Stanford Hosts Colloquium On Machine Learning And Causal Inference

Epidemiologists - Spectators Or Participants In The Machine Revolution?

“Is Prediction Enough?” That’s the title given to a recent colloquium organized by Stanford University’s Division of Epidemiology. The half-day event in late April was designed to bring together experts from the worlds of epidemiology, artificial intelligence (AI), machine learning (ML), statistics and other disciplines to better understand the successes and challenges of using big data to answer health related questions.

Examples

Potential uses of big data were provided at the meeting in a presentation by Stanford’s Nigam Shah whose group has developed an informatics consultation service which doctors can use to help support medical decision making at the point of care. This “green button”

- Stanford continues on page 2

Teaching Public Health Symposium Held At Boston University

Participants Challenged To Rethink and Redesign Higher Education

A day-long symposium on teaching public health involving more than 30 speakers took place at Boston University in March of this year. The symposium was prompted by an unmet need to reform public health education for the 21st century.

Key Presentation

A key presentation by Laura Magaña, the President of the Association of Schools and Programs of Public Health, sought to convey several key messages about public health education.

The advances in the education have lagged seriously behind advances in many other sectors of society such as

- Teaching cont'd on page 6
technology has access to demographics, diagnoses, procedures, medications, laboratory values, clinical notes, mortality, and length of stay information for millions of patients. It is able to analyze millions of records to answer a doctor’s question--what has happened to other patients like mine?” Greenbutton is further explained in a two-minute video at this link:

https://tinyurl.com/y9zgrzbek

The potential for AI-assisted health decision-making is enormous, according to experts in the field, and also has the potential to predict and guide the response to disease outbreaks. Some have gone so far as to speculate that the field has the potential to make entire professions or specialties obsolete, like radiologists and pathologists. They cite the example of piloting aircraft which used to require extreme human cognition but now airplanes can be flown on their own.

Role for Epidemiologists

It is in this hyped environment that the need for a discussion of the challenges and limitations of analyzing big data algorithmically became obvious, according to Steve Goodman, Chief of the Division of Epidemiology at Stanford. This is a natural role for epidemiologists as observational data scientists who understand the inherent limitations of using machine learning algorithms to analyze data, especially medical records, to guide treatment or prevention interventions.

Another speaker told the audience that big data is better described as “cheap data,” and epidemiologists understand the impact that poor data quality can have on inferences.

Three Tasks

To help participants think more clearly about the key question at the meeting, Harvard University’s Miguel Hernan spoke first and laid out a conceptual framework which identified three tasks data analysts/data scientists can carry out when seeking scientific insights from data: 1) description, 2) prediction, and 3) causal inference.

Prediction vs Causal Inference

A major contention during the colloquium was that the difference between prediction and causal inference is often misunderstood and can lead to false conclusions or misguided actions. The key difference between prediction and causal inference according to Hernan is that all the information required for a well-defined predictive task is included in the data, whereas causal inference requires expert knowledge of relationships not discernable from the data itself. The knowledge needed is how the system being analyzed “works,” which in turn guides analyses in ways that are hard or impossible to program into machine learning algorithms.

Perspective

In comments to the Monitor about the Colloquium, Goodman said “I think this is a fantastically important issue for epidemiologists, as we seem to be on the sidelines as a tidal wave of uncritical hype about the potential of machine
The World Health Organization has released World Health Statistics for 2018 and the report contains both encouraging and concerning facts about the health condition of the world’s populations. Currently, the global health community tracks some 50 health-related indicators across 7 major topic areas. These are:

- Reproductive, maternal, newborn, and child health
- Infectious diseases
- Non-communicable diseases and mental health
- Injuries and violence
- Universal health coverage and health systems
- Environmental risks
- Health risks and disease outbreaks

Some Good News

- The global under five mortality rate has dropped from 93 per 1,000 live births to 41 per 1,000 live births in 2016
- Improving the survival of children 5-14 years is an area of increasing focus now that more children are surviving to that age
- The number of deaths from HIV has been cut almost in half (48%) since 2005 when the number stood at 1.9 million and is now at 1 million.
- An estimated 20.9 million people are receiving antiretroviral therapy in 2016 which is slightly more than half (53%) of the people living with HIV.

