You're Invited!

By Msc II to the inauguration ceremony of

STEMISTRY

On

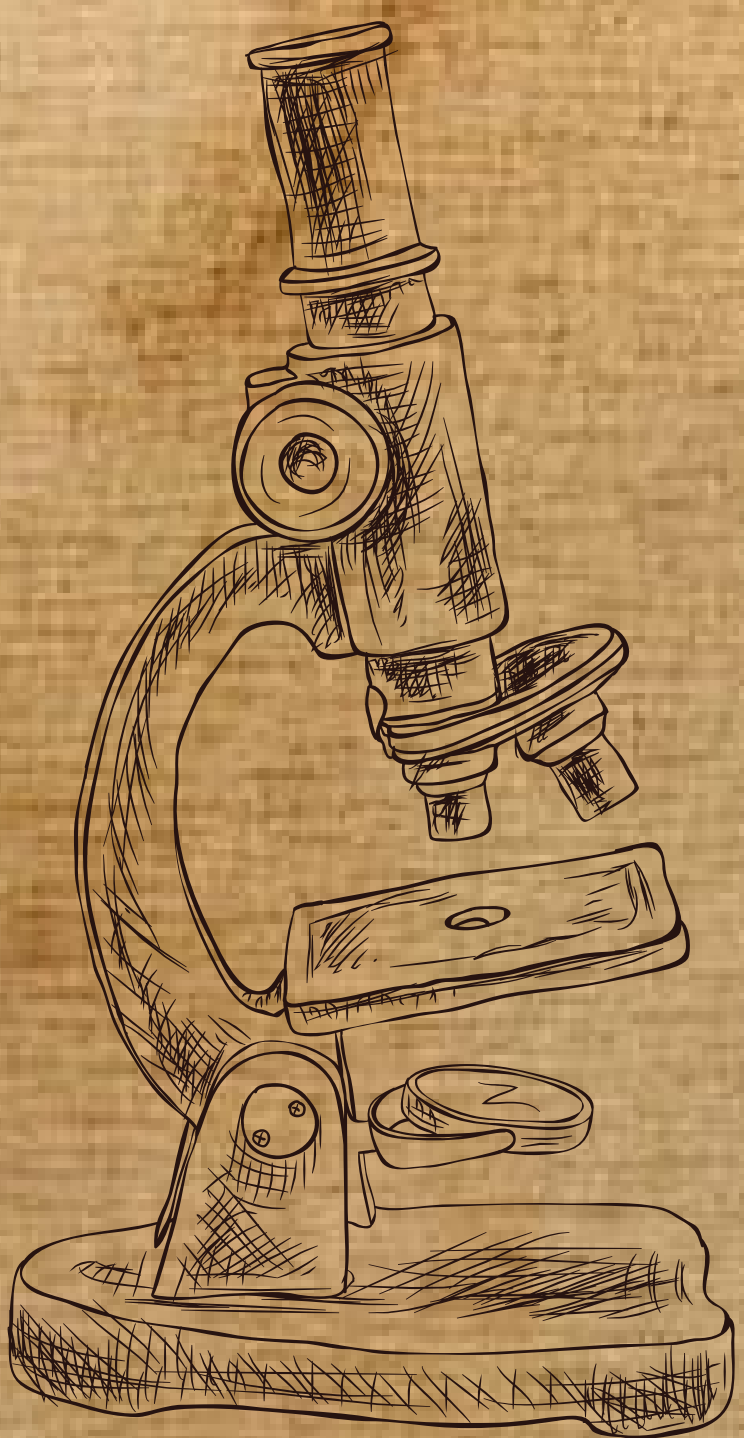
18th August 2022

At

BIOTECHNOLOGY DEPARTMENT

STEMISTRY

मूलकोशिकानां जगति स्वागतम्..



Introduction

Discovery of stem cells

The term “stem cell” makes its first appearance in the scientific annals by way of Ernst Haeckel in 1868. The German biologist used the term to describe the above-mentioned phenomenon of a fertilized egg becoming a fully functioning adult organism. He also used the term – which he referred to as a Stammzelle – to refer to the ancestor cell of all living things. However, this meaning has become obsolete today.
In 1886, William Sedgwick applied the term to the growing parts of plants, which only regenerate at certain points of the organism.

