

must not neglect the opportunities for prevention.¹⁰ This too is the responsibility of all who work with children,¹¹ but in the health service it particularly falls on primary care staff, including midwives, health visitors, school nurses,¹² and on those working with mentally ill adults and drug misusers. These teams naturally focus on the needs of their adult patients and are at risk of forgetting the child or children at home.

David Hall *president of the Royal College of Paediatrics and Child Health*

Institute of General Practice, University of Sheffield and Sheffield Children's NHS Trust, Sheffield S10 2TN
d.hall@sheffield.ac.uk

Competing interests: The College is seeking funds to extend a training scheme in child protection in collaboration with NSPCC and Johnson and Johnson Pediatric Institute.

- 2 UK review of effective government structures for children. London: Gulbenkian Foundation, 2000.
- 3 Department of Health, Home Office, and Department for Education and Employment. *Working together to safeguard children: a guide to inter-agency working to safeguard and promote the welfare of children*. London: Stationery Office, 2000.
- 4 Southall D, Samuels MP, Golden MH. Classification of child abuse by motivation and degree rather than by type of injury. *Arch Dis Child* 2003;88:101-4.
- 5 Home Office and Department of Health. *Complex child abuse investigations: inter-agency issues*. London: Home Office Communications Directorate, 2002.
- 6 Dale, P, Green R, Fellows R. *What really happened?* London: National Society for the Prevention of Cruelty against Children, 2002:40-3.
- 7 Bengier JR, Pearce AV. Simple intervention to improve detection of child abuse in emergency departments. *BMJ* 2002;324:780-2.
- 8 The Hon Mr Justice Wall. Expert evidence 10 years after the implementation of the Children Act 1989: where are we? In Rt Hon Lord Justice Thorpe, Cowton C, eds. *Delight and dole—the Children Act ten years on*. Bristol: Jordan, 2002:75-86.
- 9 Marcovitch H. Diagnose and be damned. *BMJ* 1999;319:376.
- 10 Glaser D. Child abuse and neglect and the brain—a review. *J Child Psychol Psychiatry* 2000;41:97-116.
- 11 Hall DMB, Elliman D. *Health for all children*. 4th ed. Oxford: Oxford University Press, 2003.
- 12 Olds D, Henderson CRJ, Kitzman H, Cole R. Effects of prenatal and infancy nurse home visitation on surveillance of child maltreatment. *Pediatrics* 1995;95:365-72.

1 Lord Laming. *Inquiry into the death of Victoria Climbié*. London: Stationery Office, 2003. www.victoria-climbié-inquiry.org.uk (accessed 1 Feb 2003).

Medical experts and the criminal courts

All relevant material must be disclosed, including facts detrimental to the opinion

The quashing of Sally Clark's conviction for the murder of her sons Christopher and Harry has inevitably been followed by questions about the role of the medical experts, in view of their failure to disclose key evidence and the role such evidence played in securing her conviction.¹ The debate has been played out across the media, not least in the pages of the *BMJ* and on its website.^{2,3}

Medical experts are called on daily to deliver their opinions in both civil and criminal cases. Critics have focused their attention mostly on criminal trials. The initial involvement of an expert may be through professional duties, as in the case of the forensic pathologist who performs an autopsy and then finds that evidence from the autopsy report is being used by the prosecuting authorities in a criminal trial. Other experts may be called on by the police or by the Crown Prosecution Service.

In the adversarial systems of law in the United Kingdom the defence is also entitled to seek appropriate experts. Expert witnesses are in a very privileged position as they may give opinion as evidence, unlike other witnesses who can only give evidence of fact. Whichever side experts are called by, their duty is clear—to give impartial and objective evidence for the court and not for the side that has called them. The defence may ask for an expert opinion and then choose not to use such evidence. If an expert opinion is to be used it must be disclosed to the prosecution. The prosecution, however, is under an obligation to disclose all its evidence to the defence.

We live in an era of evidence based medicine, and experts should base their opinion on solid evidence and not on intuition. Alan Moritz discussed the problem of substituting intuition for scientifically defensible interpretation in 1956.⁴ He said: "He [the

pathologist] may be highly esteemed by the police and by prosecuting counsel because he is an emphatic and impressive witness. His prestige, together with exclusive access to original evidence, places him in an exceedingly powerful position in the courtroom." A defence expert may be viewed by the jury as hired to say something that would help the accused. Moritz concluded the passage by saying that the stakes are too high to play hunches in forensic pathology.

Experts should be appropriately qualified and remain in their field. Concerns have been raised where an expert only ever appears for the prosecution or the defence and about experts who seem to be pursuing a sociopolitical agenda not based on objective evidence.

One of the major criticisms in the Sally Clark case was the use of the statistic giving a one in 73 million chance of a woman with Sally Clark's background having two "cot deaths." This evidence was given by an eminent paediatrician but was roundly criticised by statisticians. Lord Justice Kay described the statistic as grossly misleading, although the first appeal court, aware of questions over the statistic, did not overturn the conviction. The main issue in the Sally Clark case was non-disclosure. The expert witness must include all relevant material, whether it supports or is detrimental to the opinion. The basic rule is that the prosecution must disclose its material to the defence. The microbiology results should have been in the pathologist's report, or their existence declared, whether they were felt to be important or not, so the defence could consider them.

