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*a new way of thinking about everyday life
in medicine and in the clinic*

STIMULI FROM ORTHOPAEDICS AND THE PROFESSIONAL FIELD – FOR PHYSICIANS, SPECIALISTS AND EXECUTIVES

Focus on science

vitamys for knee joints



Product in focus

Affinis Inverse: 10 years of clinical experience



From the professional field

When the rumour mill is working overtime





vitamys for knee joints

By Dr Daniel Delfosse, Head of Innovation Management at Mathys Ltd Bettlach

The vitamys material was developed to prolong the lifetime of implants. Following its success in hip and shoulder replacement, this highly cross-linked, vitamin E-enriched polyethylene has now had to prove its suitability for use in knee endoprostheses.

In everyday life, knee joints – and therefore knee joint replacements – are placed under stress with every step. When we walk or climb stairs, forces occur that are two to three times our own body weight.¹ It's hardly surprising, therefore, that explanted knee inlay components almost always exhibit wear, which is one of the main causes of prosthesis loosening. Materials with greater wear resistance and long-term resilience are therefore needed to further increase knee implants' life expectancy.

Mathys is a leader in the field of material development and invests a significant proportion of its resources in the development of material technologies. The world's first company to do so, Mathys launched a «blended» highly cross-linked polyethylene, enriched with 0.1 % vitamin E for clinical use.^{2,3} It is no surprise that Ticona* a manufacturer of polyethylene powder was also interested in our vitamys formula when it was developing its GUR 1020-E. Mathys has helped to define the global standard for all highly cross-linked, vitamin E-stabilised

polyethylenes (VEPEs). As a result, vitamys can still be regarded as the forerunner of all of the VEPEs introduced since. Following the successful use of vitamys for hip implants, it was also approved in 2014 for use in shoulder joint endoprostheses.⁴ After this, the focus shifted to optimising the material for the knee joint.

balanSys components from vitamys are made from GUR 1020-E, a polyethylene containing 0.1 % vitamin E. They are cross-linked with 70kGy and finally sterilised using gamma radiation. Unlike other highly cross-linked polyethylenes (HXLPEs), only a stress relief heat treatment well below the melting point is used during the production of vitamys to safeguard the material's dimensional stability. The addition of the natural antioxidant vitamin E means that vitamys is highly resistant to oxidation. This preserves its excellent properties even after long periods of use.

Worst-case scenarios for new materials

Along with all their advantages, every new material can also be associated with new risks. To minimise these and to ensure maximum safety in vivo, potential risks must be anticipated and the material subjected to a variety of tests. An entire raft of measures of worst-case scenarios has been devised for the introduction of a new material, including: What happens if the knee components are implanted with incorrect alignment? Or how will the material behave in the body over the long term, e.g. over 20 or even 40 years? For vitamys knee components, the risks can be mapped to the three areas of strength, wear resistance and long-term stability.

Strength and long-term stability of vitamys

Test results show that the initial mechanical properties of vitamys are only very slightly weaker when compared to standard polyethylene (UHMWPE), but that they are significantly better than the 1st-generation HXLPE used

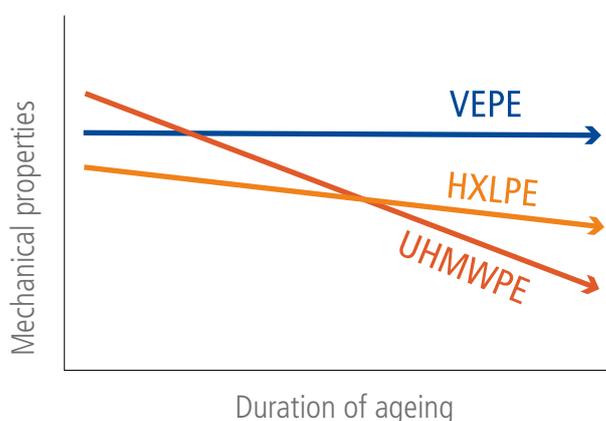
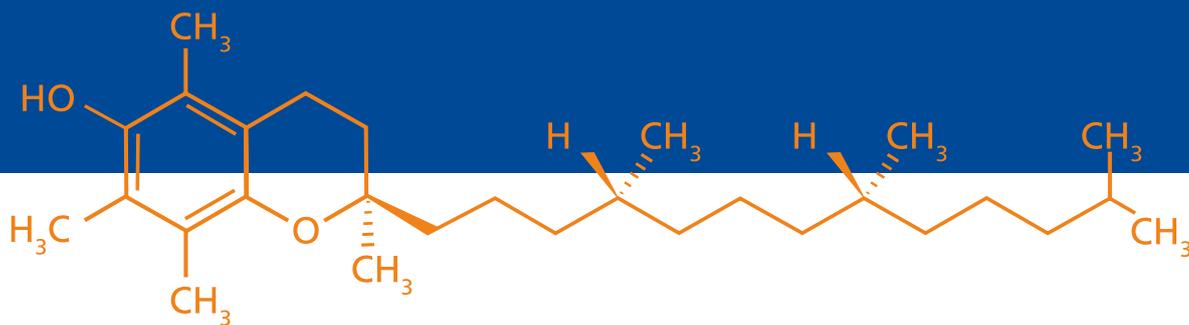


Fig. 1 Schematic representation of mechanical properties over time



currently in knee and shoulder implants, as Figure 1 illustrates. Over time, VEPE is increasingly superior to the other polyethylenes.