Some Health Challenges

- There has been a 19% decline in the incidence of TB since 2000.
- The widespread use of hepatitis B vaccine has reduced the incidence of new chronic HBV infections, including prevalence in children under five which has dropped from 4.7% in the prevaccine era to 1.3% in 2015.
- Mass or individual treatment for neglected tropical diseases was required for 500 million fewer persons in 2016 compared to 2010 driven by the elimination of lymphatic filariasis in Cambodia, onchocerciasis in Guatemala, and trachoma in Morocco.
- The risk of dying from any one of the four main non-communicable diseases (NCDs)(cardiovascular disease, cancer, chronic respiratory disease and diabetes) between the ages of 30 and 70 dropped from 22% in 2000 to 18% in 2016.
- The number of deaths from unintentional poisonings has steadily declined since 2000

"The number of deaths from HIV has been cut almost in half (48%) since 2005..."

"There has been a 19% decline in the incidence of TB since 2000."

- Good News cont’d on page 4
In 2015, an estimated 303,000 women worldwide died due to maternal causes, almost two-thirds of them in the African region.

15,000 children died before reaching their fifth birthday every day in 2016.

In 2016, 1 million persons died of HIV related illnesses.

In 2016, an estimated 41 million deaths occurred due to NCDs, accounting for 71% of the overall total of 57 million deaths.

Road traffic crashes killed 1.25 million people worldwide in 2013 and injured up to 50 million more.

An estimated 477,000 murders occurred globally in 2016, most of them male, and the highest rate by far was in the Americas region.

At least half of the world’s population does not have full coverage of essential health services.

The World Health Assembly meeting in Geneva in May will discuss these challenges and accelerate progress towards the sustainable development goals. A new work program is the result of 12 months of intensive discussion with countries, experts and partners, and centers on the “triple billion” targets:

- 1 billion more people benefiting from universal health coverage
- 1 billion more people better protected from health emergencies
- 1 billion more people enjoying better health and well-being.

To access the report for 2018, use the following link:

https://tinyurl.com/y8rwczhh

Online Access

The half-day Colloquium featured three sets of two speakers and each set had a panel which reacted to the presentations. The Colloquium in its entirety was recorded on video with timestamps for each speaker and can be easily accessed and watched selectively by speaker or in entirety at this link

https://tinyurl.com/y75m6h37

Papers by Miguel Hernan and colleagues on Data Science and Nigam Shah and colleagues on Green Button can be found at the following links:

https://tinyurl.com/yacn9hsx
and
https://tinyurl.com/yd2tomct

"...where we don't have an independent way to know the truth, that's different territory..."
The Rochester Epidemiology Project Data Exploration Portal

The Rochester Epidemiology Project (REP) has developed an interactive online web-based tool to explore patterns of prevalence and co-occurrence of diseases using data from the expanded REP medical records linkage system. In a paper published in April 2018 in Preventing Chronic Diseases, the REP is described as a rapid, free of charge method to examine 717 diseases and conditions in a large mid-western population. The data are expected to be useful to three classes of users:

1) local communities for understanding the prevalence of all conditions in the region

2) other communities may use the information as benchmarks, particularly for rare conditions

3) Investigators can obtain preliminary data when considering further studies of the co-occurrence of diseases or when assessing the feasibility of a community-based trial.

A new version of the data set allows users to choose from among 1,376 characteristics, including diagnosis based medical conditions, procedures and surgeries, prescription medications, and demographic characteristics. Users now have more flexibility to explore the relationships between characteristics. The portal allows users to choose two characteristics, to summarize the prevalence of each separately by age and sex, and to explore the co-occurrence of the two characteristics. In addition, users are presented with shaded maps to help visualize the prevalence and co-occurrence of the two selected characteristics across the REP region.

To access the portal, visit:
https://tinyurl.com/y9zcqjsj

Epidemiology and Statistics Professor Lectures Available Online

David Kleinbaum, a retired professor at Emory University’s Rollins School of Public Health, has created a “visual archive” on YouTube that provides a large collection of narrated video recordings of his course lectures, multi-media instructional materials, and more.

Kleinbaum retired from Emory in September 2017 after 25 years, preceded by 21 years at University of North Carolina. Also, he was a statistical consultant at the Centers of Disease Control in Atlanta for many years, and authored several textbooks and published journal articles on statistical and epidemiologic methods that are used/referenced worldwide.

Kleinbaum has had a long-time interest in the development of multi-media instructional materials that promote active, enjoyable and alternative learning. He began such efforts in the 1970s culminating in his 2015 electronic multimedia textbook ActivEpi Web on introductory and higher-level epidemiologic methods, which is available for free (http://activepi.herokuapp.com). Also,
http://www.activepi.com not only provides details of the unique features of ActivEpi Web, but also contains freely downloadable PowerPoint presentations on all topics covered in ActivEpi Web. This website also contains free access for downloading a Spanish translation of ActivEpi, which is called ActivEpi Espanol (only for Windows computers), which can be used for epidemiology instruction throughout Latin America (and is also sponsored by PAHO).