The use of expert evidence in the legal system has been discussed in several reviews. Most recently Lord Justice Auld examined the role of experts.⁵ At present it is for the trial judge to determine who is an expert. The possibility of using experts appointed by the court

was looked at but not recommended. Lord Justice Auld also rejected the argument that where a defence lawyer goes on a shopping expedition for a suitable expert all opinions should be disclosed to the court. This was on the basis that our current criminal trials are adversarial and the burden of proof lies with the prosecution.

The question of auditing expert medical evidence is an important one and has not yet been addressed. The courts are not the appropriate place for this. Many experts, including forensic pathologists, work in isolation. Individual cases are not reviewed before a report is prepared, although an annual audit of Home Office pathologists is undertaken in England and Wales. In forensic science laboratories, a second scientist validates each case. A second pathologist checks cancer diagnoses. No such check is routinely performed in autopsy work in England and Wales, despite the fact that the evidence may form the central core of a case that leads to life imprisonment.⁶ A second pathologist checking the work of a colleague should be routine in potential criminal cases. Forensic pathology services are currently under review in England and Wales, a region

with few established centres. However, in these centres regular audit can take place, and we have instituted such checks on work performed in our centre. Clinical audit is now established. Medicolegal work should be similarly audited and subject to quality assurance.

Christopher M Milroy *professor of forensic pathology*

University of Sheffield, The Medico-Legal Centre, Sheffield S3 7ES
c.m.milroy@sheffield.ac.uk

Competing interests: CMM is a Home Office accredited forensic pathologist, part of whose salary is directly funded by the Home Office. He appears regularly in criminal cases at the request of both the prosecution and defence. He had no direct involvement in the Sally Clark case.

- 1 Gibb F. Mother's release brings call for review of 15 cases. *The Times* 2003;31 Jan:5.
- 2 Watkins SJ. Conviction by mathematical error? *BMJ* 2000;320:2-3.
- 3 Meadow R. A case of murder and the *BMJ*. *BMJ* 2002;324:41-4.
- 4 Moritz AR. Classical mistakes in forensic pathology. *Am J Clin Pathol* 1956;26:1383-97.
- 5 Lord Justice Auld. Review of the criminal courts of England and Wales. London: Stationery Office, 2001. www.criminal-courts-review.org.uk/auldconts.htm (accessed 3 Feb 2003.)
- 6 Pounder D. Forensic pathology services. *BMJ* 2002;324:1408-9.

Thyroid function tests and hypothyroidism

Measurement of serum TSH alone may not always reflect thyroid status

Paper p 311

It is extraordinary that more than 100 years since the first description of the treatment of hypothyroidism and the current availability of refined diagnostic tests, debate is continuing about its diagnosis and management. Symptoms of thyroid failure are often non-specific, such as weight gain, low mood, and fatigue. Some patients seeking an explanation for feeling "below par" are disappointed when thyroid function tests are normal. Unable to accept that there may be psychosocial reasons for their symptoms, a vociferous minority believe that hypothyroidism may exist with normal serum concentrations of both thyroxine (T_4) and thyroid stimulating hormone (TSH).

Their hypothesis is that a doctor cannot know whether a concentration of free T_4 or TSH within wide reference ranges is normal for that individual. Such an argument, supported by some misguided medical practitioners to justify prescribing various combinations of thyroid hormones, does not appreciate the sensitivity of the pituitary thyrotroph, which modifies the synthesis and secretion of TSH in response to minor changes in thyroid hormone concentrations within their reference ranges. For example, a reduction in free T_4 from 20 pmol/l to 15 pmol/l is likely to cause a rise in serum TSH to above the upper limit of the reference range, and a similar incremental rise in free T_4 to suppress thyrotroph secretion, with a resultant serum TSH concentration of less than 0.05 mU/l.¹ In effect, any significant deviation from the set point for serum thyroid hormone concentrations, which is remarkably constant from day to day in healthy people, will trigger changes in serum TSH.

The finding of raised or undetectable serum TSH with thyroid hormone concentrations within their reference ranges is not usually associated with symptoms,

hence the basis for the unsatisfactory terms subclinical hypothyroidism and hyperthyroidism. It is better to consider them as the mildest forms of thyroid failure and thyrotoxicosis, respectively, particularly as a variable proportion of patients with subclinical hypothyroidism benefit from replacement therapy with thyroxine,² and endogenous subclinical hyperthyroidism is a recognised risk factor for atrial fibrillation and osteoporosis.³

In contrast, patients with non-specific symptoms of hypothyroidism and unequivocally normal T_4 and TSH concentrations do not benefit from treatment with thyroxine.⁴ In the paper by Meier et al in this issue we are reminded that in severe primary hypothyroidism with serum TSH greater than 20 mU/l the correlation between TSH concentrations and other end organ responses to a low serum T_4 is poor (p 311).⁵ This must not be interpreted as thyrotroph insensitivity but exhaustion after prolonged stimulation⁶; an analogous apparent loss of sensitivity occurs after treatment of hyperthyroidism as the suppressed thyrotroph requires several weeks to recover its responsiveness to falling serum thyroid hormone concentrations.

It is the exquisite sensitivity of the thyrotroph that led to the use of serum TSH measurements as a first line test of thyroid function; a normal TSH indicated euthyroidism whereas only a raised or suppressed concentration prompted the measurement of T_3 or T_4 or both, to assess the degree of hypothyroidism or hyperthyroidism.⁷ This approach has been strongly championed by some laboratories to contain costs, but they may provide misleading information. For example, a normal TSH may be recorded in patients with profound hypothyroidism secondary to pituitary or hypothalamic disease,⁸ a remediable condition that