Wear resistance in the knee simulator

Knee simulator tests were carried out with worst-case scenario combinations following artificial ageing (ASTM F2003) with up to 10 million cycles. They show that the wear is reduced by a factor of two to five if components made from vitamys are used instead of UHMWPE (Figure 2). This applies to both unicondylar and bicondylar knee replacements.

Stabilisation with vitamin E has a protective effect, preventing the mechanical or tribological properties from diminishing as the implantation period gets longer. For this reason, artificially aged vitamys behaves almost as well as «fresh», un-aged vitamys in all tests and significantly better than UHMWPE (Figure 2). This protective effect is also seen in the fact that the aged vitamys exhibits no delamination compared to UHMWPE.

balanSys inlays made from vitamys in the future

In light of these impressive test results, Mathys is introducing all balanSys inlays made from vitamys into clinical practice this year. It is assumed that vitamys will prove itself in short-term use to be at least just as good as the familiar standard UHMWPE, which already has excellent clinical results in the registries.⁵ The properties that have been adapted specially for the knee joint, such as high elasticity coupled with low wear and high ageing resistance, allow us to conclude that vitamys knee implants will exceed the current standard in terms of their long-term behaviour.

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* today Celanese Corporation

Knee simulator tests / wear in %

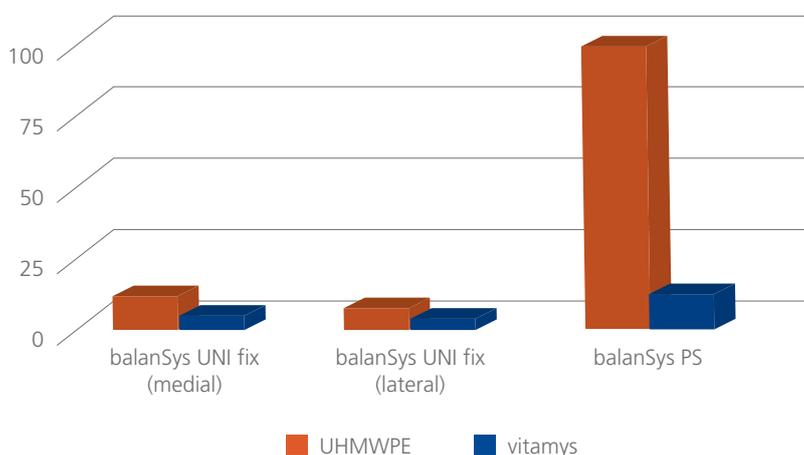


Fig. 2 Comparison of wear between vitamys and UHMWPE components in the knee simulator test

balanSys UNI vitamys

Affinis Inverse: 10 years of clinical experience

Affinis Inverse has proven its qualities in clinical practice for 10 years now. This shoulder prosthesis system combines the advantages of the inverse prosthesis with new, innovative solutions for modern-day challenges.

The first Affinis Inverse Prosthesis was implanted in December 2007. The implants design philosophy is built on proven Grammont geometry combined with contemporary design concepts.



1. Reduced PE-induced osteolysis through reversed tribological bearings^{1,2}

Biological notching, osteolysis generated by increased wear generated by the PE-inlay impinging against the scapular neck, can potentially be avoided or at least reduced by reversing the articular bearings. Having a glenosphere made of PE and a ceramic or CoCr inlay ensures that no PE particles will be generated by notching against the scapular neck.

2. Achieve consistent glenosphere overhang with simple instrumentation

Scapular impingement of the humeral inlays is correlated with the cranial-caudal position of the glenosphere.³ The Affinis Inverse surgical technique includes simple instrumentation and alignment guides to help place an eccentric metaglene along the inferior rim of the glenoid. Depending upon the size of glenosphere used, an inferior overhang of 4, 5.5, or 7 mm can be achieved.

3. Decrease abrasive wear with ceramys inlays and vitamys glenospheres

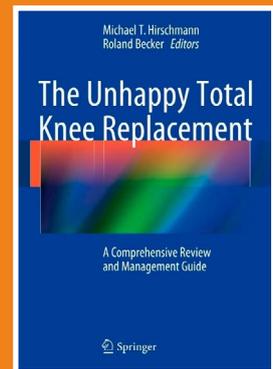
ceramys inlays, made of nanocrystalline dispersion ceramic, are designed for toughness and maximum fracture resistance. vitamys glenospheres, made of vitamin-E stabilized HXLPE, are designed for durability and longevity, possessing high wear resistance and protection against oxidation. In simulator tests, the reduction of wear with vitamys/ceramys pairings versus standard CoCr / UHMWPE pairings is approximately 80 %.⁴

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Unhappy knee replacement patients

Not every total knee arthroplasty (TKA) yields the desired success. The book «The Unhappy Total Knee Replacement» addresses the need for improved diagnostic and treatment guidelines for the unlucky cases.