To access the visual archive on YouTube, search for David Kleinbaum, click on the name, then click on playlists. The screen will show you playlists, including the following:

- **Correlated Data 2016** (video recordings of 10 classes)
- **Epi Modeling 2015** (video recordings of 20 classes)
- **Epi Modeling 2016** (video recordings of 10 classes - first half of course)
- **Introduction to Biostatistics: Distributions and Inference** (10 narrated PowerPoint videos)

Vision

Magaña’s vision for public health education comprises seven elements. They are:

1. Education must shift from being a one-time event to being a process of life-long learning. This will mean students must be given the opportunities for multiple re-entries into the system.

2. At present, schools have the same entry and graduation requirements for everyone which leads to students having a common experience. Going forward, multiple entries and exits should make it possible for students to have unique experiences.

3. Schools should focus less on transmitting knowledge since it doubles every 13 months and soon will double every 11 hours and more on developing competencies or literacy in data, technology, and in learning and adapting rapidly.

4. Flexible curricula should replace static curricula

5. Learning should take place in different settings such as on campus, online, and on the job.

6. New roles for faculty are envisaged, including designing learning scenarios, tracing students careers throughout their professional careers, mentoring instead of lecturing, interpreting performance dashboards, and coaching.

- **Teaching cont'd from page 1**

transportation, entertainment, banking, and others. Classrooms today look the same as they did decades ago with a lecturer at the front and students in the rest of the room. According to Magaña, teachers need a new mindset to revolutionize education and adapt it to the new economy. The requirements for students going forward are talent, creativity, flexibility, and innovation, she said.
7. Public health education will have to be delivered not only be a single institution but by alliances and networks with other education providers.

Call To Action

Magaña issued a call to action for the public health community to rethink and redesign the complete higher education system. She urged her audience to take the lead in educational change by creating opportunities to think about the challenges such as occurred at this BU symposium and to involve different actors inside and outside of the health sector. She closed by quoting John Maynard Keynes saying “the difficulty lies not so much in developing new ideas as in escaping from old ones.”

The symposium sought to excite and inspire participants in their reform efforts by sharing lyrics from "Wake Up Everybody" a song by Harold Melvin and the Blue Notes:

> Wake up everybody no more sleepin' in bed  
> No more backward thinkin' time for thinkin' ahead  
> The world has changed so very much  
> From what it used to be  
> There is so much hatred war an' poverty

> Wake up all the teachers time to teach a new way  
> Maybe then they'll listen to whatcha have to say  
> 'Cause they're the ones who's coming up and the world is in their hands  
> When you teach the children teach em the very best you can

> The world won't get no better if we just let it be  
> The world won't get no better we gotta change it yeah, just you and me

Written by John Whitehead, Gene McFadden & Victor Carstarphen, 1975
Symposium Topics

Among the broad topic areas covered were:

- Teaching Public Health: Past and Present
- Active Learning
- Engaging Students
- Diversity and Inclusion
- Enhancing the Educational Experience
- Public Health Teaching in Non-Traditional Settings
- Public Health Teaching Across the Lifecourse

Some of the specific topics covered in these presentations were:

A Conceptual Orientation to Public Health Teaching
Teaching by the Case Method
Practice-Based Teaching and Learning

Maximizing Student Engagement

Effective Teaching in Diverse Classrooms
Teaching with Technology: Incorporating Technology in the Classroom
Public Health for High School Students
Undergraduate Education in Public Health
Community Colleges and Public Health Education
Lifelong Learning
Challenges, Promise, and Potential: the Future of Public Health

Access to Videos

Readers can listen to many of these presentations which were recorded on video and access the slides of several of the speakers at:

https://tinyurl.com/y7sxl6gl

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Winner Selected in Limerick Contest

The Epidemiology Monitor has selected the best limerick submitted in our contest to define a common word or phrase in epidemiology by weaving humor into an accurate description of the meaning of the selected word.

Winner and Honorable Mention

The winner of the contest is Erika Brown, a PHD student at UC Berkeley School of Public Health for her limerick describing BIAS. Her winning limerick is:

Bias is often an unavoidable error  
Systematically skewing estimates with error  
Hidden, social, or from recall  
It sends validity into free fall  
If only like Poisson’s tail end, it was rarer!

