

## Division of Experimental Medicine at UCSF

The Division of Experimental Medicine (DEM) was created in 2006 to establish a new model of translational HIV/AIDS research focused on the unique needs of the developing world. The aim of the DEM is to accelerate the development of the most promising HIV-cure discoveries into safe, affordable, and scalable solutions and concurrently train emerging researchers in the U.S. and in the countries most affected by HIV/AIDS.

The DEM is an innovative and dynamic model of biomedical research, focused on humans who are at risk and infected, bringing together groups of leading and emerging researchers from both the U.S. and countries in which the epidemic is raging. The DEM's unique approach encourages ongoing collaboration and risk-taking through interdisciplinary team research. Rather than providing funding for individuals based on their home institution, it's the DEM's wish to award grants to multi-institutional teams of scientists who work collaboratively to develop new approaches and to translate them into patient care as quickly as possible and to all in need.

### Why do we need a cure for HIV disease?

We have made phenomenal progress in the global fight against HIV/AIDS over the past 30 years. Millions of people worldwide are alive today due to the availability of cost-effective antiretroviral therapies (ART) against HIV. **However, although ART is highly effective in *suppressing* HIV in the human body, it is not a cure: the virus is not completely eradicated, meaning that ART must be continued for life.**

There are three problems with lifelong ART. First, this intervention is very expensive and the global community may not be willing or able to supply it for all in need. Secondly, it is very hard for patients to consistently take ART throughout their lives. In fact, only 25-30% of those in the U.S. adhere to their treatment plan and rates are far lower in resource-constrained settings. Finally, those who can continue to take ART can expect to live ten years less than if they were not infected. While receiving treatment for HIV, they are more frequently sick, often with diseases normally only affecting the elderly.

The DEM applauds efforts to raise the money, build the health infrastructure, and develop the societal will to provide ART to all HIV-infected individuals who need it. In the meantime, they strive to find a more permanent solution: rather than accept and treat HIV infection, they wish to find interventions that can reduce the level of persistent HIV to allow individuals to live a healthy, virus-free life, without ART. In short, **the DEM seeks a cure**, one that is safe, effective, affordable, and available to all, one that will end the epidemic of AIDS.

## **DEM's approach to finding a cure**

DEM's approach to an AIDS cure is unique in two ways: first, researchers in the Division will team up with experts from around the world to study the human immune response to HIV in the setting of other chronic diseases such as those caused by TB, malaria, helminthic parasites, hepatitis C and certain bacteria in the gut. These other infectious agents are often found to co-infect people with HIV in the developing world where more than 90% of cases of HIV infection are found. Only by understanding how HIV infection proceeds in such settings is it likely that interventions to eradicate HIV will be transferrable to all.

Secondly, the Division aims to understand how the immune systems of women, pregnant mothers, and their children respond to HIV and to these co-infections. Approximately half of those infected with HIV around the world are women of childbearing age, and it is within this group of patients that the effects of HIV and its associated co-infections are often most severe. Little is now known about the changes that occur in the human immune response during pregnancy and during early life, let alone how these responses interact with chronic infectious agents. The Division wishes to fill that void and to thereby prevent or cure HIV infection in those most vulnerable.

This knowledge will teach scientists how to tip the balance against HIV in all people and to remove it from the body. In so doing, those who are infected by HIV, whomever they are and wherever they may be, will enjoy longer, disease-free lives.

## **How we think it can be done**

The Division aims to reach this goal by a process not often found in academia: bringing together experts from multiple fields who are committed to finding a cure and eager to do so collaboratively. Such collaborative research is important because eradication of HIV is a daunting and complex problem that requires insight from varied perspectives. On the one hand, the Division wishes to develop vaccines that can be used to induce the immune system of the host to destroy infected cells. On the other hand, scientists in the Division aim to develop therapies that can remove persistent virus from the body, after the initiation of ART. We believe that important insights towards these goals will arise from examination of the way that the body normally balances its interactions with multiple chronic infectious agents.

This work will be carried out by scientists with a history of close collaboration, led by the long-standing and highly productive research teams that the AIDS Research Institute at UCSF represents. These teams have been based at the epicenter of the AIDS epidemic since it started in the early 1980s. The immediate task of this group will be to understand how various infectious agents and HIV interact with one another in a given host, and to understand if and how such interactions might inform a cure for HIV.

## Why is this research important?

The Division's ultimate goal is to eradicate HIV and to end the AIDS epidemic. It will take much more than just science to do this. Scientists now know more about how HIV can persist in those who are treated and have ideas about how to make it go away. The concerted efforts and wisdom of scientists, clinicians, and community members working together in a multidisciplinary, collaborative team must be harnessed if the enormity of the problem is to be faced and finally solved.

For-profit companies form functional teams focused on the discovery and development of medical interventions for reimbursable illnesses. In the context of HIV disease, these efforts have traditionally focused on HIV-infected men in the western world (who represent less than 10% of those estimated to be infected around the world). Meanwhile, the academic environment selects for creative, ambitious, independent scientists not necessarily skilled in the formation of effective multidisciplinary teams. Left in the void are the diagnosis, prevention and treatment of many human diseases that afflict those in need around the world.

This void includes HIV disease in the context of co-infection with other chronic infectious agents, especially in women of childbearing age and their children. Working with partners at UCSF and other research units around the world, the Division of Experimental Medicine will help ensure that this work is sustained, coordinated, and expanded so that life-saving interventions can be developed, tested and ultimately manufactured for global distribution. The ultimate goal is to ensure that the Division's research discoveries will be accessible to those who need them most.

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DEM's Tim Henrich was featured in this story on the evening news in Seattle:

**Man cured, then uncured, of HIV speaks on Fred Hutch panel** <sup>[1]</sup>

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### Links

[1] <http://www.nwcn.com/news/health/man-cured-then-uncured-of-hiv-speaks-on-fred-hutch-panel/287391267>