

Towards better birth

National Women's Hospital, Auckland, is achieving major advances in prenatal research. Regular medical contributor Trish Gribben reports.

HIPPOCRATES THOUGHT that the baby in the womb determined the time of his birth. That concept was ignored for centuries and the process of birth remained shrouded in superstition and mystery. Today, 40 years after the discovery of female sex hormones and their function during pregnancy, the mechanism controlling birth is still not understood entirely. However, for the first time, scientists are confident that they are on the brink of comprehending the chain of events that leads to the delivery of a baby.

A New Zealand doctor, Professor G. C. Liggins, of the Postgraduate School of Obstetrics and Gynaecology at National Women's Hospital, Auckland, is a world leader in research into the triggering of labour. He says: "We're not too far away from complete understanding of human birth; I'd say within five years."

"Until recently, the concept of the baby initiating his own birth was lacking, but we have proved Hippocrates was right. We're at a point where we have the concept, the tools and insight into the problems — now it's just a matter of a lot of hard work."

Professor Liggins, who is in international demand as a lecturer and a prolific contributor to medical journals, has been using sheep for his experiments for more than a decade.

He has helped perfect surgical techniques to reach the lamb in the uterus, to determine the role played by the fetus in the birth process.

The ultimate goal of Liggins's work is a full understanding of the onset of human labour and fetal development; once that is achieved, doctors will be better able to control labour, so that the problems of prematurity, which lead to the deaths of many babies, can be prevented.

Already there have been spin-offs from Liggins's work with sheep which are benefiting mothers and babies.

Research with sheep into the possibilities of activating a gland called the fetal adrenal led to the discovery of the role of prostaglandins, the hormones which are now regarded as the missing link in the complex series that starts with triggering of labour and ends with birth.

Characteristics of prostaglandins are that they work in specific areas and are released in small quantities over several days before labour begins.

Technical advances, as well as understanding of physiological processes, have made it possible to administer prostaglandins in a way which simulates the natural action.

Over the last three years about 200 women at National Women's have been induced into labour with vaginal pessaries which release prostaglandin in tiny doses around the clock. It can

take up to two days for labour to start this way — but the procedure is free from side-effects, safer and more pleasant for the mother than the surgical or oxytocin drip inductions which are now commonplace.

No other hospital is using quite the same procedure, and the results of Liggins's treatment are attracting world-wide attention.

It seems unlikely that induction will ever be simplified to a pill-swallowing routine; labour is a local phenomenon which occurs chiefly in the uterus and, as drugs taken orally get dispersed through the whole body, it is better to be nearer the target by way of the vagina.

But, before long, women will be able to use the pessaries at home and go to hospital when they come into labour as for any normal birth.

Prostaglandin pessaries are considered suitable when a woman is overdue (with no pregnancy complications) and a simple, straightforward "natural" way of initiating labour is desired; or, when a baby is at risk and should be delivered (for example, when a mother has hypertension) but when a surgical induction would be unfavourable because the mother shows no physiological signs of being ready.

"Prostaglandin ripens up the cervix as it sets the mechanisms for labour in motion and, in a premature delivery, the baby is born without the degree of stress to which it would otherwise be subjected," says Liggins.

He sees his work being applicable one day to even so-called normal deliveries. "Civilisation hasn't helped women in their reproductive efficiency. Disadvantages came with the evolutionary change to erect posture, for example, and there is often room for improvement on what nature provides."

"Any woman who has had more than one baby knows that the second and third births were easier. We hope all births will be easy like that one day."

"Everyone, to some extent, has suffered ill effects from pregnancy and birth, and we aim to minimise them. I believe all of us are less than perfect; it's a matter of degree and our attention, naturally, has gone to those most seriously handicapped. Our greater understanding of birth and the prenatal period should help prevent many complications."

To those who cry that technology and science have gone far enough in interfering with childbirth, Liggins replies: "Birth under 'natural' conditions is associated with major health problems for both mothers and babies — one has only to look at psychopedic hospitals."

"If anyone is content to accept that as desirable, or inevitable, I guess that is their right. But generally speaking any effort to reduce the numbers of handicapped children and maintain healthy mothers and babies is regarded as socially desirable."