Artur Pappenheim

In 1905, Artur Pappenheim created an illustration of stem cells that anyone familiar with their pattern and function would recognize today. It shows the originating cell sitting in the middle, with the increasingly specialized cells fanned out around it. The illustration not only demonstrates the one master cell but the fact that it gives rise to other cells that are themselves master cells for further specialization as well.

Alexander Maximow

In 1909, Russian Alexander Maximow proposed a theory that all blood cells come from a single ancestor cell, an idea we now know is true. Blood cells arise from hematopoietic stem cells, capable of making everything from red blood cells that carry oxygen to white blood cells that fight off pathogens and toxins, keeping the body free of damaging substances

Florence Sabin

In 1936, the American Florence Sabin stated in no uncertain terms that the various types of white blood cells of rabbits all originated in a master cell. They also report that there exist stem cells in the marrow. They further stated that radiation can damage them, that damaged cells can lead to anemia, and that certain types of white blood cell look almost like lymphocytes, but not quite. This last observation indicates a less specialized nature and therefore the ability to specialize further.

Leroy Stevens

In 1953, American researcher Leroy Stevens discovered that testicular tumors in mice contained a wealth of different undifferentiated cells, including those that lead to bone, hair, and more

E. Donnall Thomas

In 1957, E. Donnall Thomas performed a successful bone marrow transplant. This won him a Nobel Prize. Bone marrow transplants become a standard procedure for both adults and children. Physicians still use them today to respond to a variety of cancers.

James Till and Ernest McCulloch

In 1963, Canadian doctors Dr. James Till and Ernest McCulloch published a paper demonstrating that master blood cells in mice differentiated into distinct lines: the erythrocytic, granulocytic, and megakaryocytic series. This proved that stem cells exist (although interestingly, the scientists never used the term, which was by then well established), and identifying how they differentiated was indeed a huge step forward.em today to respond to a variety of cancers.

NOBEL PRIZE FOR STEM CELL BIOLOGY

As stem cells represent an exciting area of medicine due to their potential to regenerate and repair damaged tissue and they help to explain how some functions of the body work, and how they sometimes go wrong, research on them has revolutionized the field of Medicine.
Stem cells have also shown promise for treating some diseases that currently have no cure. The field of stem cell biology is moving extremely rapidly as the concept and potential practical applications have entered the mainstream.

Despite this worldwide intensity and diversity of endeavor, there remains a smaller number of definable leaders in the field, and this volume brings most of them together. Considering the importance of stem cells, various scientists have won Nobel Prize for their efforts to bring astonishing novelties for the same.

Sir Martin Evans, PhD, FRS
Nobel Prize for Medicine 2007

Sir Martin is credited with discovering embryonic stem cells, and is considered one of the chief architects of the field of stem cell research. His ground-breaking discoveries have enabled gene targeting in mice, a technology that has revolutionized genetics and developmental biology, and have been applied in virtually all areas of biomedicine —from basic research to the development of new medical therapies.
Among other things, his research inspired the effort of Ian Wilmut and his team to create Dolly the cloned sheep, and Jamie Thomson's efforts to isolate embryonic stem cells from human embryos, another of the great medical milestones in the field of stem cell research. Professor Evans was knighted in 2004 by Queen Elizabeth for his services to medical science.

The turning point in stem cell therapy appeared in 2006, when scientists Shinya Yamanaka, together with Kazutoshi Takahashi, discovered that it is possible to reprogram multipotent adult stem cells to the pluripotent state. This new form of stem cells was named iPSCs. The turning point was influenced by former discoveries that happened in 1962 and 1987. The former discovery was about scientist John Gurdon successfully cloning frogs by transferring a nucleus from a frog's somatic cells into an oocyte.

2

Sir John B. Gurdon
The Nobel Prize in Physiology or Medicine 2012

British developmental biologist, who was the first to demonstrate that egg cells are able to reprogram differentiated (mature) cell nuclei, reverting them to a pluripotent state, in which they regain the capacity to become any type of cell.
Our lives begin when a fertilized egg divides and forms new cells that, in turn, also divide. These cells are identical in the beginning, but become increasingly varied over time. It was long thought that a mature or specialized cell could not return to an immature state, but this has now been proven incorrect. In 1962, John Gurdon removed the nucleus of a fertilized egg cell from a frog and replaced it with the nucleus of a cell taken from a tadpole's intestine. This modified egg cell grew into a new frog, proving that the mature cell still contained the genetic information needed to form all types of cells.

