60 years of medical research for children

Reflections on what medical research has achieved for babies and children over the past 30 years – and what could be achieved in the next thirty years
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Foreword

It is over 50 years since I first saw sick children being admitted to hospital, then as a student, later as a consultant. Some things remain the same – anxious parents, crying babies, alarmingly quiet children. Other things have changed dramatically, not infrequently, thanks to Action Medical Research which has made such an enormous contribution during my professional lifetime and before. Its 60th birthday, celebrated in this volume is, indeed, an anniversary to be applauded.

In my early days, infections were a dominant fear for the duty house physician. The eight-year-old boy with a limp, is it polio? Will he become completely paralysed? The drooling toddler with sudden onset of difficulty breathing, is it epiglottitis? The flushed little girl with a headache and vomiting, is it meningitis? Will she survive the night? Thanks to vaccines developed with support from Action Medical Research such fears are being transformed.

Contributing to our ability to control infections is only one of many areas where the organisation has made a big difference. Another is the newborn period. A woman is around 100 times less likely to die in childbirth today than the year of my birth, shortly before Action Medical Research came into being in 1952. The risk of pregnancy ending in stillbirth or infant death rather than with a live and healthy child has also greatly diminished. But, much more work remains to be done before premature delivery becomes a rarity and before the many complications which still may mar pregnancy, damage development in the womb or affect young children become as rare as polio – now close to elimination across the world. The majority of deaths in the first five years of life are still determined by currently irreversible damage or disorder which has taken place at or
before birth. Research provides the best hope of changing this improving but still melancholy record, but further dramatic improvement will not be easy. It was my great good fortune to receive generous support from Action Medical Research when I was, in the 1980s, establishing, in Manchester, a group to research the placenta, the key organ, then ill understood and rather little researched, which enables the mother to sustain and nourish her developing baby within the womb. Only recently are the fruits of such research, by a number of groups across the world, sufficiently comprehensive to begin to be cautiously applied to the clinical support of challenged pregnancies. My experience, at that time, illustrates a strength of Action Medical Research, its ability and its willingness to support research over the long haul from initial conception, as well as research which promises to bring more immediate rewards. Only a combination of short and long-term work brings a realistic prospect of progress in this challenging area. The development, over time, of individuals with a talent to conduct such research is also needed. This is a task where, again, Action Medical Research continues to play an important role.

For both what Action Medical Research has achieved over 60 years of very triumphant endeavour and for what it promises to continue to achieve, through research, in turning intractable challenges into soluble problems, fostering healthy children and healthy childhoods, I congratulate Action and wish the charity and the researchers it funds every future success.

Professor Sir Robert Boyd
KB, Hon DSc, FRCpCH, FFPH, FRCP, FMedSci
Why do we need medical research for babies and children in the UK?

Despite all the achievements of medicine, there remains a clear and urgent need for research to help babies and children.

Children are special

Babies and children are uniquely vulnerable. They are not small adults – their bodies are different, they have their own specific needs and they can differ in their responses to treatments.

There are many diseases that occur just in children and not in adults. Research leading to diagnosis, prevention, and treatment is the key to saving many children from a lifetime of suffering. For some children, technology could be the key to more independence.

Yet surprisingly, medical research for children is poorly funded in the UK. There is relatively little government or pharmaceutical funding for medical research into conditions that affect children, and there are very few UK charities specifically focused in this area.

Premature and vulnerable babies

Today in the UK, each year more than 3,000 babies die before their first birthday. One in 10 babies born in the UK needs some form of special care at birth because they were born too early or as a result of a difficult birth or life-threatening condition.

Premature birth is the single biggest cause of babies dying with over 60,000 babies born prematurely every year. Babies born too early can face difficulties with breathing, feeding and fighting infection. Many of those born very early develop lifelong conditions such as cerebral palsy, blindness and learning difficulties and may need a lifetime of treatment. Although the number of premature babies who survive has increased over the past 30 years, we still don’t know what causes premature birth or how to prevent it happening.

Up to eight per cent of UK babies develop problems with their growth while in the womb. Some babies grow so slowly in the womb that they are at risk of dying. Even babies who are born alive can be so small that they remain at risk of dying or developing lifelong disabilities. The cause of stillbirth remains elusive and a quarter of stillbirths remain unexplained.

Only medical research can give us a real understanding of the conditions that put babies at risk and help find new treatments. Yet despite the impact on babies and their families, there is limited research and drug development to help prevent premature birth and pregnancy complications that put babies’ lives at risk.

