Improving lives

KYRIACOS ATHANASIOU RECEIVES NEMITSAS AWARD FOR 2012

By ***Katherine Pollard***

Larnaca-born scientist Kyriacos Athanasiou has been chosen to receive the 2012 Nemitsas Prize for engineering.

The president of the foundation, Takis Nemitsas, said Athanasiou was selected to receive the prize for his discoveries in Biomedical Engineering Technology which have made a significant contribution to the development of 15 products approved by the US Food and Drug Administration (FDA), which save lives and improve the quality of life for millions of people all over the world.

Athanasiou, who lives in the US, is currently serving as Professor of Biomedical Engineering and Orthopaedic Surgery, Chair of the Department of Biomedical Engineering and Child Family Professor of Engineering at the University of California, Davis, as well as being editor-in-chief of the international journal "Annals of Biomedical Engineering".

Speaking to The Cyprus Weekly, Athanasiou said: "I have received awards from various societies and disciplines and that is always very exciting, but it is particularly exciting for me and I'm particularly pleased to be getting the Nemitsas Prize because it is from the land where I was born and raised and I'm exceedingly happy and proud."

Athanasiou led the first research group which discovered biodegradable scaffolds, a method used for repairing small defects in cartilage in various joints in the body.

Athanasiou said: "The idea was that if I have a small defect on my cartilage, maybe one or two centimetres in diameter, we could go inside the joint, clean up the surface and then implant this biodegradable scaffold, which was the conduit for stem cells in the area, so it would attract the stem cells to move in, populate the scaffold and then essentially synthesise new tissue."

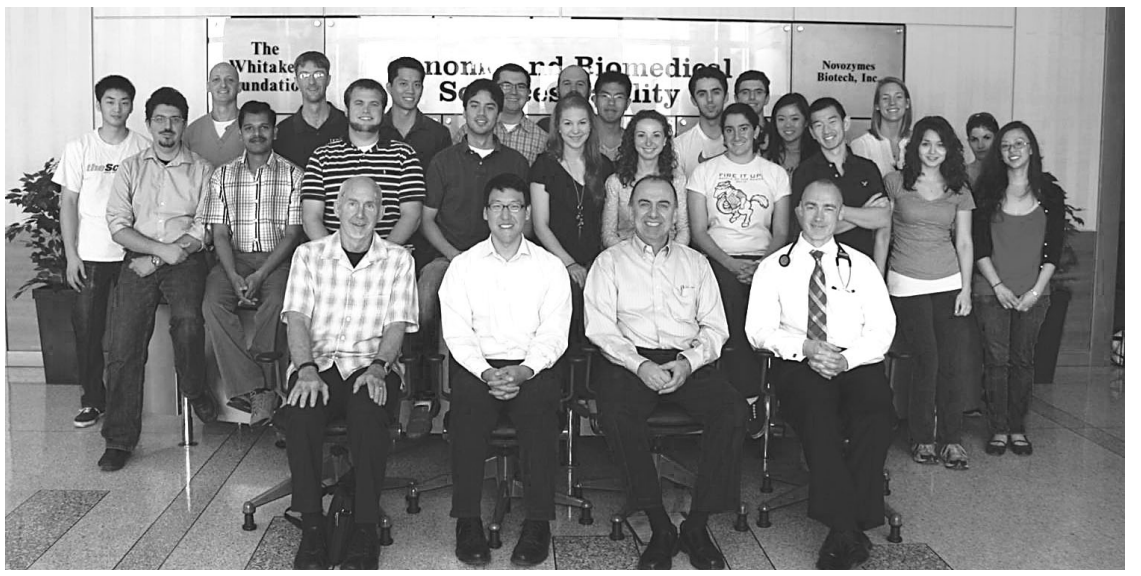
The technology was developed in the early 90s and led to the first FDA-approved product for treating small defects in articular cartilage and used worldwide.

"The reason why this is so important is that if you have a small defect in your knee and you don't treat it that degeneration is irreversible, it only gets worse and the end result is that you have to replace the entire knee with metal and plastic; the idea was that if we could arrest the development of the degradation then we would not need the artificial prosthesis," explained Athanasiou.

Other groundbreaking research carried out by Athanasiou involved a series of projects and products for delivering drugs intraosteously (through the bone) instead of intravenously (through the veins) to patients whose peripheral blood supply shuts down as a result of heat shock, motor vehicle accidents and other kinds of shock.

"As most of our blood is made inside our bones, in the bone marrow, we developed a way to deliver the drugs through the bone itself, from behind the knee, instead of through the veins that are collapsed. The device is small enough to allow you to create an IO (intraosteous) instead of an IV (intravenous) line in the patient."

The method was first used by US troops in Iraq and Afghanistan and it has since been used widely throughout every ambulance and emergency room in the US.



Regenerating tissues

Athanasiou and his team are currently working on the regeneration of tissues of the musculoskeletal system such as cartilage, bone, tendons, and ligaments. In particular they are interested in engineering the various types of cartilage that we have in the body by making tissues to replace diseased tissues in joints such as the knee, the hip, the shoulder, the joints in the hands and feet, as well as the jaw joint (TMJ).

"The Holy Grail in what we do is the making of cartilage and tissue that is mechanically strong and suitable to take all the high stresses and pressures that are generated in the joints," he continues.

As Athanasiou explains, cartilage is the tissue in the joints which experiences extremely high pressure and stress in doing daily activities.

"As we get out of the chair or walk around we generate pressures in our knees and hips that are about 2000 psi (pounds per square inch); to put things into perspective, we have about 30 psi in each tyre of our car, so clearly these are tissues that operate under very strenuous environments. So whatever we make will have the mechanical integrity and strength to be able to take those very high stresses."

The majority of defects in the joints occur after trauma caused by a sports related injury, motor vehicle accidents, or simply the wear and tare that occurs in our joints, so as we get older the continuous wear on the surfaces results in the formation of such defects.

"However, there is a significant set of diseases related to cartilage that are genetic in nature, so people are born with a predisposition toward cartilage degeneration or osteoarthritis, in which case even smaller stresses can create defects," he adds.

Practical outcomes of hands-on research

Addressing the 10th World Hellenic Biomedical Congress in Nicosia yesterday, Athanasiou delivered a keynote lecture entitled "Trail-blazing a commercialisation pathway in academia: From paper-napkin designs to saving lives".

During his lecture he discussed his path over the years in developing products that are based on academic research, while he pointed out that the focus is not only on the theoretical aspect of research but also in the hands-on, practical applications from the outcome of that research.

Commenting on the development of scientific research in Cyprus, Athanasiou noted that Cypriots hold a spectacular place worldwide.

"If you look anywhere in the United States as well as the UK you will find so many exceptional scientists, engineers and physicians that are of Cypriot decent or born and raised in Cyprus doing some of the most recognised work in the area and that stands under multiple fields," he said.

"Over the last five or six years we have also begun to see research carried out in Cyprus that has been recognised worldwide, so there is no doubt that Cyprus has been leaving an indelible mark in science and medicine."

Nonetheless, Athanasiou expressed his concern regarding the impact of the financial crisis on the areas of academic and scientific research.

"I truly hope that Cyprus does not fall into the trap of beginning to cut its support to university-based or institution-based academic research. Those no matter what, need to be funded, supported and amplified because that is a spectacular achievement of Cyprus."

Athanasiou will be receiving his prize at the Presidential Palace on November 27, including a certificate, the Nemitsas Foundation gold medal and a monetary award of €50,000.

The ceremony will be held under the auspices of President Demetris Christofias and is one of in the official events for the Cyprus Presidency of the EU Council.