"What we must strive for is the compromise which provides the mother, husband and baby with the best possible environment for their emotional, as well as physical welfare."

Another major research by-product came from a chance observation,



PICTURES: ROBIN MORRISON

which has led to being followed in many parts around the world.

Liggins noticed that not only did the fetal adrenal gland develop on labour, but it caused a rapid development of the organs which the newborn depends for survival, particularly the lungs.

This observation led to the first breakthrough, developed by Liggins with Dr Ross Howie, in the prevention of the major killer of premature babies, a condition known as "respiratory disease syndrome", which is caused by the fact that the infant's lungs are too immature to work properly.

While labour is held off by using a drug that acts on the uterine muscles (the same drug that asthma sufferers use to relax the muscles of their air passages), the mother is injected with a steroid which passes through the placenta to the baby's lungs. In only 24 to 48 hours of treatment, it is possible to cause lung development that would otherwise have taken up to six weeks.

National Women's Hospital was the first in the world to adopt this as routine for premature deliveries seven years ago and about 1600 babies have been treated. It is now being instituted internationally.

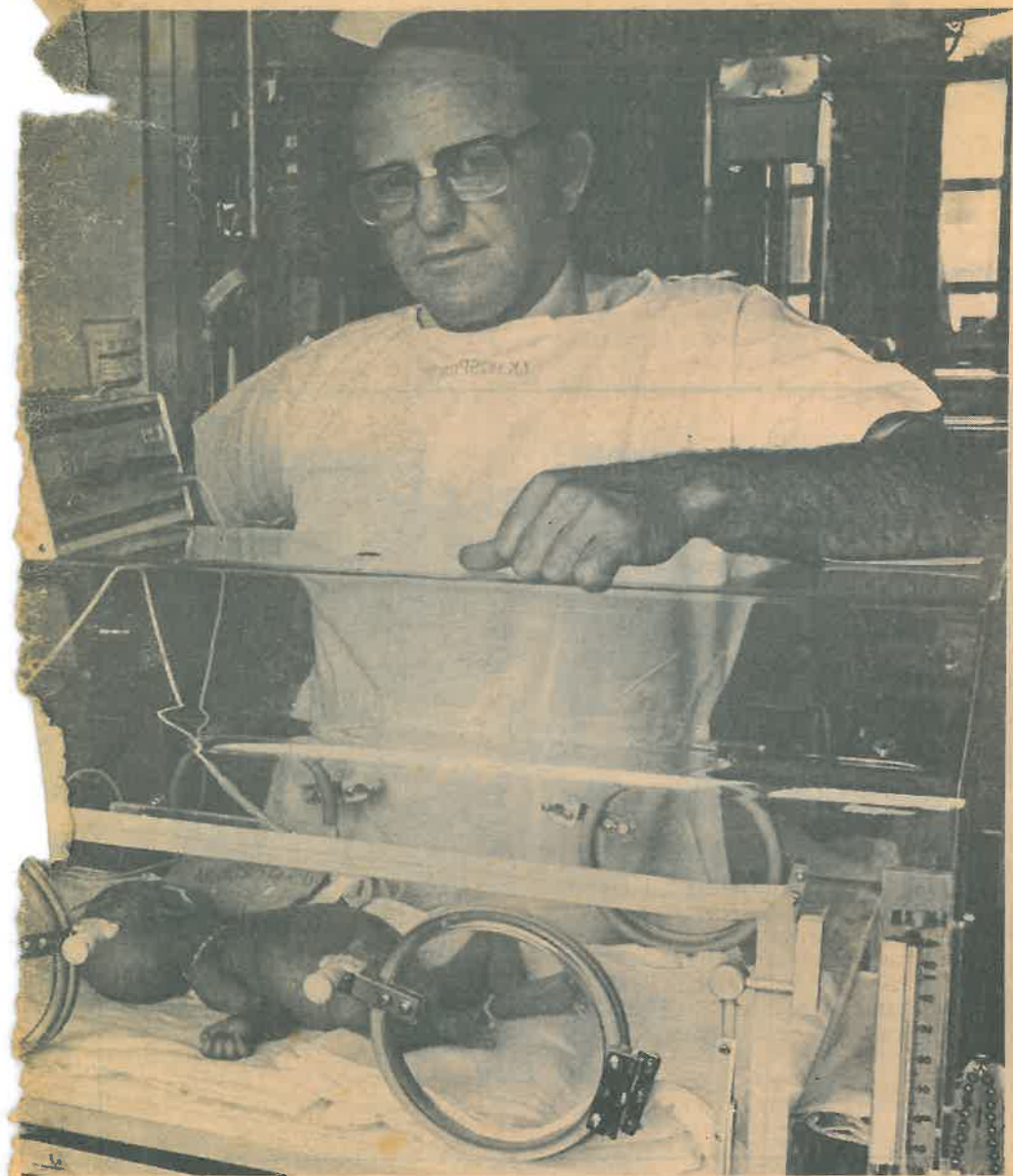
Clinical trials over the seven years show that very small babies, born up to three months before term, can be saved. Certainly those born eight to 10 weeks premature have a much higher survival rate with this treatment.