Research is the key to saving many children from a lifetime of suffering
Infections

Babies and children remain vulnerable to deadly infections. Research is needed to prevent and treat infection and to make sure it is those babies and children most at risk who receive early and prompt treatment.

Some devastating childhood diseases are now prevented by vaccination. Today children are protected against diseases including polio, meningitis caused by *Haemophilus influenzae* type B (Hib) and rubella by vaccines developed with the support of Action Medical Research. But meningococcal disease now kills more children under five than any other infectious disease in the UK and healthy children can become seriously ill within just a few hours. Sadly, between one child in ten and one in 20 of these will die, and survivors can be left with devastating disabilities.

A lifetime of challenges

Some children face a lifetime of challenges caused by conditions such as epilepsy. Almost 60,000 children suffer from epilepsy in the UK. Children with epilepsy sometimes have behavioural problems and around one in five has learning needs. Other conditions where children may face lifelong challenges include diabetes, arthritis and multiple sclerosis.

Rare diseases

Some problems faced by children simply don’t have a high profile because they are relatively rare – yet together these conditions add up to thousands of families across the UK coping with the challenge of caring for a child with a devastating disease for which there is no cure. More than half of the genetic disorders affecting babies and children are not understood at a molecular level.
Achievements in medical research for babies and children in the UK over the past 30 years

Medical research for children has led to great advances in the past 30 years.

More newborn babies survive today and the understanding and treatment of these babies has greatly improved. Neonatal deaths in the UK have almost halved, from over 4,600 deaths in 1982 to around 2,400 deaths in 2010. Children are benefiting from new vaccinations and treatments for diseases that previously could not be beaten.

Here are just some highlights of the progress made in the past 30 years.

**Pregnancy care**

**Monitoring unborn babies**

The introduction of ultrasound scanning for pregnant women during the 1980s changed pregnancy care across the world.

Ultrasound is used during pregnancy to monitor a baby’s development and diagnose possible problems. The medical application of ultrasound began in the first half of the twentieth century, but during the 1950s Professor Ian Donald of the University of Glasgow began experimenting with the technology. The technique evolved rapidly and a big leap was made with the development of real-time scanners, which could produce a moving display and allowed study of a baby’s movement in the womb.

During the 1970s and 1980s research, including projects funded by Action Medical Research, developed ultrasound techniques during pregnancy to enable the diagnosis of problems before birth.

These days ultrasound scanning is routinely used as part of pregnancy care across the world. Its impact in terms of antenatal care, pregnancy assessment and the assessment of babies after they are born has been immense. A whole range of important spin-offs depend on this technique, including the diagnosis and improved understanding of neonatal brain injury and monitoring and assessment of the hearts of babies receiving intensive care.
More recently, a fetal heart rate monitor has been developed with the support of funding from Action Medical Research, which lets doctors read heart signals of unborn babies through electrodes on a portable wireless device placed on the mother's skin and can help identify potential problems.

**Taking folic acid supplements**

The number of babies born in the UK with a defect of their spinal cord such as spina bifida was three times higher 60 years ago.

Spina bifida occurs when the spinal cord and surrounding bones do not develop properly, leaving a gap or a split. Babies who survive this can suffer from hydrocephalus (water on the brain) and be left with serious disabilities.

In the 1970s Professor Smithells and his team at the University of Leeds, supported by Action Medical Research, were able to establish a link between taking vitamins during and before pregnancy and neural tube defects which can result in conditions such as spina bifida in babies. The positive results of a trial in the 1980s, supported by Action Medical Research, paved the way for larger clinical studies and a major trial in 1991 funded by the Medical Research Council proved that folic acid can prevent spina bifida in up to seven out of 10 cases. Today, women trying to become pregnant are routinely advised to take folic acid supplements.
Helping premature babies to breathe

Babies’ lungs
Neonatal respiratory distress syndrome (RDS) affects premature babies. It occurs when a baby is born before their lungs are fully developed and capable of breathing air. It is due to the lack of a substance called surfactant which is secreted into the inside lining of the lungs. Surfactant makes it easier for the lungs to expand during breathing and it keeps them from collapsing when air leaves the lungs. More than half of all babies born before 28 weeks of pregnancy will develop RDS.

Action Medical Research was one of the funders of studies to understand surfactants and RDS. The introduction of artificial surfactant therapy in the 1990s radically changed the severity of the lung disease affecting premature babies and improved survival. This treatment approximately halves the risk of premature babies dying or developing severe respiratory complications.

