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Screening for health: Tunisia

Imagine the distress for everyone involved when it becomes apparent that a child is mentally disabled, especially if the condition could have been avoided. Thyroid deficiency in newborn babies can lead to varying degrees of mental retardation or intellectual impairment and, in severe cases, can lead to deaf mutism. For the person affected and their family, life will never be normal and yet the condition can be treated effectively if it is detected within the first few days of life. Radioimmunoassay (RIA) is a simple, cost effective diagnostic technique.

The Model Project: Tunisia

The economic cost of screening and, when necessary, treatment is far less than the cost of providing care for mentally disabled children and adults. It has been shown that even when using the most expensive reagents it is ten times cheaper to screen than not to screen and in some countries, up to thirty times cheaper to screen than care for, and lose the productive capacity of those affected.

Neonatal hypothyroidism affects one in one thousand live births in Tunisia.

Screening should be considered an essential part of primary health care and many developing countries have successful national screening programmes. The IAEA Model Project in Tunisia builds on the success already achieved, for example in Thailand, Guatemala and Costa Rica. The incidence of iodine deficiency is particularly high in Tunisia where one in one thousand babies are born with the condition in a population of between 7 and 8 million and a birth rate of 2.17. So detecting and preventing the condition will have a major impact. Furthermore, Tunisia has a high doctor patient ratio, in the order of 1:2,000 and a good health care coverage even in rural areas. This means that those babies who need to be treated will receive the medical attention they need.

Every newborn child will be screened within the first few days of life for this potentially distressing condition. Those affected will be treated immediately and should grow up to be normal and healthy children because early treatment is effective for life.

The IAEA Model Project in Tunisia can be taken as a model for other countries wishing to establish or extend their own RIA facilities

The need for and benefits of RIA

In many developing countries, the average diet contains insufficient iodine for normal development of the thyroid gland. If a pregnant women has a poor level of nutrition, her baby may be born with a thyroid deficiency. This may result in impairment of the baby's mental and physical development unless the child is treated promptly with hormonal replacement. Radioimmunoassay (RIA) is a diagnostic technique for screening purposes that is inexpensive and easy to use. Furthermore it is sustainable within the context of the technical and economic circumstances in developing countries. The technique is easy to learn and is far more rugged than some other diagnostic techniques since it is more resistant to adverse environmental conditions such as high temperature and humidity.

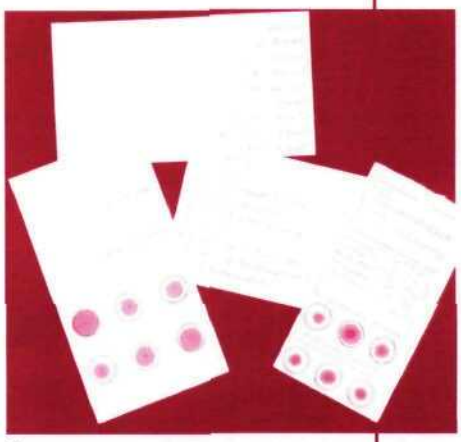
The RIA technique is simple and inexpensive enough to be applied on a national scale.

RIA - the initial challenge

A major constraint to the initial development of RIA was the high cost of the reagents required. Laboratories in developing countries had neither the equipment nor the technical skill to produce even the simpler reagents and had to rely on imported commercial kits which were expensive and subject to erratic delivery. Consequently, laboratories were unable to meet the

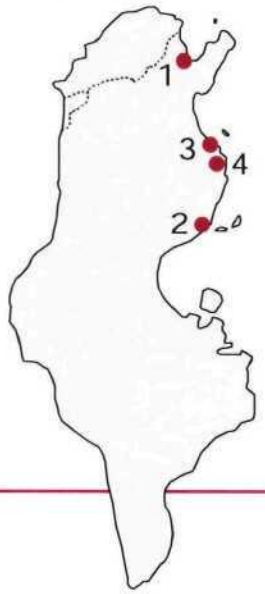
'Having a mentally deficient person in the family affects everyone, particularly in developing countries'

Rienzil Piyasena IAEA



Health care workers take a sample of the baby's blood, apply it to a special card which can then be mailed to the laboratory for testing and diagnosis.