Follow-up on the low birth-weight babies has shown that, with good environmental support, they become normal, healthy children.

With Dr John France at National



Research with sheep led to the discovery of the role of prostaglandins.



Professor Liggins: results are attracting worldwide attention.

Women's, Liggins isolated the first known biochemical defect in the placenta, an enzyme deficiency which prevents the fetus from triggering labour. Previously, such babies died in the womb but now, once diagnosed, they can be safely delivered. (*Listener* July 31.)

In the early 60s Liggins pioneered a serial contraceptive pill which is used world-wide. Also, with Professor H. K. Ibbertson of Auckland, he developed and perfected gonadotrophin therapy to stimulate ovulation for women previously unable to become pregnant. The best-known babies associated with this research were the Lawson quins, among the first in the world to be born as a result of this treatment.

There have also been spin-offs from Liggins's work in the animal world.

At Ruakura, Dr Bob Welch is investigating the induction of cows by "fooling the system" with two injections of the steroid produced by the fetal adrenal. About 200,000 cows a year are being treated throughout the country.

Traditionally, late calvers are sent straight to the works because they are out of phase with the milking system, but they can now be kept in cycle by having premature deliveries — with obvious benefits to farmers.

The technique is also used in the production of astrakhan, or Persian lamb skins, which are made from the skin of stillborn or very young lambs.

In South Africa, lambs being bred for astrakhan are being induced with the adrenal hormone. The premature birth gives the highly-prized quality skin and in Persia these births have

for centuries been induced by beating the ewes with sticks.

Professor Liggins's work is an obvious example of the kind of research which Foundation 41 (see "Research Appeal" on this page) will support.

Since 1969 he has received grants totalling \$65,000 from the Wellcome Trust, a private British foundation which takes up important research, regardless of where it is being carried out. Once the work is firmly established the foundation expects local funding organisations to carry it on.

As a full-time university employee, Professor Liggins is also supported by the University of Auckland and for the last four years the New Zealand Medical Research Council has been phasing in with funds totalling \$50,000. Professor Liggins has applied for continued support from the MRC when the Wellcome Trust grants stop at the end of this year.

Commenting on the need for Foundation 41, Professor Liggins said that New Zealanders had excelled in an ability to develop the basic concepts on very modest budgets.

"Some people express concern that research done in this country is only duplicating what is done on a grander scale elsewhere. But, in fact, having made fundamental discoveries and progress with limited funds, New Zealanders have been happy to let the rest of the world develop them.

"Foundation 41's appeal target of \$250,000 is still very modest compared with research budgets overseas, though it will undoubtedly help produce greater understanding of an area vital for the welfare of our mothers and babies."

Research appeal

FOUNDATION 41, a trust that will sponsor research into the most critical period of life — the 41 weeks from conception to the first week after birth — is making a \$250,000 house-to-house appeal to all New Zealanders on November 6.

The project is the most ambitious undertaken by the New Zealand Association of Round Tables, a service club for men in the young-father age group.