3

Shinya Yamanaka
The Nobel Prize in Physiology or Medicine 2012

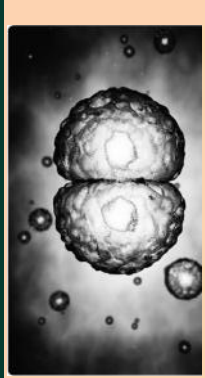
Mr. Yamanaka showed that a surprisingly simple recipe could turn mature cells back into primitive cells, which in turn could be prodded into different kinds of mature cells. In 2006, Shinya Yamanaka's work again took the scientific community by surprise and changed the way researchers think about how cells develop.Yamanaka showed that adult, fully specialised mouse cells could be reprogrammed to become cells that behave like embryonic stem cells – so-called induced pluripotent stem cells, which can develop into all types of cells in the body.

The History of stem cells Timeline

The first bone marrow transplant 1970-1980

1970

Santos began studying in the 1970s, some bone marrow recipients. About 20 percent of bone marrow transplant patients ended up recovering their own marrow instead of the donor marrow. He eventually discovered that unlike total body radiation, which wipes out a patient's entire immune system, cyclophosphamide only kills blood cells and leaves the blood stem cells intact.



1972

In 1972, Thomas performed the first successful bone marrow transplant on a patient with aplastic anemia using Santos' chemotherapy approach. Since that first successful surgery more than 30 years ago, bone marrow transplants using Santos' preparatory regimen become the treatment of choice for everything from cancers to genetic diseases of the blood

1978

Cord blood stem cells were discovered in 1978, and after the first cord blood transplant in 1988, the cord blood banking industry was formed.

1981

Martin Evans of Cardiff University, UK, then at the University of Cambridge, was the first researcher to isolate embryonic stem cells from mice in 1981. he was awarded the Nobel Prize in Medicine for his in discoveries concerning embryonic stem cells and DNA recombination in 2007.

1993 The first unrelated cord blood transfer

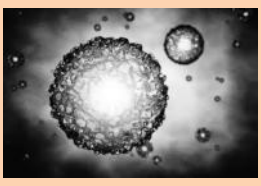
1993

First unrelated cord blood transplant in the world was performed by Dr. Joanne Kurtzberg at Duke University's Pediatric Blood and Marrow Program. It was performed in a 3-year-old child with refractory T-cell acute lymphoblastic leukemia utilizing a 4/6 matching cord blood unit from the New York Blood Center. While this child engrafted, he later died of interstitial pneumonitis. A second child, also with refractory leukemia, transplanted with a 4/6 matched cord blood survived more than 15 years later in remission with full donor chimerism, normal immune function and no evidence of graft-versus-host disease (GvHD).

Embryonic stem cells at the frontier 1995

1995

James Alexander Thomson worked with rhesus monkeys , leading to the publication of the first paper on deriving primate embryonic stem cells. The paper, "Isolation of a Primate Embryonic Stem Cell Line," appeared in the August 1995 issue of the Proceedings of the National Academy of Sciences of the United States of America. Studying mice and monkeys allowed Thomson to gain an understanding of mammalian embryo development, but his chief curiosity was human embryo development. Before Thomson and his team isolated primate embryonic stem cells, the possibility of isolating human embryonic stem cells seemed far off. Thomson's 1995 breakthrough, however, placed human embryonic stem cells at the new frontie



1996 Dolly the sheep

1996

On July 5, 1996, Dolly the sheep—the first mammal to have been successfully cloned from an adult cell—is born at the Roslin Institute in Scotland.
The cloned lamb was given the name Dolly Parton after the singer and actress. It was initially known as "6LL3." One of the stockmen who helped with her birth apparently came up with the name after learning that the animal was cloned from a breast cell. A six-year-old ewe's udder was used to collect the cells, which were then cultured in a lab using microscopic needles in a procedure that was initially applied to human fertility treatments in the 1970s. After the scientists produced a number of healthy eggs, they were implanted into surrogate ewes. 148 days later, one of the ewes gave birth to Dolly.

