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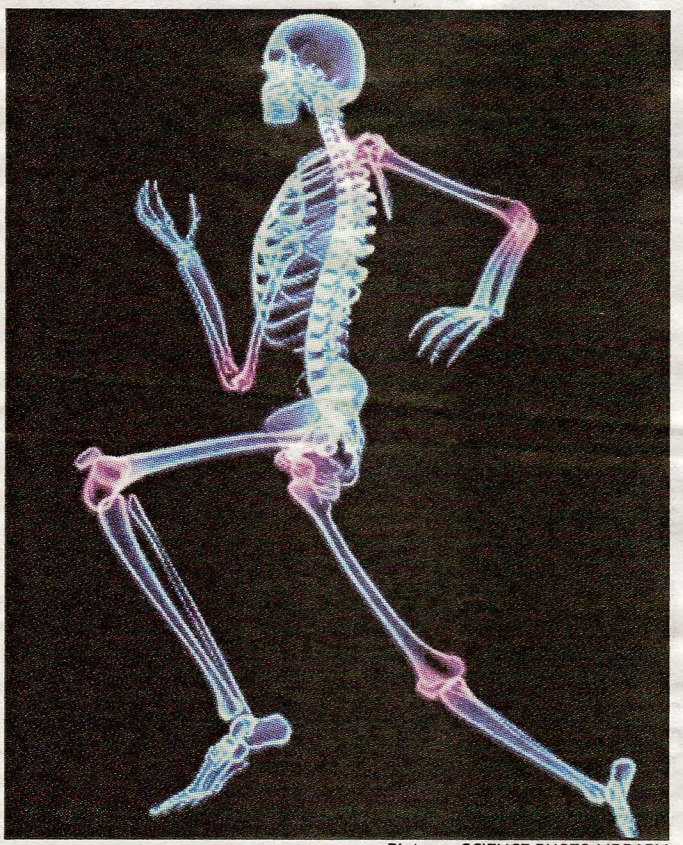
Glass 'bones' that heal broken hips

By JULIA PIERCE



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A GLASS implant being developed by British scientists could revolutionise the treatment for damaged bones. The implant, which dissolves in the body, releases calcium which encourages damaged bones to re-grow.

Normally, a bone that is damaged or broken heals itself. However, if the damage is significant — such as after an accident or following the removal of tumours and cysts — the patient may need a bone graft, where healthy bone is taken from elsewhere in the body.

Bone grafts are also used in dentistry to treat periodontitis — where bone loss at the tooth root causes teeth to fall out.

Every year thousands of British patients undergo bone graft operations; bone is second only to blood in terms of the amount of transplanted material that is used.

Current surgical best practice is to use healthy bone from the hip. However, the procedure can cause post-operative pain at the site of bone removal and involves a long recovery time. Obviously, the bone taken from this area is also in limited supply.

SHOULD more bone be needed, doctors may use animal grafts or bone from bone banks. These bones are not as strong as normal grafts and there is a chance they carry diseases or may be rejected by the recipient.

A patient may require lifetime treatment with expensive immunosuppressant drugs that can also have dangerous side-effects.

The glass implant, which is being developed at Imperial College, London, with the Universities of Kent and Warwick, is designed to act as an immediate replacement for the missing bone, carrying out tasks such as bearing weight.

The implant is made of cloudy-looking glass containing small holes called pores similar to the inner layer of bone, which has a honeycomb-like structure.

These small holes contain calcium, the building block of bone. Once in place, the implant reacts with bodily fluids and gradually dissolves, bonding to existing bone while creating instant support — and a scaffold for new bone to grow.

As it dissolves, the calcium, which is found naturally in some glass, is released exactly where it is needed. The implant dissolves at the same rate the new bone grows.

It releases other elements, too, such as silicon which signals the body's bone growth cells.

The implant is formed from a substance known as Bioglass, which is based on a material invented in the Seventies during the Vietnam War. Scientists developed a glass powder which, when spread on broken bones, formed a bond so strong it could not be removed without breaking the bone.

Technological advances have meant scientists have been able to adapt the material so it releases calcium at the rate at which new bone needs it.

They are now developing a different, less brittle version of the glass so it can flex slightly when under certain pressures such as twisting — this puts more strain on the bone than a straightforward impact would.

The implant, which would be available in various shapes and sizes depending on where it was needed, could be used in areas such as hips that are under great stress. This could be significant for elderly patients, whose bones are slow to heal as the number of so-called 'active' cells — cells that allow healing —reduces with age.

Every year thousands of elderly patients suffer broken hips and have to undergo hip replacements; it's thought that the new implant might prevent the need for this by encouraging healthy bone to grow in weakened areas.

GLASS implants could also help in the treatment of cleft palates. Repairing these with materials that respond to the body will allow the repair site to change as the child grows, reducing the need for further surgery.

The grafts are expected to undergo clinical trials within five years.

Dr Michael Laverick, a consultant orthopaedic surgeon at the Ulster Hospital, Belfast, and a former president of the British Limb Reconstruction Society, said: 'The idea that you could create a replacement part for a bone defect that would function almost immediately, but gradually evolve into normal bone, is truly innovative.

'It will enhance and expand the field of limb reconstruction and other surgical specialities.'