

Irene Ayako Uchida

cytogeneticist

World famous Down syndrome researcher

"Do your best no matter what you do even if it's a menial job."

The Person

Birthplace Vancouver, BC

Birthdate April 8, 1917

Residence Burlington, Ontario

Office Department of Pediatrics, McMaster University,
Hamilton, Ontario

Family Members

¥ Father Sentaro

¥ Mother Shizuko

Title Professor Emeritus, Depts. of Pediatrics and Pathology, McMaster U. Director of Cytogenetics, Oshawa General Hospital

Status Retired--but still interested in the effect of radiation on chromosome division as shown in Down syndrome, spontaneous abortions and other syndromes, resulting from having the wrong number of chromosomes.

Awards

¥ Ramsay Wright Scholar, U. of T., 1947

¥ Woman of the Century 1867-1967,

¥ National Council of Jewish Women,

¥ Manitoba Annual Queen Elizabeth II Lectures,

¥ Canadian Pediatric Society, First invited speaker

¥ Queen Elizabeth II Speaker, Children's Hospital, Winnipeg, 1971

¥ 25 Outstanding Women, International Women's Year,
Ontario Government, 1975

¥ 1000 Canadian Women of Note 1867-1967,

¥ Media club of Canada and Women's Press Club of Toronto, 1983

¥ Officer, Order of Canada, 1993

¥ Founder's Award--Canadian College of Medical
Geneticists, 1994

Degrees

¥ B.A. University of Toronto, 1946

¥ Ph.D. University of Toronto, 1951

Mentors Curt Stern (geneticist), Bruce Chown (blood group specialist)

Character Hard worker, feisty, jovial, gracious

Favourite Music Beethoven's Violin concerto

Other Interests

¥ Violin

¥ Piano

¥ Art

¥ Photography

The Story

Uchida has been asked to join the morning hospital rounds at Children's Hospital in Winnipeg. It's around 1960. She's talking about the symptoms of trisomy of the 18th chromosome--having three #18 chromosomes instead of the normal two--when a doctor named Jack Sinclair raises his hand and says, "Hey, I think we have one of those on the 4th floor."

He takes her up to the ward right away and they get a blood sample and add some anticlotting agent. She immediately goes to work to identify the chromosomes. This was something very new, and had never been done by anybody in Winnipeg.

First she lets the red blood cells settle in the vial, then she takes the white blood cells off the top with a pipette. She puts them in a glass container about 1" by 2.5" long containing a medium where they grow and multiply for three days inside an incubator. Then she takes out the liquid and centrifuges it down, then fixes the cells with acetic acid solution, then drops them onto a glass slide so the cells break and spill out their chromosomes. She stains this and looks for the chromosomes under the microscope.

The room she's in has the vinegary smell of acetic acid. Low tables by the windows have lots of microscopes with technicians in white lab coats seated at most of them. High benches where they make their preparations are over along the opposite wall. Uchida was able to identify the chromosomes that day as being 18 trisomy and this was a first for Winnipeg and Canada.

History

Irene Uchida was born in Vancouver, BC. Her father, who was brought to Canada as a young man, ran a Japanese stationery and book store and was chairman of the board of the Alexander Language School.

She joined Canadian Girls in Training at the Powell Street United Church. She served as organist for services and choir work, and was also in demand as pianist for meetings as she could play any request by ear.

At UBC she was a member of the Japanese Students Club, Cosmopolitan Club and a violinist in the UBC orchestra which provided the music for their annual productions of Gilbert and Sullivan operettas. She also served as a reporter for The New Canadian, a weekly Japanese Canadian newspaper in Vancouver. During WWII, she was very active in the Japanese Canadian Citizens for Democracy which played a vital role for the Japanese community in Toronto and nationally as well. This was a period of great anxiety for all the Japanese who were uprooted from their homes in BC by an Order-in-Council of the Federal Government.