Antenatal steroids
During the 1980s and early 1990s there was also recognition that steroids, given to a mother who had signs suggesting she would have a premature delivery, stimulated the secretion of surfactant and reduced the risk of serious lung disease. Action Medical Research helped fund some of these studies.

Clinical trials showed that this treatment approximately halves the risk of death or severe complications if a baby is born prematurely. This is one of the major factors contributing to the dramatic improvement in the outcomes of severely premature babies.
A newborn baby who needs medical help today finds a different world from that just 30 years ago.

**Improved care for newborn babies**

**Intensive care for newborn babies**

A newborn baby who needs medical help today finds a different world from that just 30 years ago.

Premature babies are now much more likely to survive given the development of new and better ways to support newborn babies. Specialist doctors and nurses in dedicated neonatal intensive care units now use high-tech equipment like monitors, ventilators and incubators. Even portable ultrasound scanners are available.

Almost all equipment used on neonatal units has been improved during the last 30 years. This has involved miniaturisation of the whole range of medical equipment specially adapted for use with newborn babies. This has included heart monitors and respiratory support devices right down to vital equipment such as blood vessel needles.

**Cooling therapy to prevent brain damage in babies**

When a baby suffers a shortage of oxygen to the brain around the time of birth, this can lead to brain injury. This condition, called hypoxic-ischaemic encephalopathy, is one of the three leading causes of death in newborn babies.

Until recently, there were no specific treatments to prevent this brain damage. However, new cooling therapy is changing this. A baby is cooled by a few degrees with a purpose-made cap or with a special blanket or mattress and is gradually warmed again after about three days. By cooling the body to reduce brain temperature, doctors can alter the chemical processes that lead to brain damage.

This breakthrough therapy is the product of a 20-year programme of research to which Action Medical Research contributed through key projects funded in the 1990s and 2000s. Over the last decade, the results from clinical trials have built up powerful evidence supporting the safety and efficacy of cooling so that the National Institute for Health and Clinical Excellence has now published guidance supporting its use. Further research now aims to provide additional treatments so that the therapy can help more babies.
Better care for babies

Preventing sudden infant deaths – the Back to Sleep campaign

In the late 1980s, approximately 1,500 babies died in the UK each year of Sudden Infant Death Syndrome (cot death). It was discovered through research in the late 1980s and early 1990s that laying babies on their front was a major risk factor for cot death. Other risk factors were identified including covering babies in too many blankets and exposing babies to tobacco smoke.

Following the research there was a public health campaign which led to a very dramatic reduction in cot death in the UK and throughout the world. Further findings established that the safest pace for a baby to sleep was in a cot in a room with parents for the first six months and that the advice should be followed day and night. By the mid 2000s, the number of babies dying each year from cot death had reduced by 75 per cent.

Feeding and nutrition

Thirty years ago little attention was paid to nutrition of children especially those who were sick. Various studies resulted in improved nutrition in all children especially the sicker ones. There has been a steady increase in our knowledge and understanding of children’s requirements. This has resulted in improved growth and the reduction in a range of conditions associated with poor nutrition such as rickets in babies.

The digestive system of small, premature babies is not fully developed and feeding with milk is a recognised risk factor for developing a condition called necrotising enterocolitis (NEC). Up to 3,000 babies a year in the UK will develop this condition which causes serious inflammation of the bowel wall, and sadly around 35 per cent of these babies die. As a result premature babies are often fed intravenously during their first few days of life. However this method of feeding can also carry risks for the baby, reduced if milk can be initiated earlier.

In 2005 the ADEPT trial, funded by Action Medical Research, set out to find out whether it is more beneficial to feed high-risk babies their first milk feeds within two days after birth or to feed them intravenously and delay milk feeding for up to six days. The results show that the babies who received early milk feeding achieved full milk feeds faster and were no more likely to develop NEC, whereas the late feeding group needed a longer course of intravenous feeding, longer stay in intensive care and more babies developed cholestatic jaundice. Early feeding seems to be the better way to manage these high-risk
babies. This important research can potentially be incorporated into evidence-based guidelines for doctors and nurses and looks set to have an almost immediate, major impact.

Vaccinating children against meningitis

Meningitis can be a very serious, even fatal, illness and children are particularly at risk. Children who survive meningitis can face permanent disabilities, such as vision and hearing troubles, learning difficulties and limb amputation.