RIA laboratory sites in Tunisia



1 Tunis
2 Sfax
3 Sousse
4 Monastir

In phase I, RIA facilities will be established or upgraded in four cities. A further five cities will be included under Phase II.

Screening for health: Tunisia

clinical demands of the workload nor maintain an adequate level of analytical reliability since standards of quality control were being compromised.

Solutions

IAEA first identified the problems and then helped participating laboratories in Member States by supplying reagents in bulk form. An intensive training programme was put in place to ensure good laboratory RIA practice, with proper attention to the monitoring of assay performance by means of internal quality control and computer assisted data processing. Even when using bulk reagents supplied from abroad, laboratories are able to reduce their costs by a factor of five. But as expertise develops, local reagent production is stimulated to the extent of economic viability. Costs of reagents come down further as they become more widely available locally and some laboratories are now finding these costs have reduced by a factor of ten, thereby greatly increasing the number of assays that can be offered. With continuing support from IAEA, many laboratories in Member States now have the equipment and trained personnel in place to produce their own primary reagents, and some laboratories are now producing the more sophisticated reagents required for some assays.

MARK EDWARDS/STILL PICTURES

Iodine deficiency leads to goitre as in this woman. Mental retardation is not necessarily severe but may be very disabling.

Is it safe?

- No radioactivity is administered to the patient.
- The level of radioactive tracer used in most assays is so small that liquid waste can safely be washed down the sink.
- In more advanced laboratories that make up their own tracers, proper procedures for protecting personnel and the environment must be established. Safety procedures form part of IAEA training.

The Tunisia experience

For a national screening programme to succeed, RIA laboratories must exist or be created in a sufficient number of centres to provide reasonable coverage for the entire country. Tunisia has RIA facilities in at least nine major hospitals and each has adequate equipment and trained staff as a result of IAEA support. Inexpensive bulk reagent-based methods have been introduced in each centre and, in addition, the Salah Azaiz Institute in Tunis now has the capability to produce and distribute the primary reagents required for thyroid assay to the other centres within the country. This Institute also has the data processing capability necessary for analysing test results on a national scale and can now assume responsibility for the neonatal hypothyroidism national screening programme in Tunisia and for organizing and implementing training programmes in all RIA centres within the country.

The radioactive element

^{125}I (iodine) is most widely used in RIA. An oxidising agent is used to convert Sodium^{125}Iodine to reactive iodine.

^{125}I has the advantages of:

- ready availability
- virtually 100% radiochemical purity
- easy introduction to many proteins and other biological molecules.

Furthermore, it is:

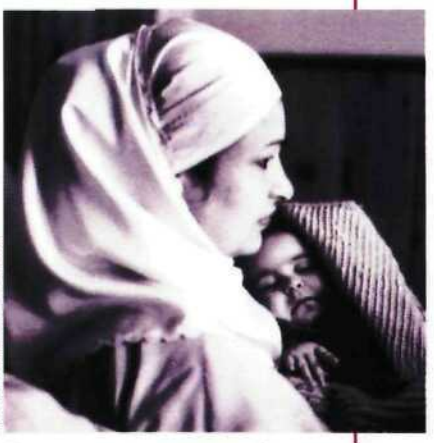
- inexpensive
- simple to use

The Model Project - IAEA input

Depending on need, the Agency's inputs usually include equipment, reagents and training. Governments are expected to take over the cost of supplying reagents once the programme is established and sufficient lead time has elapsed for the necessary budgetary provision.

'It's not just a question of dollars or dinars but of quality of life - for the individual, the family, the people around them - for society as a whole.'

Rienzil Piyasena IAEA



SEAN SPRAGUE/PANOS PICTURES

A healthy baby - every woman's pride and joy

OVER the last two decades, IAEA has assisted approximately 70 laboratories throughout Africa to establish RIA facilities. One technician working full-time on the analysis of blood spot samples for neonatal hypothyroidism can realistically be expected to handle 10,000 samples per year. In Tunisia, with nine centres participating in the screening programme, the total sample capacity of over 100,000 assays can be achieved. The economic cost to the country is minimal compared to the cost of institutional care for mentally disabled adults and children who would never be able to lead economically productive lives. For the families of those affected, the saving in anxiety and distress is incalculable.

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