In 1942 she was evacuated from her comfortable home in Vancouver to Christina Lake, a self-supporting centre of the Japanese, but was called shortly afterward to act as principal of the largest Japanese camp school in the Kootenays at Lemon Creek. Her innovative ideas developed unusual programs for extracurricular activities which did much to stimulate the youth in creative pastimes.

Two years later she moved to continue her education at Victoria College (University of Toronto), graduating in 1946 with a BA and also winning the Ramsay Wright Scholarship. Although she had planned to take up Social Work, she was persuaded by one of her professors to enter the field of genetics.

In 1951 Dr. Uchida received her PhD in Zoology from the U of T and began her career as a Research Associate at the Hospital for Sick Children in Toronto. Her work in genetics involved the study of twins, mongolism, children with congenital heart diseases and those with a variety of other abnormalities. The studies on twins are still ongoing.

In 1959, while working with *Drosophila* fruit flies at the U of Wisconsin on a Rockefeller Fellowship, she turned her attention to human chromosomes. When scientists in France discovered that mongoloids had an extra chromosome (47 instead of 46), Dr. Uchida decided to try to learn the cause of the extra chromosome. She was appointed Director of the Dept of Medical Genetics at the Childrens Hospital, Winnipeg, in 1960.

In her first study of human chromosomes, Dr. Uchida found that there appeared to be an association between maternal radiation and Down syndrome (mongolism). Then in 1969 with a Medical Research Council grant she went as a visiting scientist to the University of London and Harwell, England, to study the technique for analyzing the chromosomes of mouse ova.

Dr. Uchida continued her research on the effects of radiation on humans and mice at the McMaster University Medical Centre, as well as carrying out her teaching duties as a professor. As Director of the Cytogenetics Laboratory, she had responsibilities which included the diagnosis of chromosome abnormalities in patients with congenital abnormalities, mental retardation and other genetic diseases as well as prenatal diagnosis of chromosome anomalies. She was the geneticist who worked with doctors on the Genetic Counseling Program that she initiated at the McMaster Medical Centre. She has published papers on the effects of radiation, abnormalities in chromosomes,

etc. She has been invited to speak in many countries and is a member of various provincial, national and international scientific organizations.

The Science

Cytogenetics is the study of chromosomes in cells. It concentrates on the behaviour and identification of chromosomes.

1. Banding

Our 23 pairs of chromosomes have tens of thousands of genes that carry the information needed to create a unique person. For each pair, one comes from your Dad, the other from your Mom. The bands indicate different types of DNA. Geneticists use the bands to match the pairs.

2. X & Y chromosomes

You can tell by Jodi's two X chromosomes that she is a girl. Boys have one X and one Y chromosome.

3. Chromosome 21

About 1 child in 700 is born with Down syndrome. It's caused by the accidental tripling of chromosome 21 during conception. Normally you have 23 pairs of chromosomes. Other genetic diseases are caused by tripling of number 13 or 18. This is called "trisomy". People with trisomy of chromosomes 13 or 18 usually die as fetuses, resulting in miscarriages. Those who are born alive do not usually live more than a year. To find out more about human genetic diseases visit the WebPath database of cytogenetic diseases.

4. Jodi Special Olympics champion and actor Jodi Kaczur with actor Arnold Schwarzenegger.

Down syndrome people are not so handicapped as people think. They are very happy, generally affectionate and always nice people.

Activity

Try to pair up chromosomes from a typical spread that cytogeneticists routinely examine and sort under a microscope. Either click the "Game" button to go to the Chromosome Pairing game or you can download the chromosome spread available at the GCS website at <http://fas.sfu.ca/css/gcs/scientists/Uchida/uchida.html>. Try to see if this person has Down syndrome or some other genetic disease.

Mystery for Next Generation

Find out how to inactivate one of the chromosomes in a 'tri' individual. Since this happens naturally in all women--one of their X chromosomes is always inactivated--this technique might "cure" some of these genetic diseases in the parent or at an early embryonic stage.

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