Focus shifts to umbilical cord stem cells 2000s

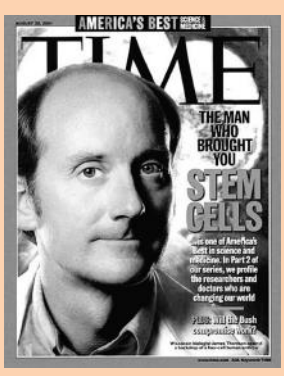
2001

umbilical cord blood has been shown to be therapeutically useful for rescuing patients with bone marrow-related deficits and inborn errors of metabolism. Umbilical cord blood offers advantages over bone marrow because cord blood does not require perfect human leukocyte antigen (HLA) tissue matching, has less incidence of graft vs host disease, and may be used allogenically. In addition, cord blood may be banked, and thus is available for use "off-the-shelf.research labs have published on the isolation and characterization of cells from the umbilical cord. Dr. Davies' lab at the University of Toronto and Dr. Y. S. Fu at the National Yang-Ming University, Taipei. These groups reported that UCM cells are MSC-like cells and are robust. These cells can be isolated easily, frozen/thawed, clonally expanded, engineered to express exogenous proteins, and extensively expanded in culture. Human UCM cells express a marker of neural precursors, nestin, without exposure to differentiation signals. In response to differentiation signals, human UCM cells can differentiate to catecholaminergic neurons, expressing tyrosine hydroxylase TH. Human UCM cells meet the basic criteria established for MSCs described previously.

2006 The Nobel prize

2006

The discovery of induced pluripotent stem cells (iPSCs) by Shinya Yamanaka in 2006 was heralded as a major breakthrough of the decade in stem cell research. Shinya Yamanaka and Kazutoshi Takahashi developed the mouse iPSCs in 2006 through the method of reprogramming: the use of a retrovirus to deliver into a somatic cell(mouse fibroblast), a combination of four reprogramming transcription factors,the iPSCs have a self-renewal capability in culture and can differentiate into cell types from all three germ cell layers (ectoderm, mesoderm, and endoderm). The iPSC technology holds great promise for personalized cell-based therapy, human disease modeling, and drug development and screening.For their remarkable revolutionary discoveries, Shinya Yamanaka and John B. Gurdon were awarded the 2012 Nobel prize in Physiology or Medicine.



Stem cells in therapy 2010 onwards

2019

Recent research reporting successful translation of stem cell therapies to patients have enriched the hope that such regenerative strategies may one day become a treatment for a wide range of vexing diseases. In fact, the past few years witnessed, a rather exponential advancement in clinical trials revolving around stem cell-based therapies. Some of these trials resulted in remarkable impact on various diseases. In this review, the advances and challenges for the development of stem-cell-based therapies are described, with focus on the use of stem cells in dentistry in addition to the advances reached in regenerative treatment modalities in several diseases.

Blog post

Stem cell therapy to treat diabetes

N experimental stem cell therapy designed to reverse the course of Type I diabetes wed patients to go treatment- for months and in one case, ce years, a study released sday said.
Thirteen of the 15 patients who k part in testing the therapy re able to quit the insulin injec- ns that most diabetics depend on l remain insulin-free today, the earchers reported in the *journal he American Medical Association*

not be a life sentence, according to a prominent US diabetes researcher.

Brazilian researcher from the University of Sao Paolo in Ribeirao

enough they could reprogram the body's immune system, allowing

supplemental insulin following treatment and have not had recourse to synthetic insulin since then. Periods of remission range from 36 months for the patiest who had the therapy first to six months for more recent graduates of the trial.

Two other patients needed some supplemental insulin for 12 and 20 months after the procedure, but eventually both were able to wean themselves from the synthetic form of the hormone supplied in daily shots.

One patient went 12 months without shots, but relapsed a year after treatment after suffering a viral infection, and resumed daily insulin injections.