Over the past 20 years the health of children has been dramatically improved by the use of vaccines for meningitis. Cases of meningitis due to *Haemophilus influenzae* type b (Hib) and Group C meningococcus have both fallen dramatically since vaccines were introduced. The leader of the group developing the vaccine against meningitis caused by Hib was Action Medical Research Chair in Paediatrics at the University of Oxford, Professor Richard Moxon. Before the vaccine introduction in 1992, Hib was the commonest cause of bacterial meningitis in children. Each year England and Wales saw approximately 800 cases, with around 30 deaths and about 80 children left with brain damage or deafness. The Hib vaccine has dramatically reduced this; cases of meningitis caused by Hib in under-fives have fallen by 98 per cent.
Understanding genetic diseases

The ability to identify genes using evermore sophisticated technology has revolutionised the understanding of some diseases in recent years.

**Cystic fibrosis**

The treatment of children with cystic fibrosis has seen enormous changes in the last three decades largely due to research defining the best care with the use of regular antibiotics and physiotherapy as well as diet.

Action Medical Research helped fund the Duncan Guthrie Institute of Medical Genetics opened in Glasgow in 1980, the first institute built specifically for medical genetics in Europe, conducting tests for many conditions including those which affect newborn babies, such as cystic fibrosis. Action Medical Research has also funded clinical studies into cystic fibrosis and infection.

**Muscular dystrophy**

Muscular dystrophy is a devastating illness. Many sufferers need to use a wheelchair, and they may need help to breathe and a full-time carer to help them eat, wash and perform everyday tasks that others do without thinking. Sadly, some will lose their lives to their illness. There are many different types of muscular dystrophy. Duchenne muscular dystrophy is the commonest and most severe. About 100 boys are born with the condition each year in the UK.

Action Medical Research has funded some research into the genetic basis of Duchenne muscular dystrophy. The identification of the genes involved in genetic disorders means that specific tests are now available for diagnosis and some treatments are being developed. Research into Duchenne muscular dystrophy has been important for maximising the quality of life of children with this devastating disease.

**Rare genetic diseases**

One in every 36,000 children in the UK will be born with a rare genetic disorder called Von Hippel-Lindau disease (VHL). People with VHL experience growth of multiple cysts and tumours on many parts of the body, including the eyes, brain and kidneys. As a result they can suffer a range of symptoms, from numbness and pain to vision problems and even paralysis. Action Medical Research funded scientists at the Universities of Cambridge and Birmingham during the 1990s to study VHL. The team had a breakthrough in 1993 when, in collaboration with international
colleagues, they identified the gene for the disorder. From this they developed a genetic test for VHL, which is now used across the UK. In addition, the knowledge gained from studying this relatively rare disease may have much wider benefits, particularly for sufferers of kidney cancer, which has been linked to this gene. Action Medical Research has also funded research that identified the gene that causes the hereditary skin condition incontinentia pigmenti, as well as the gene responsible for causing Van der Woude Syndrome, an inherited form of cleft lip and palate and also the genetic faults behind ectodermal dysplasia, a condition that affects the skin, hair, teeth and nails.
A cure for leukaemia in children

Leukaemia is a cancer of the blood. The most common cancer in children, it accounts for around one third of cases. Each year in the UK, almost 500 children are diagnosed with leukaemia. More than half of these children are under the age of five. Childhood leukaemia was incurable until the 1960s.

A particular success has been the treatment of a specific type of cancer affecting children called acute lymphoblastic leukaemia. Acute lymphoblastic leukaemia (ALL) is the most common type of leukaemia to affect children, accounting for more than 80 per cent of all cases. ALL is the only form of leukaemia, and one of the few forms of cancer, that is more common in children than in adults. Thanks to medical research the survival rate for ALL is now approaching 90 per cent.

Technology

Imaging

Magnetic resonance imaging (MRI) is a medical imaging technique. Over the past 30 years it has transformed our ability to see into and understand more about the brain, resulting in advances in non-invasive diagnosis and informing treatment.

The development of MRI for brain imaging of children with epilepsy has also been fundamentally important for improving diagnosis of underlying brain abnormalities and therefore better defining causes of epilepsy. MRI has given doctors information on the detailed structure of the brain, helping to decide which children may benefit from surgery.

