Over the years there has been much research done to find cures for diseases where conventional medicine has not been successful, and stem cells have become a viable option, say the scientists.

Stem cells are the original building blocks of life, which differentiate into everything that makes up the human body. These can be used to repair or regenerate new blood vessels, cardiac muscle, nerves, bones and other tissues, potentially helping heart-attack victims, patients with brain and spinal-cord injuries, people with osteoporosis, and even those with brain degenerative conditions, such as Alzheimer’s.

Rightly or wrongly, the science of stem cells has long been viewed with a clouded eye and is shrouded in controversy, with many people closing themselves off to the potential that lies within these magical cells.

The reason for this comes down to the simple fact that scientists and doctors initially looked at embryonic stems cells, deemed to be the richest and most abundant of stem cells. But the retrieval process meant the possible termination of human life, and experimentation on unborn foetuses.

Further investigation and research revealed that umbilical cord stem cells are a better source, both morally and ethically, and this has become increasingly popular. These are taken from the umbilical cord and placenta, which are discarded at birth anyway. But again, this has its limitations.

Luckily, for those who don’t still have their umbilical cord stem cells, scientists have found new ways to fight ageing and disease, using the stem cells created from your own body.
WHY ADULT STEM CELLS?

Adult stem cells are found throughout our body and are responsible for repairing our tissue as we age. Bone marrow is rich in haematopoietic (blood) stem cells, which are used to treat mainly blood-related diseases and our fat is rich in mesenchymal stem cells (MSCs). These stem cells can differentiate into many tissues of the body, are extremely robust, can be easily replicated, and have shown remarkable results for both aesthetic and medical conditions.

“Recently, interest in fat-derived stem cells has eclipsed all other stem cell types and these cells, known as adipose-derived stem cells (ADMSC), are progressing rapidly to clinical practice,” explains Dr Stephen Ray, chief scientist at Natural Biosciences SA and senior lecturer in Clinical Physiology at Oxford Brookes University in the UK.

Ray isn’t alone in his thinking. Last year, national and international scientists gathered at the third annual International Fat Applied Technology Society Conference, held in Virginia in the USA, to present findings from 47 research extracts, all suggesting adipose tissue (fat) is a practical and appealing source of stem cells for regenerative therapies of the future.

And in August, the International Stem Cell Institute, considered a worldwide leader in stem cell therapy, released a statement saying that adipose-derived adult stem cell therapy is an extremely effective solution to treat degenerative diseases and conditions. It has been widely accepted in the medical and scientific fields that adult stem cells hold the real key to curing and treating diseases and conditions such as Parkinson’s, Rheumatoid Arthritis, Alzheimer’s, Myocardial Ischemia, Lupus, Multiple Sclerosis, stroke, diabetes Type-1 and Type-2, spinal cord injuries and a host of autoimmune-related conditions. “This is the future direction of medicine,” “Patients suffering with degenerative diseases today have few options, so this medical breakthrough is an important milestone, both for affected patients and doctors treating them,” explains Rita Alexander, executive director for the International Stem Cell Institute, located in San Diego, California.

Dr Ray explains that MSCs are accessible and easier to expand than blood stem cells, in order to use them for treatment. And the retrieval process is relatively easy.

Only 100ml of fat is needed to be extracted from the abdomen, and this procedure is normally done under local anaesthetic. If a patient is getting liposuction done for cosmetic reasons, doctors are recommending more and more that they collect and store these stem cells.

Cord blood is rich in haematopoietic (blood) stem cells, while the cord tissue is rich in mesenchymal stem cells. As soon as they are collected, these cells, as with adult stem cells, start dying, so you need to get them to the lab within 24 hours to ensure maximum viability, which is why local storage is preferable. These stem cells are easily collected and a perfect match for your baby. There is also a one-in-four chance that they will be a match for siblings. Another good reason to collect your baby’s stem cells is that it is extremely difficult to find suitable donors for families of African origin and mixed race marriages, as they are so seriously under-represented in public stem cell banks. There is a one-in-40 000 chance that you will find a match in a public stem cell bank, and if you are lucky enough to do so, there is still a 50 percent chance that your body will reject these cells, which is why autologous transplants are preferable.

Netcells Cryogenics is currently the only local stem cell bank storing cord tissue stem cells. It costs R6 900 to store cord tissue and R13 900 to store cord blood, which is inclusive of 20 years’ storage. Storing your baby’s stem cells is therefore an issue of affordability. If you can afford it, you should do it.

Says Dr Yvonne Holt, medical director of Netcells Cryogenics: “Even though you can access adult stem cells, it is still advisable to store your baby’s stem cells, as cord-derived stem cells have long, healthy telomeres which shorten as we age, resulting in lower levels of proliferation and regenerative potential and efficacy.”
THE PROCESS

Once the fat has been collected, it is taken to a special lab designed to deal with human tissue, where scientists extract the stem cells from the fat. These cells are cultured in special “flasks” (fed nutrients in order to grow to a required number which is adequate for storage and initial therapy) and then cryogenically frozen at -196°C. The best part is that these are your own cells, stored for your personal (autologous) use in the future. As your body recognises these cells, there is little to no risk of rejection.

