present in a cell. Dr. Walter and his lab have shown that when they add damaged DNA to these extracts, the damage is repaired, which allows them to ask detailed questions about how the repair reaction normally unfolds. In addition, the team is able to remove specific proteins from the extract to...

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## AFFILIATION

 Harvard University (Medical School)

## EDUCATION

- Ph.D. in Molecular Biophysics and Biochemistry 1995, Yale University
- B.A. in Biochemistry 1989, University of California, Berkeley

## AWARDS

- Appointed to the Howard Hughes Medical Institute, 2013
- Fellow of the American Association for the Advancement of Science (AAAS), 2008
- Leukemia and Lymphoma Society Scholar, 2006-2011
- Burroughs Wellcome Career Award in the Biomedical Sciences, 1998-2003

## RESEARCH AREAS

Health & Wellness, Longevity, Immortality Research

## FUNDING REQUEST

Your contributions will support the continued research of Dr. Johannes Walter and his diverse and talented team at Harvard Medical School. The research in the laboratory requires sophisticated reagents and highly trained personnel to conduct these experiments. Donations will help fund the annual \$1.2M required to operate optimally and pursue all desired projects. Partner with Dr. Walter's team to learn how knowledge of DNA repair can be exploited to treat diseases such as breast cancer and Fanconi anemia.