During the 1990s Action Medical Research funded research to develop MRI and other brain scanning techniques to help detect areas of the brain responsible for seizure onset and direct surgery in the brains of children with epilepsy who had not responded to antiepileptic drugs. This has increased the number of children who may be suitable for surgery and a possible cure for their epilepsy, reducing the long term problems associated with the condition.

Technology for support and movement

Children with severe disabilities often need posture support, such as a specialised seat, to perform daily activities like eating. But this can be expensive and may cause painful pressure sores.

In the 1980s, Action Medical Research funding helped develop a unique posture support system. With funding from the charity, researchers at University College London developed the ‘Matrix’ seating system from a prototype, through development and clinical trials to a commercial product now used internationally. Their award-winning design can be fitted closely to body shape,
averting pressure sores and so easing considerable distress. Its shape can be changed as needed by adjusting the links making up the web-like structure. This was not possible before and is particularly beneficial for growing children. With worldwide fittings of over 30,000 Matrix seating systems during the past 25 years, the Matrix is still in use today, and recent modifications mean it may even be able to help correct spinal deformities.

Children with cerebral palsy have difficulty walking but the technology for measuring children’s walking has been transformed in the last 30 years. It is now possible to track the movements of a child’s limbs using a combination of special cameras and reflective markers. Doctors can then assess the movement profile of each individual joint, identify problems and target treatments. Even the joints of the feet can be assessed in this way. Research and development work has produced a range of new mobility aids for children including improved walking aids and splints.

Action Medical Research funded a study in 2001 into how children with cerebral palsy walk, to improve understanding of why they often develop foot abnormalities which sometimes need surgery. A ‘motion analysis system’ was developed which used infrared cameras to measure and analyse movement patterns within the specific parts of a foot. The system, which became known as the Oxford Foot Model (OFM) is now used worldwide.

**Improved surgery for babies and children**

Surgery for children has moved forward in the past 30 years. For example, surgery for children with cerebral palsy has advanced greatly with the introduction of new orthopaedic procedures. As a result children are more likely to have only one operation rather than a much more disruptive programme of further surgery throughout childhood.

Action Medical Research supported the invention of a revolutionary growing prosthesis (artificial limb bone) for children whose bones have been destroyed by tumours, preventing the need for painful surgery. The device was first successfully implanted into a 13-year-old girl in 2002. Since then its use has extended to 15 countries.
What might the next 30 years of medical research hold for babies and children?

The very nature of the way medicine and science develops makes it hard to predict where or when the next breakthroughs might come. The following thoughts give just some insights into what the future might hold.

Treating unborn babies
Safer ways to diagnose babies in the womb could develop from prenatal diagnostic techniques based on the use of maternal blood. Potentially stem cells and gene therapy could be used in some babies in the womb. Conditions like fetal growth restriction, haemophilia and even cystic fibrosis could be helped in this way. It may even become possible to administer new drugs to the mother to improve the outcome for the baby who is going to be born prematurely.

Predictive tests may be able to identify high risk pregnancies and allow effective treatment. Conditions such as pre-eclampsia, preterm labour, intrauterine growth restriction and stillbirth which occur in early pregnancy could potentially be tackled.

Tackling premature birth
Large scale genetic studies as well as the use of sophisticated molecular techniques mean that knowledge of the mechanisms leading to preterm birth is increasing. This raises the realistic prospect of improved screening tests to identify women in early pregnancy who are at high risk of preterm birth as well as introducing preventative treatments for them.

Cooling therapy to help more newborn babies
Cooling therapy is now being used to prevent brain damage in babies suffering a shortage of oxygen around the time of birth – but this treatment can only help some of the babies affected. Therapies such as drugs given in addition to cooling or to the mother before delivery are being researched to try and increase the number of babies who can be helped. Action Medical Research is helping to fund some of these studies.
Preventing deadly infections
Vaccination and research into diseases like meningitis have improved the outlook for so many babies, but there is still work to be done. A wider range of immunisations need to be developed to prevent other forms of meningitis and serious infection. The next 30 years could herald prevention of one of the last major bacterial cause of meningitis in children – meningitis B.

Obesity in children
A shocking 17 per cent of boys and 15 per cent of girls aged two to 15 years are obese in the UK, putting them at risk of serious, long-term health problems, such as heart disease and diabetes. Research into diet, exercise and metabolism could help tackle the rising tragedy of childhood obesity that will shorten the life expectancy of many.

Action Medical Research is currently funding studies into obesity in children. One study is investigating whether special diets might help correct a faulty energy balance circuit in the brain and a further study is investigating obesity in adolescents and possible links with sleep deprivation and time spent using technology and other gadgets.