CURE FOR PARKINSONS

Surat

October 15, 2016

For 59 years old Mr. Ashok Kumar, living with Parkinson's disease (PD) for the last 12 years was nothing less than an ordeal. Mr. Kumar who formerly served as General Manager in a private firm, had been leading an active and productive life until he was diagnosed with Parkinson's disease. The progressive neurol his lif follow treatm Howe of und for PD

Mr. Kumar is one of the many Parkinson's patients who have got successfully treated at PNSRC. The Centre which has over 25 years of clinical experience in treating neurological disorders, offers stem cell therapy for neurological, psychiatric and

muscle, liver, brain, sk etc. They are also k progenitors cells since t to creation of new cells.

"Stem cell thera Parkinson's disease collection of stem cells patient's own bone mar

THE TIMES OF INDIA, BHOPAL
TUESDAY, JANUARY 13, 2015

First stem cell therapy performed in Bhopal

Vol No. 25

NEUROGEN TIMES

Stem Cell Therapy treatment for incurable diseases in Mumbai

Two years ago, U.S. Navy personnel and their families assigned to the Atsugi Navy base, home of the U.S.S.

teacher and assistant director of the Orange County Symphony; and Mike Tiffany, bass, a computer engineer.

south of Tokyo — left the home away from home, with its lush green rolling landscape and its multitude of cherry

and entertained the locals for a few fun-filled hours. It turned out that it was just one of many establishments in the city.

WHAT ARE STEM CELLS?

Stem cells are cells found in bone marrow and other organs. They can develop into any type of tissue that exists in the fully developed body. Owing to its regenerative properties and they are far less likely than to be rejected than foreign cells that originated from another source, stem cells offer new hope for a variety of diseases

There are there are over 37 disorders for which stem cell therapy intervention is on-going including neurological conditions, orthopedics, chronic kidney diseases, COPD and other lung diseases, liver diseases, cardiology, autoimmune disorders, ophthalmology diseases, infertility and cosmetic procedures

Free stem cell transplant for three-year-old boy

TIMES NEWS NETWORK

Ahmedabad: Veer Patel's family members were shattered when they came to know the cost of his treatment. There was no way a farmer from Dabhoi who reared his joint family of 10 members on rotating crop of maize and lentil could shell out Rs 10 to 12 lakh for a stem cell transplant for his son diagnosed with thalassemia major.

The family waited for a year, mulling how to arrange the finances. Finally, the hospital and doctors came to his rescue and offered the entire allogenic stem cell transplant surgery

Kristy Cruise after her treatment

MS sufferer hails 'stem cell miracle'

STEPHANIE BEDO

southeast
uresque and

mecca surfers paradise.
Surfing magnet Burleigh

Among Noosa's greatest swimming."

for bait in a magistrates court

MS patients finding hope in stem cell treatment

article.

Professor Frank Barry, scientific director, Remedi, and Professor Colin McGuckin, president and director, Cell Therapy Research institute, Lyon, France MAURA HICKEY

The day when Irish parents can use stem cell technology to treat their children's future afflictions is still some way off

THE HARDEST CELL

Professor Colin McGuckin, stem cell adviser to Pope Benedict XVI, gave a slick presentation to the media and assembled politicians at a Dublin city centre hotel last Wed-

Susan Mitchell Health Correspondent

the country's maternity hospitals to facilitate cord blood banking.

For scientists, stem cells hold huge promise, and the hope is that, in the future, they will be able to use them to conquer incurable diseases and grow new body parts.

disease and sickle cell disease, to name a few".

The claim that some 70 diseases can be treated using cord blood was reiterated by McGuckin during his presentation last Wednesday, and on radio stations later that day.

The Irish Stem Cell Foundation

What are stem cells?

Experts have likened stem cells to the seeds from which the body's many tissues grow – they are the body's master cells.

Stem cells are extracted from the blood or other

to get a clear picture of which stem cell therapies were readily available today. He expressed concern at the hype that surrounded stem cells in general, when they still had very limited use in clinical practice.

"The companies touting for business are commercial ven-

wrong. It's a practice of pr saring young people to pa significant amount of mon for private use . . . I think not evidence-based."

During his presentatio McGuckin said Ireland m prepare for the future and t stem cells provided a roadm

SCOTLANDonSUNDAY

Award-winning researcher's ste offers hope for Parkinson's cur

Lyndsay Moss
Health Correspondent

cially-treated cells to cure condition.