Asked about how she came about writing her limerick, Erika told the Monitor “I’m an epidemiology PhD student in the midst of studying for my qualifying exams. My friend had broadcasted the contest a few weeks into back-to-back textbook reading, and needless to say, I was eager to find ways to have fun with the material. I love limericks and adore public health, but have never tried marrying the two before this.”

When asked how she came to pick BIAS as the word to write about, Erika said “One of my biggest frustrations with science is how seemingly impossible it is to eliminate subjectivity in what’s considered to be an objective process. No matter how skilled or careful the researcher(s), bias finds a way in. The implications of that are incredible, but in my experience, rarely discussed outside of academic circles. I would like it to be.” As winner, Erika will receive a $300 first prize.

A second limerick by Janice Westenhouse also from the California Department of Public Health was selected as runner up and deserves honorable mention. It was on SURVEILLANCE and is presented below.

Disease can spread fast and furious  
Explanations are often times spurious  
Surveillance in action  
Can give us traction  
To find answers those who are curious.

Gift Card Winners

In addition, three gift cards worth $50 each are being awarded to three readers who voted in our contest to help select the best slogan and were chosen randomly to receive the cards. These lucky voters are:

Paul Cieslak,  
Mary Ward, National Cancer Institute  
Maria Flores, California Department of Public Health

Do you have news about yourself, a colleague, or a student?

Please help The Epidemiology Monitor keep the community informed by sending relevant news to us at the address below for inclusion in our next issue.

people@epimonitor.net
Editor’s Note: We reported in a previous issue the death of 35 year old CDC epidemiologist Timothy Cunningham who disappeared mysteriously in Atlanta. His body was found in a nearby river about one month into his disappearance. Local authorities have now ruled his death as suicide caused by drowning. Many have expressed skepticism about this cause of death, however, the medical examiner told the press “We do our due diligence… If we didn’t know, we wouldn’t call it that way.”]

Appointed: Ihsan Assam, as chief medical officer in Nevada. Assam served as Nevada’s chief epidemiologist since 1995 and has 35 years of national and international experience in epidemiology, public health, and disease control and prevention.

Elected: Elisabete Weiderpass, as the new Director of the International Agency for Research on Cancer effective January 1, 2019 for a five-year term. Dr Weiderpass is an expert in cancer epidemiology and prevention. She currently leads the Department of Research at the Cancer Registry of Norway and of the Genetic Epidemiology Group at the Folkhalsan Research Center in Finland. She holds teaching positions in several countries.

Appointed: Diane Gross, as regional epidemiologist for a seven county area in West Virginia. Gross is a former CDC epidemiologist who has worked on both bacterial and viral diseases at the federal agency and has served with WHO in Europe. Gross has a doctorate veterinary medicine as well as epidemiology and the county is thrilled to have her, according to Lee Smith, the county health officer.

Interviewed: Peter Salama, Deputy Director General of the World Health Organization and epidemiologist leading the response to the Ebola outbreak in the Congo. On this voice recording, Salama describes the current outbreak and the challenges it is posing health workers. Listen here: https://tinyurl.com/y82wxccy
Near Term Epidemiology Event Calendar

Every December The Epidemiology Monitor dedicates that issue to a calendar of events for the upcoming year. However that often means we don't have full information for events later in the year. Thus an online copy exists on our website that is updated regularly. This year we will print upcoming events in the Monitor monthly. To view the full year please go to: [http://www.epimonitor.net/Events](http://www.epimonitor.net/Events)