A way forward into tackling diseases commonly seen in children today
Genetics and stem cells

Now is truly the golden age for genetic research. The costs of the technology are reducing and the potential for medical research is vast. This could help tackle complex genetic disorders as well as offer insights into the genetic aspect of conditions like asthma and epilepsy. Improved understanding of rare diseases, and diseases affecting adults, could introduce a way forward into tackling diseases commonly seen in children today.

An improved understanding of genetic susceptibility to disease and the ways that interaction with the environment can cause affected pregnant women and children to become unwell could allow effective treatments to be designed – to either prevent the adverse outcomes associated with complex genetic disease or to improve the outcomes of affected individuals.

Genetic analysis will tell us a lot about people’s risk of developing certain conditions in their lifetime. Whilst there is a long way to go, research will continue to improve our understanding about genes, and their interactions with each other, and the environment. This will lead to unprecedented opportunities for people to change their own risk through changing their behaviour, and also to new treatments.

Gene therapy may become a reality for Duchenne Muscular Dystrophy and Spinal Muscular Atrophy, the two commonest severe and life-shortening neuromuscular disorders.

The genes for both have been identified. The introduction of neonatal screening for Duchenne Muscular Dystrophy will allow early diagnosis and in the coming years trials of the new gene based treatments could be a reality.

Stem cell research could help genetically-determined disorders like the devastating neurological movement condition, idiopathic torsion dystonia. The use of tissue engineering to create organs and to replace diseased
Research to try and increase the number of babies who can be helped

tissues is likely to improve the lives of many children in the future. Spinal cord neuronal regeneration research could allow recovery after traumatic and inflammatory spinal cord injury. Stem cell and tissue regeneration could help replace tissue lost after, for example, cancer surgery, congenital defects, burns and trauma.

**Increased Technology**

Advances in technology will undoubtedly power more research.

The next 30 years should see further improvements in measurement technology to assess the way children move, and in particular how they walk. This could help children affected by conditions like cerebral palsy. Ever increasing power of computer modelling is bound to make a difference. Large computer databases have the potential to help make predictions on the basis of how previous patients have progressed. Ideally doctors would like to try out their treatments on a computer before treating a child. In the future we are also likely to see the development of more implantable technology as an alternative to splints with the potential to develop systems for use in children with movement disorders.

Perhaps the last frontier of understanding will be a better understanding of the brain and how and why it goes wrong, and what can be done to improve its function. This could lead to developments in mental health, epilepsy, neurodisability and learning impairments in children.
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About Action Medical Research

In 2012 Action Medical Research is celebrating 60 years of funding vital research to help babies and children. Since the charity began in 1952 it has funded more than £100 million of medical research helping save thousands of children’s lives and changing many more.

At Action Medical Research we are determined to stop the suffering of babies and children caused by disease and disability. We know that medical research can save and change children’s lives. We have the flexibility to identify the very best medical research most likely to make this vital difference for sick children of all ages.

The charity was originally founded in 1952, by Duncan Guthrie, in his quest to find a cure for polio, a condition that blighted the lives of many thousands of children including his own daughter Janet. Early research funded by the charity contributed to the development and rapid adoption of the first oral polio vaccine which eradicated new cases of the disease in the UK.

Since then the charity has developed an extraordinary track record in supporting some of the most significant medical breakthroughs in recent history – breakthroughs that have helped save thousands of children’s lives and changed many more.

Achievements over the past 30 years made possible with Action’s support include: the use of ultrasound in pregnancy; the use of folic acid to prevent spina bifida; cooling therapy to prevent brain damage; and vaccination to prevent forms of meningitis.

Today, Action Medical Research plays a vital role as the leading UK-wide medical research charity dedicated to helping babies and children. We believe that the diseases that blight the lives of so many of our children can be beaten and we continue to fund some of the best medical research in the world. Thanks to advances in science and medicine the prospects are good.

Only a lack of funds will hold back our pioneering work.

We hope what you have read will help inspire you as to what medical research has achieved and could achieve for babies and children. Just think how much change there has been so far. But there is still so much more to learn about what triggers diseases, how to prevent them and how to develop effective new treatments and find the best ways to treat sick babies and children.

Make 2012 a special year and help fund more life-changing research for some of the UK’s sickest babies and children. With your help we can make a difference to children’s lives.

To find out more visit: action.org.uk