

**Davidson Fellow**  
**Caleb Kumar**  
\$25,000 Scholarship Recipient



**Personal Info**

Age: 15  
Blaine, Minnesota

**School, College and Career Plans**

A rising junior at Breck School, Caleb hopes to attend Stanford University and learn to implement computer-based applications in the field of medicine.

**Davidson Fellows Submission: Science**

In his project, "Designing a Java Program to Diagnose Bladder Cancer," Caleb developed an algorithm that automates the diagnosis of bladder cancer. Bladder cancer is on the rise with more than 71,000 new cases in 2009. By first identifying indicative bladder cancer cellular characteristics, Caleb programmed morphometric algorithms to quantitatively examine the

images, of bladder cells and then engineered a Java neural network that differentiates cancerous cells from normal cells based on shape, color and curvature. Caleb's software is accurate, quick and inexpensive compared to current methods, and has the potential to provide faster, cheaper and more precise diagnoses of cytological diseases.

**Biography**

Caleb could count before he could spell! Math was always his forte and at nine, he was taking courses at the local community college and at 11 he was admitted to the University of Minnesota Talented Youth Math program. At 13 Caleb graduated with honors from North Hennepin Community College with an associate's degree.

Caleb decided he wanted to make a difference in the lives of people suffering from bladder cancer after learning about the debilitating and painful effects of the disease. The American Cancer Society showed that the survival rate of bladder cancer is around 95 percent with a quick and accurate diagnosis, however if the cancer spreads and treatment is delayed, the survival rate drops to just 6 percent. Caleb spent the entire summer of 2010 immersed in his investigations under the guidance of the head of science at his school as well as the medical director of Access Genetics.

This academic year, Caleb will be the captain of the advanced science research team at his school. Last year he was the programming captain of the Breck Robotics team and member of the Quiz Bowl finalist team. Caleb enjoys playing the piano and is a member of his school's marimba band. He also plays tennis and ping pong.

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**Davidson Fellow  
Caleb Kumar  
(cont.)**

- 2011 Davidson Fellow
- 2011 Adventures of the Mind Invitee
- 2011 Breck Science Award of Excellence
- 2011 Breck Cum Laude Society Paper Award
- 2011 Minnesota State Department of Education Scholar of Distinction in Mathematics Award
- 2011 Breck School Academic Award for Superiority in Performance and Achievement
- 2011 NAQT Quiz Bowl Nationals Breck team member
- 2011 First Robotics National Competition Breck team programming captain
- 2011 Twin Cities Science Fair Grand Prize Research Paper Competition
- 2011 Twin Cities Science Fair Intel Excellence in Computer Science Award
- 2010 Completed University of Minnesota Talented Youth Math Program
- 2010 Breck School Science Departmental Distinction Award for Outstanding Achievement in Science
- 2009 Johns Hopkins University Center for Talented Youth (CTY) Award for High Honors in the International Mathematics and Verbal Talent Search
- 2009 Phi Theta Kappa Honor Society Student Life Award for Leadership and Academic Excellence
- 2009 Phi Theta Kappa Honor Society Community Service Award
- 2009 Associates Degree from North Hennepin Community College (Minnesota Colleges and Universities' youngest graduate)
- 2008 Recognized by Johns Hopkins University CTY as a Student of Exceptional Talent

**Community Activities**

Caleb volunteered in Phi Theta Kappa Honor Society as the treasurer. He was involved in the Phi Theta Kappa "Books for Africa" program that sends used textbooks to Africa and the "Go Green" program. Along with members of his church, Caleb visits retirement homes and plays music. Caleb designed a website "Stronger after Stroke" to provide information to teens who are recovering from stroke.