MONASH medical researchers have developed a system of intravenous feeding which has dramatically reduced the death rate among very small, premature babies.

It involves pumping specially-formulated life support fluid directly into the heart.

In effect, the intravenous feeding simulates an artificial umbilical cord, providing the premature baby with nourishment very similar to what it would be getting if still in the womb.

The research project is headed by Associate Professor Robert MacMahon, in the department of paediatric surgery at Monash, assisted by professional officer Brian James, M.Sc.

Working in the Agnes Nathan Children's Unit at Queen Victoria Hospital, they have successfully treated babies weighing as little as 600 grams (less than 1½ lb.) and born up to 14 weeks premature.

Since starting clinical trials 21 months ago, they have used the intra-vascular feeding method on 17 babies. All weighed less than 1050 grams at birth and were between 10 and 14 weeks premature.

Twelve of the 17 survived—a mortality rate of 29 per cent. This compares with a death rate of 82 per cent among the 96 babies of similar birth size born at the hospital during the years 1970-72. The 82 per cent figure was comparable with overseas statistics.

At present another two babies are “feeding” via the heart-tube system in the hospital's Special Care Nursery, where nurses use electronic monitoring equipment to keep a constant watch on their progress.

"We don't know the limits of how small or how premature a baby might be saved by the feeding system," says MacMahon. “What we do know is that we will push back those limits as our technology improves.”

Heart injection feeding for premature babies

The Monash team believes its success disproves the theory that a very premature infant has a poor chance of survival simply because its body—particularly the respiratory system—is not sufficiently developed.

They suggest instead that the tiny infants die because they have little or none of the key "substrate stores"—energy reserves—which help a full-term baby survive the first few vital days outside the womb.

"What we have to do with these babies is feed them a lot of nourishment—and quickly—and the intra-vascular injection method accomplishes this," says MacMahon.

He says the normal method of trying to feed very premature babies orally with either expressed mother's milk or a milk substitute has had poor results. The infants are too weak to suck properly and when tube fed, there was a danger of their regurgitating the fluid and breathing it into their lungs, causing fatal choking or pneumonia.

The lifeline used by the Monash team to save the tiny "prems" is a plastic catheter (tube) one millimetre in diameter. MacMahon inserts this under the scalp behind the right ear. He then threads it under the skin to the neck and from there into the jugular vein.

It is then eased along the vein and into the right atrium—the first chamber of the heart. The intricacy of the operation can be gauged from the fact that the heart of such a tiny baby is about the size of the ball of an adult thumb.

At the end of the catheter lodged in the heart is a tiny valve which allows the life-giving fluid to drip through but at the same time prevents blood being forced back the other way.

The catheter tip is specially treated to continue next page
‘Reality shock’ gives teachers a caning

HIGH school students who find a newly-graduated teacher is turning into a classroom tyrant should sympathise rather than complain. It could be a symptom of “reality shock”.

This is a form of mental agony suffered by novice teachers as they discover the yawning gap between the theoretical idealism of their training days and the harsh realities of life in front of a blackboard.

The diagnosis comes from Dr. John Thorne McArthur, a research fellow in the Monash Faculty of Education. He makes it after studying the experiences of 800 fledgling Victorian secondary teachers—about 60 per cent of those trained to start work in the state’s schools in 1973.

The study is the initial stage of a project in which he will trace the careers of the young teachers during their first five years in the classroom.

By questioning teachers before they took up their first appointment and again after six months teaching, he found an average increase in “custodialism” of 13.14 per cent.

Teacher training institutes generally stressed personal relationships, student-centred learning and democratic classroom management, says McArthur. But the teacher subculture leans towards social distances in teacher-pupil relationships, subject-centred learning, and controlled and orderly learning environments.

“Whether they like it or not, secondary teachers are daily placed in situations where they may be required to impose and enforce rules possibly appropriate to 11 and 12-year-olds, but often not equally applicable to 18-year-old students, elsewhere regarded as adult in terms of political enfranchisement and legal responsibilities,” he says.

To survive in their new environment, idealistic new teachers may have to, at least outwardly, espouse custodial ideologies and display custodial behaviour to be accepted by their more experienced colleagues, says McArthur.

Students taking part in the study consistently complained of the unreality of their practice teaching and the lack of help and guidance from supervising teachers, he says. Many supervisors regarded their duties as an imposition and interference with their normal routine that was only slightly compensated for by the supplementary allowance to their salaries.

McArthur suggests the trauma of discovering the facts of teaching life could be a factor in the high dropout rate from the profession. Secondary teacher resignations in Victoria up to 1972 were between seven and 10 per cent a year—a large proportion involving relatively young teachers.

Almost 20 per cent of graduate mathematics science teachers who entered Victorian government secondary schools in 1969 had resigned by the beginning of the 1970 school year.

To cushion novice teachers against the effects of “reality shock”, considerable changes are needed in selection and training methods, McArthur says.