Dr Tilo Kunath has be

Hoping for a normal life

RUSSIA THE LAST CHANCE FOR MULTIPLE SCLEROSIS RELIEF

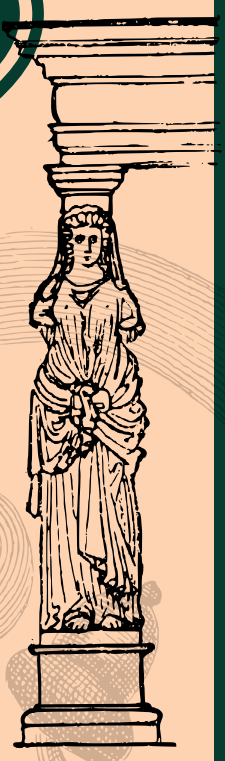
Ellen-Maree Elliot

HOPE and fear are sending Brett Stone 14,064km away from his Manly West home to a hospital in Moscow, Russia, for a controversial

FUNDRAISING DAY

WHAT: Fun, Family, Food & Fitness Day, plus bootcamp, hosted by 2012 *Biggest Loser* winner Margie Cummins
WHEN: 9am, Sunday, June 29

Did you know?

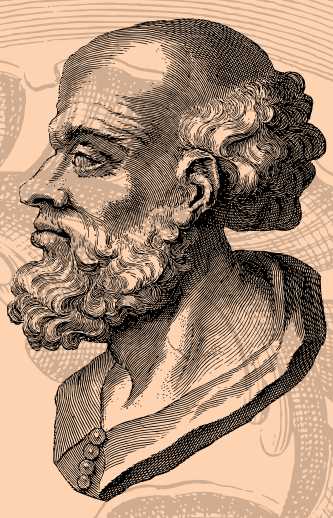


ALL MAMMALS HAVE THEM!

EMBRYONIC STEM CELLS ARE DERIVED FROM EGGS FERTILIZED IN THE LABORATORY, NOT IN A WOMAN'S BODY.

EMBRYONIC STEM CELLS ARE LIKE "STARTER CELLS" THAT CAN BE COAXED INTO BECOMING A VARIETY OF OTHER TYPES OF CELLS.

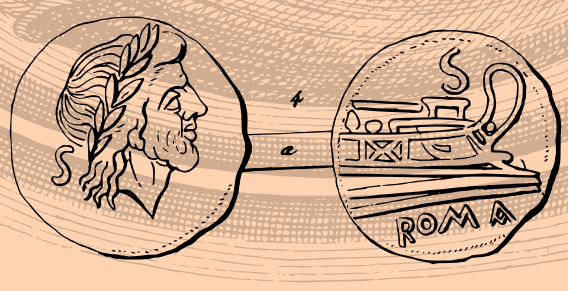
In 1998, scientists first learned how to isolate human embryonic stem cells. They were developed for infertility purposes through in vitro fertilization.



