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TRANSLATIONAL RESEARCH AT UCL

By Stephen M. Fleming

A cursory glance through recent issues of the leading science journals that are found lying on your average university coffee table (*Nature, Science, PNAS*) will be enough to convince you that UCL Life Sciences are thriving. With alumni as illustrious as the molecular biologist Francis Crick and evolutionary theorist John Maynard Smith, this shouldn't come as too much of a surprise. But now UCL is also leading the way with so-called 'translational' research – medical science that seamlessly strides into the public domain, with the potential to directly impact on people's lives. Think penicillin, anti-depressants and polio vaccinations, and you're on the right lines.

One of the most debilitating and currently incurable ills is Alzheimer's disease. Modern science believes that Alzheimer's is caused by the gradual accumulation of unwanted proteins, known as plaques, around crucial brain cells. These same proteins can be found in a variant of the disease called systemic amyloidosis, which attacks the body but not always the brain. A team from the Institute of Neurology, led by Professor Mark Pepys, had been working on a novel drug, known as CPHPC, which initially seemed promising for treating this rare disorder. But recently, Pepys's researchers stumbled upon something new: 'The drug, to our surprise, entered the brain', comments Pepys. Indeed, it not only entered the brain, but also completely removed the build-up of serum amyloid P component (SAP) in a trial on five Alzheimer's patients.

The reason for the researchers' surprise is that the brain is cordoned off from the body's standard blood supply by a fine mesh-like barrier, which only allows the most essential of nutrients and oxygen through. This barrier has seriously hindered the development of therapies in the past, including the drug of choice for Parkinson's disease, L-DOPA. However, as luck would have it, CPHPC slipped straight through, having immediate biological effects. It remains to be seen how longer-term treatment affects mental functions in these patients; but CPHPC, like penicillin, may have the potential to become a household name.

Slightly earlier on the journey to routine medical application, but no less important, a UCL team of biologists led by Professor Jeremy Brockes has recently uncovered a new molecule which might prove the key to regenerating injured body parts. The salamander has long been the poster animal for regenerative medicine, due to its miraculous ability to precisely regrow itself after amputation. But even in these champions of resilience, the presence of intact nerve cells in the remaining stump is critical. Without these nerve cells, the salamander would be just like us, and would be unable to grow itself a new limb. Professor Brockes and his team set out to discover why. By screening for characteristic molecules in the collection of stem cells at the amputated stump (the blastema), they identified an intriguing chemical known to the field as n(ewt)AG. This molecule is expressed by the cells surrounding the nerve tissue (known as Schwann cells) during regrowth. Remarkably, applying nAG artificially could entirely substitute for the presence of nerve cells in the stump and lead to full regrowth of the salamander limb (Kumar et al., 2007). The UCL researchers published their findings in *Science*, and went on to win the AAAS Newcomb Cleveland Prize for the most outstanding paper in the journal during 2007. Ultimately, the team hopes to apply their knowledge of the salamander's reparative ability to studies on mammals, and by extension, humans. Thanks to both serendipity and the humble salamander, translational research is proceeding apace.

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References

Kumar, A., J. W. Godwin, P.B. Gates, A. A. Garza-Garcia, & J. P. Brockes, 'Molecular basis for the nerve dependence of limb regeneration in an adult vertebrate', *Science 318* (2002): 772-7.