He recommends the following as a realistic program:

• Six months “internship” as a super-numerary appointee at a school, with normal staff rights but no specific teaching allotment. The trainee could possibly be attached to one or more of a team of experienced teachers.

• One year in a training institution with a series of short practice teaching rounds in a variety of schools, enabling the trainee to learn both the theoretical and practical aspects of teaching.

• Six months “externship” back at the first school, where the trainee is phased into full duties with short periods back at the training institution for refresher courses and general reinforcement of teaching theory.

McArthur says the present system of initial appointments means newly-qualified teachers are used generally as stop-gaps after experienced teachers are transferred and/or promoted.

The system should be changed, he says, by appointing new teachers FIRST and independently of transfers and promotions.

New teachers should also be told the name of their first school at least half way through their last year of training. This would give them time to establish contacts and develop relationships at the school well in advance of taking up duties, he says.

Some form of regionally organised meetings should be established for first year teachers, McArthur says. Those would provide a forum for greenhorn teachers to share experiences and discuss problems.

In most school settings teachers tend to do their work in isolation, he says, and under such conditions the beginners often assume their problems are unique.

“The realisation that others share their fears and frustrations may offset feelings of personal inadequacy,” he suggests.

Heart injection feeding

from previous page

be radio-opaque, so it shows up on X-rays. This lets MacMahon check that it is sited correctly.

“That tube becomes an artificial umbilical cord,” he explains. “By pumping the concentrated feeding fluid through it, we are providing the baby with the next best thing to an artificial placenta.”

The fluid, varied slightly from baby to baby according to its individual needs, is formulated by Brian James and made up daily in the hospital pharmacy.

It contains water, glucose as a main energy source, plus 16 amino acids, nine vitamins and two vitamin co-factors, major elements such as potassium, sodium, calcium, magnesium chloride and phosphorus. In addition there are trace elements—iron, copper, zinc and manganese.

Intravenous feeding of such premature babies has been tried before, but has attracted many opponents among medical men. MacMahon and James say this is because:

• The babies were considered “pre-viable” (too premature to have a chance of survival).

• Little hope was held of formulating a successful feeding solution.

• There was too much risk of infection—either local inflammation where feeding was through “surface” peripheral veins or general infection of the system if a central blood vessel was used.

No infection

But the Monash researchers have shown the tiny babies CAN be saved. And they have had no infection problems, MacMahon says this is because the valve-tipped catheter he uses keeps the feeding tube clear of blood and because he insists the tube be used only for administering the feeding solution.

When similar feeding systems have
The colorful world of Dr. Black

NEW coloring compounds produced by Monash organic chemists could one day be worth millions of dollars to the wool industry.

"It is hoped they will lead to development of wool dyes that do not fade in sunlight—a drawback with existing dyes which has lost wool a large chunk of the babywear market in particular."

"Baby" blue and "baby" pink are especially fade-prone colors.

The new color compounds have possible commercial applications in other fields, such as for color film and paints. 

Some 3B of them are now being evaluated at the International Wool Secretariat Technical Centre in the U.K. and worldwide patents on the manufacturing technique have been applied for.

The Australian Wool Corporation, through the Wool Research Trust Fund, is supporting the Monash work with annual grants. These have totalled almost $100,000 since 1970.

Like vitamins

The research program is headed by Dr. David Black, a reader in the department of chemistry. He came across the idea for the new color compounds while working on the synthesis of simple models for vitamin B12.

Both the vitamin and the synthetically-produced color compounds contain metal ions enclosed in large cyclic organic molecules.

It has always been a source of frustration in the wool industry that many existing dyes are stable and hold their color when used on other fabrics, but fade when used on wool.

"Normally when light shines on dye molecules, electrons in the molecules are excited and return the energy absorbed in the form of color and fluorescence," explains Black.

"But when the dyes are used on wool there is some interaction with chemical groups in the amino acids of the wool protein. When this happens, the absorbed light energy instead breaks the bonds holding the atoms of the dye molecules together and the color fades. The detailed mechanism of this phenomenon is still obscure.

Light sensitive

"All we know for certain is that it makes the dye chromophores more light sensitive, resulting in fading."

"Chromophores" are the key to the whole question of color. Briefly they can be described as any molecular unit that absorbs light. They can be an entire molecule or a section of a molecule. The number of atoms each contains, and the pattern in which these are arranged, varies the wavelength of light it absorbs, which in turn varies the color produced.

"In other words, a chromophore can be described as a molecular skeleton, or structure, which comprises the basic building block of a dye," explains Black.

"By varying that structure, we get different colors. Other variations produce properties like water solubility."

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To keep up with the demand for "new" colors—or, more precisely, new shades of the limited number of basic colors—chemists around the world are continually producing new variations of existing chromophores.

What the Monash researchers have done is come up with totally new chromophores. Four are being patented, as well as variations on two existing ones. Black and his assistants are also working on others.