### June 2018

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<tr>
<th>Date</th>
<th>Event details</th>
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<tr>
<td>June 3-16</td>
<td><a href="http://www.biostatepi.org/">http://www.biostatepi.org/</a> Summer Program: Summer School on Biostatistics and Epidemiology / Biostatepi / Treviso, Italy</td>
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<tr>
<td>June 4-8</td>
<td><a href="https://tinyurl.com/5mw4pbf">https://tinyurl.com/5mw4pbf</a> Short Course: Evidence Based Clinical Practice Workshop / McMaster University / Hamilton, Ontario, Canada</td>
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<tr>
<td>June 4-6</td>
<td><a href="https://tinyurl.com/yal6cycd8">https://tinyurl.com/yal6cycd8</a> Short Course: Causal Inference in Epidemiology / University of Bristol / Bristol, England</td>
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<tr>
<td>June 4-15</td>
<td><a href="http://tinyurl.com/n2bspy">http://tinyurl.com/n2bspy</a> Short Course: Epidemiology in Action w/Epi Info Training / Emory University / Atlanta, GA</td>
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<tr>
<td>June 7-8</td>
<td><a href="https://tinyurl.com/yczavde5">https://tinyurl.com/yczavde5</a> Short Course: Statistical Methods for Mediation Analysis / University of Bristol / Bristol, England</td>
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<tr>
<td>June 10-12</td>
<td><a href="https://tinyurl.com/y88g7it8r">https://tinyurl.com/y88g7it8r</a> Short Course: Mendelian Randomization / University of Bristol / Bristol, England</td>
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<td>June 10-14</td>
<td><a href="https://tinyurl.com/y67wy3rl">https://tinyurl.com/y67wy3rl</a> Conference: CSTE 2018 / Council of State and Territorial Epidemiologists / Palm Beach, FL</td>
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<td>June 10-14</td>
<td><a href="http://tinyurl.com/jgwl7w8">http://tinyurl.com/jgwl7w8</a> Summer Program / Harvard University / Boston, MA</td>
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<td>June 11-13</td>
<td><a href="https://tinyurl.com/y6dpn3y">https://tinyurl.com/y6dpn3y</a> Conference: Genomic Epidemiology of Malaria / Wellcome Trust / Cambridge, England</td>
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<tr>
<td>June 11-22</td>
<td>Summer Program: Summer Institute in Infectious Disease and Global Health</td>
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<tr>
<td>June 13-15</td>
<td>Conference: APIC 2018 / Association for Professionals in Infection Control</td>
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<tr>
<td>June 15-17</td>
<td>Conference: Conference on Epidemiological Birth Cohort Studies</td>
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<tr>
<td>June 15-18</td>
<td>Conference: 2018 Student Conference</td>
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<td>June 16-20</td>
<td>Workshop: Observational Epidemiology</td>
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<td>June 18-20</td>
<td>Short Course: Applied Epi Info Training</td>
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<td>June 18-22</td>
<td>Short Course: Genetic Epidemiology</td>
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<td>June 18-22</td>
<td>Short Course: Genomic Epidemiology of Infectious Diseases</td>
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<td>June 18-22</td>
<td>Summer Program: 31st Residential Summer Program in Epidemiology</td>
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<tr>
<td>June 18-22</td>
<td>Summer Program: Summer Program in Population Health</td>
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<tr>
<td>June 18-29</td>
<td>Short Course: Introduction to Infectious Disease Modeling</td>
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To add your event to our calendar or place an ad for your event please go to [http://epimonitor.net/Post-an-Event.htm](http://epimonitor.net/Post-an-Event.htm)

Full year online calendar: [http://epimonitor.net/Events.htm](http://epimonitor.net/Events.htm)
Printable 2018 Calendar: [https://tinyurl.com/y95pm5n](https://tinyurl.com/y95pm5n)
# Near Term Epidemiology Event Calendar

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<td>June 19-21</td>
<td><a href="https://tinyurl.com/y8j368j8">https://tinyurl.com/y8j368j8</a></td>
<td>Conference: Advancing Brain Tumor Epidemiology / Brain Tumor Epidemiology Network / Copenhagen, Denmark</td>
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<td>June 24-26</td>
<td><a href="https://tinyurl.com/y84ijuup">https://tinyurl.com/y84ijuup</a></td>
<td>Conference: 2018 Annual Research Meeting / Academy Health / Washington, DC</td>
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<td>June 26 - July 14</td>
<td><a href="https://tinyurl.com/y76m4da9">https://tinyurl.com/y76m4da9</a></td>
<td>Short Course: Introduction to Epidemiology &amp; Medical Statistics / London School of Hygiene &amp; Tropical Medicine / London, England</td>
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<td>June 25-July 6</td>
<td><a href="https://tinyurl.com/y8e222mh">https://tinyurl.com/y8e222mh</a></td>
<td>Summer Course: Introduction to Epidemiology &amp; Biostatistics / European College of Veterinary Public Health / Bern, Switzerland</td>
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<td>June 26-27</td>
<td><a href="https://tinyurl.com/y9pq6f4z">https://tinyurl.com/y9pq6f4z</a></td>
<td>Conference: 1st International Meeting on Teaching Epidemiology / University of Zurich / Zurich, Switzerland</td>
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<td>June TBA</td>
<td><a href="https://tinyurl.com/yaugxs5e">https://tinyurl.com/yaugxs5e</a></td>
<td>Short Course: Introduction to Causal Interference / Harvard University / Boston, MA</td>
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<td><a href="https://tinyurl.com/y7yw5ul7">https://tinyurl.com/y7yw5ul7</a></td>
<td>Short Course: Statistical Analysis with Missing Data / London School of Hygiene &amp; Tropical Medicine / London, England</td>
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## July 2018