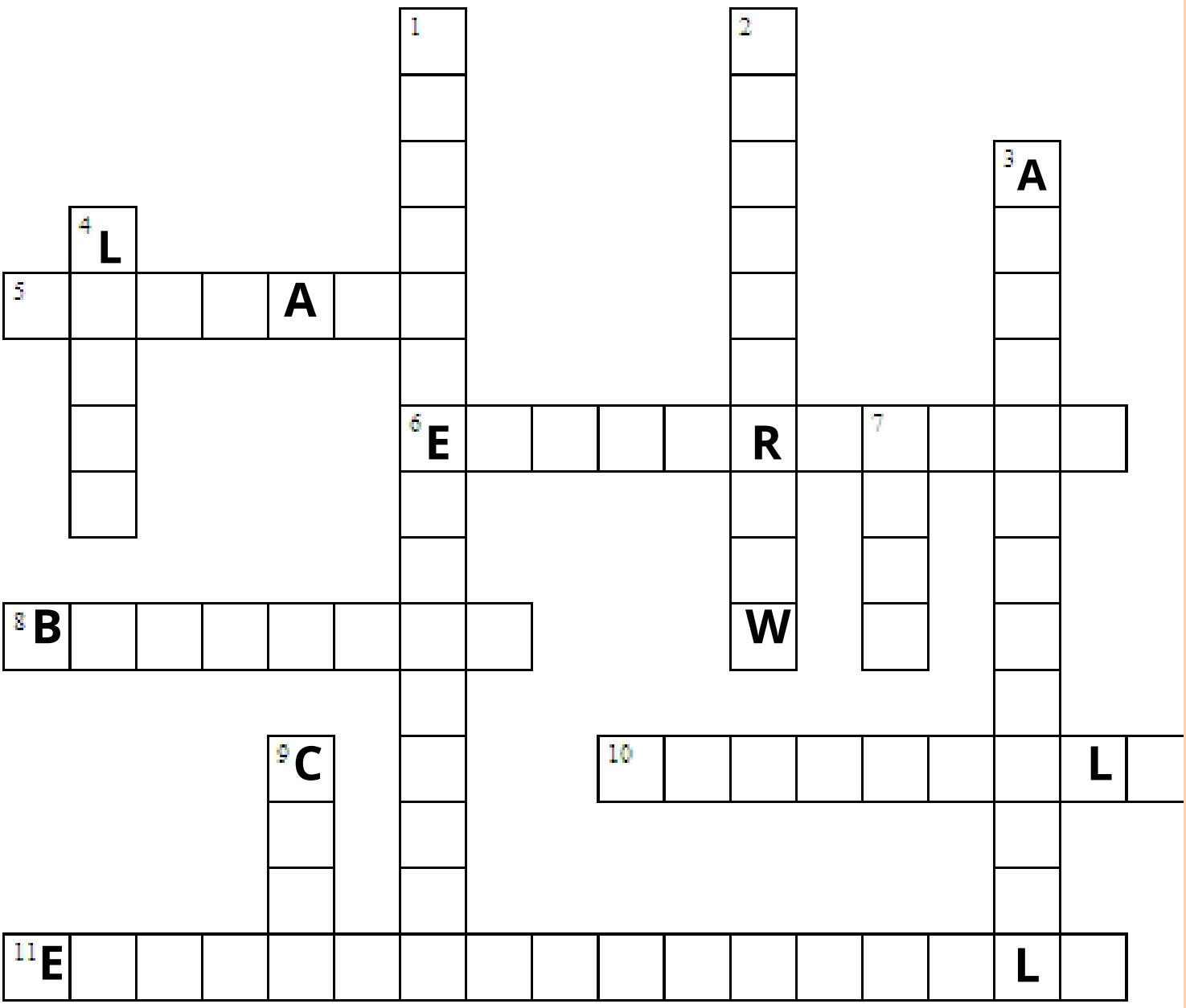
Adult stem cells isolated from our own body are much safer for therapeutic applications than their counterparts.

BONE MARROW AND FAT ARE KNOWN TO BE THE RICHEST SOURCES OF ADULT STEM CELLS, APART FROM CORD BLOOD

DURING PREGNANCY IF A MOTHER SUFFERS FROM ORGAN DAMAGE THE BABY IN HER WOMB SENDS STEM CELLS THE DAMAGED ORGAN



CROSSWORD



ACROSS

(1) make copies of themselves and

(2) make specialized cells like skin cells, red blood cells or liver cells.

(5). Any condition that causes pain, dysfunction and/or death to a person; scientists study stem cells to understand a broad range of these conditions and to find treatments.

(6). Specialized cell that contains haemoglobin, cell type made by blood stem cells.

(8).Granular leucocyte that releases histamine and heparin; involved in some allergic reactions and in inflamation.

(10).Series of events that takes place in a cell leading to its division; scientists study stem cells to understand this process better.

(11).Stem cell found only in very early embryos.

DOWN

(1).The process by which a stem cell becomes a specialized cell type.

(2).Place in the body where you find blood stem cells.

(3).Stem cell found in a fetus, a baby, a child or a grown up person, but not in an early embryo.

(4).Organ that detoxifies the body; scientists want to use stem cells to grow cells found in this organ to test new drugs for treatments.

(7).What your body is made up of; it has an average size of 10 μm and a typical mass of 1 nanogram.

(9).When a stem cell replicates, it makes a ... of itself.

Acknowledgement

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vaishnavi,Charmi, Aaliya

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Facts- Aaliya

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