Although the unborn child has been a focus for more attention since the early 60s than ever before, the gap between conception and birth is a comparatively neglected area of medical research.

"It seems incredible that in the last quarter of the 20th century, one cannot say with certainty that following a healthy pregnancy a mother will have a normally sound baby," Sir Ronald Scott, chairman of the new Foundation 41 trust board, told a press conference launching the appeal.

In fact, one in every 10 babies born in New Zealand has a mental or physical defect — "Is born, less than perfect" states the foundation's slogan.

Some of these babies have only minor problems, but others have major abnormalities which become life-long disabilities needing special care. In the vast majority of cases, doctors are unable to tell distressed parents the reason why their baby is different. Foundation 41 aims to help researchers seek the answers.

One of the few known causes of abnormality — the disastrous effects of the drug thalidomide — led to the establishment of Foundation 41 in Australia in 1971.

Australian gynaecologist Dr William McBride won worldwide recognition after discovering the effects of thalidomide on the fetus. The French Institute for Life awarded him \$40,000 for what it termed "the most significant medical discovery of the 1960s". Concerned that not enough was being done in prenatal research, Dr McBride launched the Foundation with this prize money.

The New Zealand Foundation 41 funds will be administered by a trust board, in association with the Medical Research Council, and will largely go towards salaries for research workers.

The members of the board are Sir Ronald Scott, Prof. D. G. Bonham (head of Auckland's Postgraduate School of Obstetrics and Gynaecology), Prof. D. R. Aitken (Department of O and G, Christchurch Clinical School), Dr Patricia Buckfield (neonatal paediatrician, Dunedin), Prof. F. T. Shanon (Department of Pediatrics, Christchurch Clinical School), Mr G. O. Duncan (a Wellington obstetrician), Mrs A. Wallace (SM of Auckland) and three Round Tablers, Robert Turnbull, Peter Packard and John Wright.

Following the overwhelming public response for the National Children's Health Foundation through TV2's telethon, the Round Table project committee questioned doctors throughout the country on the justification for setting up Foundation 41—and found strong support for recognising obstetrics as a specific research area distinct from pediatrics.

Appeal co-ordinator John Wright of Invercargill said there would be liaison with the Children's Health Foundation to avoid duplication of projects. "But we are dealing with separate areas that affect children's development; Foundation 41 is aimed at the very basis of life itself."

Wright emphasised that Foundation 41 had no associations with either side of the abortion debate. "Our objective is to give every baby born the best possible chance of normal healthy development."

"It seems obvious that we must look towards prevention because too often there is no cure for the defects babies are born with."

"Who knows? Success in the area of Foundation 41 research could help reduce the demands placed on special care and welfare facilities."

Professor Bonham said the spirit of interest and co-operation generated by establishing Foundation 41 was as important as the money raised.

"There is close liaison between obstetricians and paediatricians in New Zealand—I don't know of anywhere in the world where it is better," he said. "And this co-operation and feedback of results, helped by our small, relatively static population, makes it possible for New Zealanders to make significant contributions to medical knowledge."

Sir William Liley developed here much of the treatment of Rh haemolytic disease. This is a good example of how basic research led first to treatment of the unborn and ultimately to prevention of the problem in many cases.

Bonham emphasised that it was not always the stated goal of research projects that led to real progress — side discoveries often proved to be the fundamental ones.

Areas currently being studied in New Zealand include fetal growth and brain development, respiratory functions, congenital malformations, prevention of prematurity, the effect of drugs taken during pregnancy, and cot deaths.

Patient in the womb

FETAL SURGERY, surgery on the unborn infant to correct congenital defects before birth, is not far off, according to *Childmenders*, a documentary on pediatric surgery screening on TV1 this week.

Deformities in the newly-born are already being repaired on the first day of life. Surgeons now consider it best to carry out repairs as soon as possible.

The documentary is set in the Prince of Wales Hospital in Sydney, a hospital that has specialised in curing several forms of cancer in children.

Childmenders examines the development of the techniques of micro-surgery and the miniaturisation of the instruments that are used in surgery on the very young.

CHILDMENTERS, TV1, Monday, 10 pm.