

ACCESS
TO THE IDEAS,
RESEARCH AND
TECHNOLOGIES BEING
DEVELOPED BY OVER 4000
OF THE UK'S BRIGHTEST
BIOMEDICAL RESEARCH
SCIENTISTS



CENTRE FOR
THERAPEUTICS
DISCOVERY

humanizing antibodies

mrctechnology.org

PROVEN TRACK RECORD
CLINICAL RELIABILITY
RAPID DEVELOPMENT TIMES

We deliver humanized antibodies and add IP

Antibody humanization is a quick and effective way of developing drugs to target major life threatening and debilitating diseases. It is clinically validated, and a rapid and reliable developmental process which offers:

- Short clinical developmental times
- High regulatory approval rates
- Better management of risk

To rapidly progress your therapeutic antibody candidates our Therapeutic Antibody Group (part of the MRCT's Centre for Therapeutics Discovery), offers you the ability to take advantage of its substantial antibody engineering know-how to target major life threatening and debilitating diseases. With over 20 years experience we have:

- Engineered and recombinantly expressed over 50 antibodies
- Humanized 40+ antibodies – 11 progressed to clinic
- Out-licensed 2 antibodies to major Pharma companies
- Proven understanding of CDR loop structure and the role of framework residues in supporting them

Humanization remains the dominant technology currently being exploited by biopharmaceutical companies for the development of therapeutic antibodies. With 14 humanized antibodies having already obtained market approval there are another 80 or more in clinical trials.

In 2009 therapeutic antibodies produced revenues well in excess of US\$36 billion, nearly half of which was generated by humanized antibodies. Between 2007 and 2013, revenue for therapeutic antibodies is forecast to grow by a CAGR of 10.9% to nearly \$50 billion.

To discuss your requirements further, please contact:

John Kelly or Duncan Young

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our humanization process

MONTHS 1-3

TAG scientists will not only clone & sequence the mouse variable region genes, enabling them to design the humanized antibody variants, but also make and test a chimeric version of the antibody.

PCR-clone & DNA sequence mouse variable region genes

Design, construct and test chimeric antibody

Design of the humanized antibody variable regions

MONTHS 4-6

Scientists will construct and analyse several humanized antibody variants in an iterative process to generate the optimal humanized antibody against your target antigen:

Analysis & optimisation of the humanized antibody

Construct and analyse a panel of humanized antibody variants

Deliver your clinical candidate

drugs approved for market

CASTLEMAN'S DISEASE (JAPAN)	Actemra®
CROHN'S DISEASE (US)	Tysabri®
JUVENILE IDIOPATHIC ARTHRITIS (JAPAN)	Actemra®
MULTIPLE SCLEROSIS (EU/USA)	Tysabri®
RHEUMATOID ARTHRITIS (JAPAN/US/EU)	Actemra®

drugs currently at clinical trial

ALZHEIMER'S DISEASE PHASE I	BAN2401
BONE METASTASES PHASE II	MLN1202
CANCER PHASE I	ASONEP™
CROHN'S DISEASE PHASE II	Actemra®
CROHN'S DISEASE PHASE III	MLN0002
DIVERSE LARGE B-CELL LYMPHOMA PHASE II	CT-011
JUVENILE IDIOPATHIC ARTHRITIS PHASE III	Actemra®
MELANOMA PHASE I	AS1409
MULTIPLE MYELOMA PHASE I/IIa	BT062
MULTIPLE MYELOMA PHASE II	Actemra®
RELAPSED FOLLICULAR LYMPHOMA PHASE II	CT-011
RENAL CANCER PHASE I	AS1409
ULCERATIVE COLITIS PHASE III	MLN0002
WET AGE-RELATED MACULAR DEGENERATION PHASE II	ISONEP™

current humanization projects

CHEMOKINE RECEPTOR	CCR2
MEMBRANE PROTEIN	CRLF2
TRANSGLUTAMINASE	TG2
SOLUBLE PROTEIN	sCTLA4

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case study: Tysabri®

Scientists in our Therapeutic Antibody Group humanized Natalizumab using CDR-grafting, otherwise known as antibody humanization. The drug is used to treat Crohn's disease and multiple sclerosis and is marketed by Biogen Idec and Élan under the commercial name Tysabri. The CDR-grafting strategy was first invented at the Medical Research Council (MRC) Laboratory of Molecular Biology by Sir Greg Winter and patented by the MRC in the late 1980's. This humanization technology was successfully developed and optimised by MRCT for over 20 years. The technology was originally developed to address the problem of the HAMA (Human Anti-Mouse Antibody) response, which had effectively prevented the therapeutic use of mouse monoclonal antibodies up to this time.

Our team builds on this experience and know how to offer your company the best starting point for obtaining a humanized antibody.





MEDICAL
RESEARCH
COUNCIL
TECHNOLOGY

MRC Technology works with you on:

IP Licensing

Partnered Research

Humanizing Antibodies

Drug Discovery Initiatives

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WORKING WITH OVER 4000 OF THE UK'S BRIGHTEST RESEARCH SCIENTISTS

MRC Technology is the exclusive commercialisation catalyst for the UK Medical Research Council (MRC), working to translate cutting edge scientific discoveries into commercial products.

We bridge the gap between innovative basic science and making medicines. By providing chemical tools and antibodies with therapeutic potential, we give pharmaceutical and biotechnology companies new starting points for drug development, based on MRC advances in science.

Income generated goes back into further research. We commercialise our discoveries in order to benefit healthcare.

Working with MRC can be beneficial to your company - you will have access to some of the World's finest scientific minds and inventions. Indeed, our expertise is used by the World's leading pharmaceutical companies.

KEY MRC DISCOVERIES

YEAR	DISCOVERY
1913	Tackling tuberculosis
1916	Rickets caused by lack of vitamin D
1933	Influenza is a virus
1953	Structure of DNA
1956	Smoking causes cancer
1973	Magnetic Resonance Imaging
1974	DNA sequencing
1975	Monoclonal antibody production
1986	Humanized antibodies
1991	Folic acid treatments cut spina bifida
1993	Gene for Huntington's disease
1998	Genetic blueprint of nematode worm
2003	Stems cells to treat spinal injuries