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Midatech Announces Positive Proof-of-Mechanism Results from £1.5 million Antibiotic Nanoparticle Study

SEEDA grant funds research with potential to combat antibiotic resistance in bacteria

Oxford, UK (December 05, 2008) - Midatech Group, a world leader in nanotechnology, announces the successful completion of proof-of-mechanism studies using nanoparticles to deliver antibiotics to bacterial cells *in vitro*. Based on these positive studies, antibiotic nanoparticles have now been progressed to toxicology studies. This £1.5 million research programme is co-funded by an Exceptional Research and Development grant from SEEDA, the South East England Development Agency and Midatech Group, with the aim of providing an innovative solution to combat drug resistance in bacteria such as *Helicobacter pylori* and MRSA.

The Grant for Research & Development (R&D) is a national DIUS (Department of Innovation, Universities and Skills) programme, managed in the South East region by SEEDA, to assist with the development of technologically innovative products and processes. Exceptional R&D grants are only awarded where a significant technological advance is involved which is strategically important for a particular sector.

The proof-of-mechanism results that were reported at the XXIst International Workshop on *Helicobacter* held in Riga, Latvia show that amoxycillin attached to Midatech's gold nanoparticles is more active *in vitro* against *H.pylori* cells than equivalent concentrations of soluble amoxycillin. Subject to successful completion of the planned toxicology studies, the programme will move into clinical trials at Midatech's recently formed drug development subsidiary PharMida, based in Basel.

The principle behind this research relies on each gold nanoparticle delivering a large number of antibiotic molecules in one go, thereby increasing the local concentration of antibiotic compared to freely soluble antibiotic. This increased local concentration of antibiotic means that bacteria are treated with a much higher dose of the drug than could be administered in soluble form and are killed outright, preventing the development of resistance.

At the same time as delivering antibiotics to the bacterial cells, the nanoparticles can be heated non-invasively using an alternating magnetic field in order to induce death in nanoparticle-targeted cells without harming neighbouring cells. Midatech has developed a device that can produce the alternating magnetic field required for *in vivo* studies and intends to conduct further research to ascertain the bactericidal effectiveness of both antibiotic delivery and magnetic heating when combined.

"We are encouraged by the success of this study so far," commented Midatech Chairman, Professor Thomas Rademacher. "This is an important area of research as antibiotic resistance is a significant concern globally. We believe that our nanoparticle technology would be applicable not only to *Helicobacter pylori*, but to any bacteria, a particularly interesting target being MRSA."

Helicobacter pylori is one of the most common infections in the world. About 20% of infected people may develop serious gastroduodenal disease including peptic ulcers, and about 1% may develop gastric cancer. Although the incidence of *Helicobacter pylori* infection is falling

in industrialised countries, it remains an important pathogen globally as the prevalence of antibiotic resistance is increasing, leading to a fall in the eradication rate of the organism with consequent failure to cure the ulcer disease.

For further information, please visit www.midatechgroup.com

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For media enquiries, contact:

Dr Eileen Paul, eileen.paul@collegehill.com +44 (0)1260 296516

Dr Anastasios Koutsos, anastasios.koutsos@collegehill.com +44 (0)207 866 7856

Notes to editors:

About Midatech Group

Midatech Group Ltd, UK, is a world leader in the design, synthesis and manufacture of biocompatible nanoparticles. These nanoparticles can be used to create a wide variety of products with novel characteristics, functions and applications for a number of industry segments including life sciences, electronics and fine chemicals.

Founded in 2000, Midatech Ltd is a private company headquartered in Abingdon, Oxford, UK. In 2005 it registered its manufacturing facility – Midatech Biogune S.L. – in Bilbao, Spain, which became fully operational for cGMP standard design and manufacturing of API nanoparticles in March 2007. In 2008 Midatech Ltd further expanded with the opening of PharMida AG in Basel, Switzerland, which is responsible for developing Midatech's technology in the life sciences arena.

For further company information see www.midatechgroup.com

The Technology in life sciences – a paradigm shift in drug development and drug delivery

Midatech's biocompatible nanoparticles possess a number of unique properties that make them ideal for diagnostic and therapeutic applications.

The nanoparticles are water soluble and can be designed to either diffuse freely *in vivo*, or to target specific cells. With a diameter of less than 5nm, unbound nanoparticles are freely excreted from the kidneys, reducing the likelihood of non-specific *in vivo* accumulation. Their size enables drug delivery via different routes of administration, such as parental or intranasal. Their stability to enzymatic digestion may also permit oral therapy. Nanoparticles can be designed to be invisible to the host immune system with multiple ligands attached to a single nanoparticle allowing multivalent drug or multi-drug delivery on a single particle. In addition, as the nanoparticles self-assemble in a single step chemical process manufacturing is simple, safe, scaleable and low cost.

Midatech Ltd. has exclusive world-wide IP for the technology covering design, manufacture and application/use of nanoparticles in both diagnostic and therapeutic pharmaceutical areas as well as in other industries. It also has exclusive world-wide rights for technology relating to the synthesis and applications of self-assembling nanoparticles.

SEEDA, the South East England Development Agency, is the Government-funded agency responsible for the sustainable economic development and regeneration of the South East of England – the driving force of the UK economy. Our aim is to create a prosperous, dynamic

and inspirational region by helping businesses compete more effectively, training a highly skilled workforce, supporting and enabling our communities while safeguarding our natural resources and cherishing our rich cultural heritage.