After first describing the scientific principles of TKA, in the second part the book focuses on the various causes of failure and pain. In the third section, the diagnostic options are discussed in detail, from biopsy to nuclear-medicine imaging. Furthermore, helpful state-of-the-art diagnostic algorithms are presented. The fourth part takes a look at the treatment options, including conservative approaches as well as salvage and revision strategies. Future perspectives are outlined, and a series of case studies exemplifying situations and conditions frequently seen in clinical practice are presented. Not only orthopaedic surgeons, but also general practitioners, physiotherapists and industrial engineers will find the book helpful.

Hirschmann MT, Becker R. (Hrsg.)
The Unhappy Total Knee Replacement.
A comprehensive Review and Management Guide.
Hardcover 823 pages

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When the rumour mill is working overtime

Gossip and tittle-tattle are the order of the day in many companies, and hospitals are no different. When changes are imminent, rumours are quick to spread. So to ensure that harmless conversations do not turn into bullying, managers should know how to stop gossips in their tracks.

«Have you heard ...?». Gossip and tittle-tattle are the order of the day in many companies and organisations, and that includes hospitals. When changes are imminent, for example following new appointments or the merging of departments, rumours are quick to spread. The private lives of supervisors and colleagues are often particularly popular topics, and the more salacious the details the faster the gossip spreads. But talking about others behind their backs has a negative connotation. That's because, usually, only rumours that are of questionable veracity are spread.

Gossip and tittle-tattle as «social glue»

The British psychologist and anthropologist Robin Dunbar believes that gossip is not a character weakness, but rather a social skill. According to his theory, the desire to gossip is an evolutionary throwback from times when people still lived in caves.¹ He compares tittle-tattle with the de-lousing that primates carry out on each other. His theory postulates that both of these activities serve to encourage social cohesion between group members.¹ Sharing private information about someone else is a sign of trust and strengthens bonds. Informal story-telling therefore acts like a «social glue» that binds us within a society. According to Dunbar, around 75 % of our day-to-day conversations relate to interpersonal matters.² His thesis is that gossip and tittle-tattle are «the core of human social relationships, indeed of society itself».¹

The fact that water-cooler gossip can actually have positive effects has been demonstrated by a British study.³ According to this study, gossip between nursing staff helps them to share emotions such as concern, annoyance, anger or fear with colleagues and to process emotionally charged experiences as part of a team or with patients.³ Gossip was regarded as a form of emotional support and a way of reducing stress.³

Bullying in the hospital

Talking about others, however, entails risks. The consequences of bullying in the hospital workplace were investigated as part of a major European data survey.⁴ The aim of this study was to determine whether gossip has any impact on the commitment and risk of burn-out of employees, and on the quality of care and patient safety in the hospital.⁴ 532 hospital employees from various countries took part in the anonymous survey, around

with burn-out. In other words, the more people talked about others, the more frequently the employees complained of emotional exhaustion and the feeling of de-personalisation.⁴ The rattling rumour mill also reduced the energy and willingness of the team to work and impaired team collaboration.⁴ What's more, there was a weak yet significant, indirect effect of negative gossip on the number of medication and treatment errors reported where burn-out played a role.⁴ As



48 % of them medical personnel, 40 % nurses and around 12 % technicians and employees from administration and management. The results show that negative gossip, for example tittle-tattle about colleagues when they are not there, had a positive association

such, there is indeed a risk of a reduction in the quality of care and patient safety as an indirect consequence of negative gossip.

So it is very important to nip rumours in the bud. After all, once the bush telegraph starts

Download

«Stopping bullying»

5 tips on how to put a stop to gossips, available here as a free download for you.



to hum and rumours become widespread, the next step can only be damage limitation.

How to prevent this situation from happening

- The best means of quieting rumours is prevention through targeted internal communication. Keep employees regularly up to date so that they feel included. This gives staff security and prevents speculation.
- Communicate information early if changes are on the way for the hospital. Employees often find things out sooner than you think. Because the bush telegraph can often distort or put a negative slant on the facts, providing prompt information to your team is essential.
- Promote a culture of mutual acceptance and respect by setting a positive example and never talking negatively about third parties. Praise them instead and watch how not just the person you're talking about shines, but so too do you.

To ensure that positive gossip and harmless conversations about absent colleagues do not turn into bullying, managers should skilfully stop gossips in their tracks. We've put together the most successful strategies and practical tips for stopping bullying in a compact checklist.

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Mathys Ltd Bettlach • Robert Mathys Strasse 5 • 2544 Bettlach • Switzerland
Telephone: +41 32 644 1 485 • E-mail: move@mathysmedical.com

Editor responsible for the magazine:

Tanja Rölli • Head of Market Communication & Congresses • Mathys Ltd Bettlach

move! is published by Mathys Ltd Bettlach – your competent partner for total arthroplasty. With new, useful information, *move!* is addressed to specialists in orthopaedics and traumatology in hospitals and practices, as well as all specialist and management staff in the medical field, nursing staff and general

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