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<td>July 2-16</td>
<td><a href="http://tinyurl.com/h74x2kl">http://tinyurl.com/h74x2kl</a></td>
<td>Summer School: Social Determinants of Health / University College London / London, England</td>
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<td>July 4-6</td>
<td><a href="https://tinyurl.com/yb38guzh">https://tinyurl.com/yb38guzh</a></td>
<td>Conference: European Congress of Epidemiology 2018 / Multiple Sponsors / Lyon, France</td>
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<td>July 8-20</td>
<td><a href="https://tinyurl.com/y8yfsh8g">https://tinyurl.com/y8yfsh8g</a></td>
<td>Summer Program: Advanced Epidemiology &amp; Preventive Medicine / Tel Aviv University / Tel Aviv, Israel</td>
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<td>July 8-27</td>
<td><a href="https://tinyurl.com/h882ocw">https://tinyurl.com/h882ocw</a></td>
<td>Summer Program: Summer Session in Epidemiology / University of Michigan / Ann Arbor, MI</td>
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<td>July 9-12</td>
<td><a href="https://tinyurl.com/y7xfrdub">https://tinyurl.com/y7xfrdub</a></td>
<td>Short Course: Health Protection Principles &amp; Practice / University of Bristol / Bristol, England</td>
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<td>July 9-13</td>
<td><a href="https://tinyurl.com/ydbophsh">https://tinyurl.com/ydbophsh</a></td>
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<td><a href="https://tinyurl.com/yc5mkuth">https://tinyurl.com/yc5mkuth</a></td>
<td>Summer Program: 10th Summer Program - Infectious Disease (SSMID-Summer Institute in Statistics and Modeling in Infectious Diseases) / University of Washington / Seattle, WA</td>
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<td><a href="https://tinyurl.com/y8r8tmkl">https://tinyurl.com/y8r8tmkl</a></td>
<td>Conference: Epidemiology of Aging / Rand / Santa Monica, CA</td>
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<td>July 13</td>
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<td>Short Course: Epidemiology Concepts Applied to Outbreak Investigation / University of Bristol / Bristol, England</td>
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<td>July 16-17</td>
<td><a href="https://tinyurl.com/y7ttm7fq">https://tinyurl.com/y7ttm7fq</a></td>
<td>Short Course: Data Linkage / University of Bristol / Bristol, England</td>
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<td>July 16-20</td>
<td><a href="https://tinyurl.com/y8z9u9l8">https://tinyurl.com/y8z9u9l8</a></td>
<td>Conference: 1st International Symposium on Lifecourse Epidemiology / The Lorentz Center / The Netherlands</td>
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<td>July 22-August 3</td>
<td><a href="https://tinyurl.com/jeaqvbo">https://tinyurl.com/jeaqvbo</a></td>
<td>Short Course: Epidemiology &amp; Prevention of Cardiovascular Disease &amp; Stroke / American Heart Association / Tahoe City, CA</td>
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Applications are invited for a faculty appointment in the Department of Epidemiology and Biostatistics. We seek a colleague who will build a program of independent research in cancer epidemiology in a multidisciplinary collaborative environment located in a major academic cancer center.

The MSK environment encourages and provides unparalleled opportunities for fostering multi-disciplinary collaborations with clinicians, geneticists, pathologists, biostatisticians, cancer biologists and others involved in cancer research as well as patient care. Our large patient population, coupled with the extensive core facilities and distinguished research tradition provides exciting opportunities and a dynamic environment for the creation of an independent research program in epidemiology. Unique features of the institution include access to considerable numbers of rare cancer types, patients with double malignancies or other known genetic syndromes, and rapid access to large populations of patients with more common types of cancer. There are also numerous opportunities to build upon and expand existing on-going epidemiologic investigations.

Candidates should hold a PhD or an MD, and should have post-doctoral research training. Any level of experience will be considered, with the appointment at an appropriate academic rank. MSKCC is an equal opportunity employer with generous compensation and benefits packages. Please send a cover letter, CV, research statement, and contact information for 3 references to the address below. Information about the Department is available at: http://www.mskcc.org/research/epidemiology-biostatistics/epidemiology.

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