With all medical breakthroughs come years of research, and for Natural Biosciences SA – a company with expertise in stem cell research and treatment – this was no different. Dr Ray worked out that they only needed to use certain secretory factors of the cell, not the entire cell as previously advocated, to have impressive results with medical treatments.

This is seen as an advancement, as the previous method of transplanting the entire cell brought with it the risk of tumours forming. Ray explains that, as it is only the cell fractionate, there is no risk of this happening, describing it as essentially “cell-free therapy”.

Dr Ray’s team of scientists work with the secretory factors of the cell which help it to “communicate” on an intercellular level. The cell fractionates are used to prepare a therapeutic, which is injected back into the body. This can be done intramuscularly or intravenously for diseases like motor neuron disease, which affects the entire body. Once back in the body, the secretory factors simply do what nature intended them to do: home in on the damaged cells and start to repair them. It’s simply working with basic cell biology and how cells naturally repair themselves – they have just been given a kick-start again.

DO YOUR HOMEWORK

With numerous case studies and clinical trials to back up stem cell treatments, there are still charlatans out there – numerous supplements and serums, which promise the earth, but are short on delivery, the scientists warn.

One product, Swiss Apple Stem Cell Serum, suggests it can reverse skin-ageing, increase the lifespan of human cells, and possibly make lost hair regrow.

Celebs like Helen Mirren and Jennifer Lopez are said to be big fans.

But, Professor Liam Dolan, Sheradian professor of Botany at Oxford University, who specialises in studying plant cells, is sceptical about the product, and was quoted on The Daily Mail’s website as saying: “I don’t see how plant stem cells could interact with human stem cells in this way.”

Dr Daniel Schmid, research director of Mibelle Biochemistry, the Swiss lab which developed PhytoCellTec Malus Domestica [the “magic” ingredient in the serum], explains his apple stem cell extracts have been “shown to improve the maintenance of the characteristics of epidermal stem cells”.

He says: “The extract offers a promise of real skin rejuvenation,” but admits, “the anti-ageing benefit for the skin after topical application could not be confirmed in a clinical trial.”

Dr Carola Niesler, senior lecturer and stem cell research group leader in the Department of Biochemistry at the University of KwaZulu-Natal responds: “Although some supplements have been shown (in small clinical trial-type settings) to have an effect on (for example) stem cell levels in the peripheral blood, it is difficult to extrapolate this to the larger population.

These supplements are usually also not cheap.

It is therefore important to be aware of the fact that they may or may not work, when you buy them.”

TREATMENT

There are three major stem cell transplant centres in South Africa: Netcare Pretoria East Hospital, Constantiaberg Medi-Clinic and Groote Schuur Hospital. Many transplants are done monthly with bone marrow stem cells. Recently, more have been done with umbilical cord blood stem cells, which all engrafted successfully. South African physicians, in the future, will be able to offer more treatment options to their patients.

Natural Biosciences SA is currently treating patients on a compassionate basis in Germany and Switzerland, with good results. Dr Ray has been meeting with doctors in South Africa, so that patients here can be treated locally going forward, instead of having to travel overseas. Natural Biosciences SA is working with Netcells Cryogenics, South Africa’s largest stem cell bank, to do the lab work and stem cell banking.

As recently as March this year, Netcells began offering adult fat stem cell banking, which costs around R15 000.

‘Banking your stem cells is your medical insurance policy for the future’
WHAT DOES THIS MEAN GOING FORWARD?

Right now, today, scientists have learnt how the body should repair itself and can stimulate this repair with stem cells when the body fails to do so. Banking stem cells – whether they be umbilical cord or adult – is a good idea, because you will have them readily available should you ever need them. Using your own stem cells to repair damage done to your body truly is “personalised” medicine – and is set to change the future of medicine, at a rapid pace. As medical science progresses, more and more diseases will become treatable with stem cells, and although you may never use them, banking your stem cells may be your medical insurance policy for the future.

PRACTICAL APPLICATIONS

Dr Ray presented his findings in Cape Town, in March this year, to local aesthetic and plastic surgeons, who are now considering using this technology to help with skin rejuvenation.

In addition, mesenchymal stem cells from adipose tissue have shown increasing success with both aesthetic and medical condition, such as neurology, sports injuries, cardiology, reconstructive surgeries, antioxidant effects and more. They have also shown improvements in dementia, autoimmune and degenerative diseases. Interestingly, people who adopt this treatment for a specific condition sometimes find marked improvements elsewhere in the body.

The cost of stem cell therapy varies according to the disease which is being targeted – some diseases need just one injection during treatment, whereas others may need a few.

Every potential patient under Natural Biosciences SA works with a treating physician and scientist. However, it isn’t a cheap exercise: just the lab work can cost anywhere from £1 000 (R10 000) to over £10 000 (R100 000), as it needs to be done in a completely sealed laboratory.

What can go wrong? The experts suggest that the response from one patient to another with regard to stem cell treatments is different, and success of these treatments depends on the person’s age, general health and the extent of deterioration or damage to the body.