They have developed new synthesis techniques for these types of compounds; these are simpler than existing methods and offer higher yields.

An important aspect of the Monash chromophores is that they have great structural flexibility, lending themselves to a great range of variations.

Thousands of color shades are theoretically possible.

By varying the new chromophores they have already synthesised, the Monash chemists have produced more than 100 pigments and dyestuff compounds in varying shades of various colors. It is the best of these which are now being tested in the U.K.
UNVEILING MARRIAGE PROBLEMS

SOCIETY should consider legally approved trial marriage as a way of preparing couples for the real thing, suggests Monash sociologist Warwick W. Hartin.

He makes the recommendation after completing a four-year study of marital breakdown, carried out as postgraduate research with the University's Department of Anthropology and Sociology.

During the study, Hartin examined the experiences of 30 unhappily married couples and 45 divorced women who sought help from Melbourne's Cairnmillar Institute. The result is a 622-page report which examines all aspects of courtship, marriage and divorce.

Hartin is assistant director of the Institute, an independent, privately-operated community health organisation. Marital counselling comprises 25-30 per cent of its work.

He says his findings show that many people marry before they have acquired sufficient maturity, experience of life and clarity about what they want from the relationship.

Of the 45 divorcees he questioned, 16 per cent said they had no engagement and 27 per cent were engaged for six months or less. The 30 married couples wed in even greater haste. More than half (57 per cent) made their vows with either no engagement or one of six months or less.

Statistics thrown up by the study confirmed earlier findings that the longer the engagement, the better the chance of marital success.

An understandable feeling of regret that they had married so soon was evident, particularly among the women, says Hartin. About 60 per cent of both the divorcees and those still married now felt that marriage should wait until a woman had time to mature and develop an understanding of herself. A further third believed it was necessary to see something of life and develop some discernment of people before marrying.

Asked what their pre-wedding hopes had been, 43 per cent of the married women, 36 per cent of their husbands and 20 per cent of the divorced women said they had had no clear prior expectations of what married life would be like.

Possibly as a result, 20 per cent of the married women, 17 per cent of the husbands and four per cent of the divorcees pinpointed the honeymoon as the starting point of trouble in their marriage. Seven per cent of both divorced and married women could locate the start of difficulties at a point prior to the wedding ceremony.

Hartin quotes one married woman as saying: "Because I intended breaking the engagement and didn't, I was dissatisfied from the beginning. There was always resentment there that I had done what I really didn't want to do."

Only 31 per cent of divorced women and 23 per cent of the married couples could describe the outstanding impression of their honeymoon as "quite happy."

Questioned on the sexual side of their marriages, 38 per cent of the married women and 46 per cent of the married men cited relationship and sexual problems as the outstanding impression of their honeymoon. Adds Hartin: "Further evidence ... shows that these problems were never satisfactorily resolved."

Among the married women, 67 per cent said they were now dissatisfied with their sexual relationship, as did 37 per cent of the husbands; 40 per cent of the divorcees felt the same at the time they separated from their husbands.

Contrary to popular belief, however, no evidence was found in the study that poor sexual relationships by themselves cause marital breakdown, says Hartin.

Nor was evidence found suggesting they led to adultery. Where adultery occurred, particularly on the part of women, the total marital relationship was found to be unsatisfactory. The resultant emotional deprivation then commonly propelled them to seek more emotionally rewarding relationships.

Hartin says a "somewhat surprising" finding was that twice as many of the married women than their husbands had been involved in extra-marital affairs (33 per cent to 17 per cent). The divorced women, however, claimed their ex-husbands had a high incidence of affairs.

Not one of the still-married straying wives said they felt guilty over their affairs. Twenty per cent of them said they believed the illicit relationships had helped hold their marriages together.

The most common excuse given for affairs was impoverishment of the marital relationship, Hartin says. The findings suggested it was not so much adultery which caused marital breakdown as the breakdown which caused adultery.

Hartin says the high number in the sample with no clear prior expectations of marriage highlighted the fact that apart from conditioning of the romantic variety, very little was done to prepare people for wedlock.

It was found that the women in particular frequently entered marriage because it was "the thing to do" or because they were lonely, or because it seemed to be a way out of a pre-marital situation where they were unhappy.

Marriages which end in divorce are not necessarily less satisfactory than those remaining intact, says Hartin. As an indication of how difficult it often is to abandon an unsatisfactory union, 33 per cent of the divorcees said they had been dissatisfied for more than five years before cutting the nuptial knot and 20 per cent of the women still married said they had been dissatisfied for periods in excess of five years.

Even more surprising, says Hartin, was the finding that 53 per cent of the married women were clinging to marriages with which they had never been satisfied.

Society's approval of trial marriage would recognise the realities of the human situation more genuinely than does the conventional marriage service with its requirement that the relationship shall continue "until death do us part."

"To approach the most intense of all human relationships in this way is futile and fantastic," Hartin says.