Infective hepatitis and the handling of specimens in general practice

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IT HAS BEEN KNOWN FOR some time that the virus of infectious hepatitis with a short incubation period, 15–45 days (IH virus; virus A), is present in the blood (or tissues and tissue fluids) during the later part of the incubation period and during the clinical illness; it also may be in the duodenal juices, faeces and (perhaps) urine at these times. In some patients excretion of virus in faeces may continue well into convalescence. Anicteric cases may be particularly numerous, especially in children, and are an important source of infection. Gamma globulin given to contacts may protect in the sense of preventing clinically manifest disease but a subclinical infection may still occur. Clearly this virus (IH) may sometimes be transmitted by blood products or tissues collected during the incubation period of an overt case, or conceivably from an anicteric case of the disease.

Until recently there seemed to be a clear-cut difference between infectious hepatitis, virus A, and serum hepatitis with the long incubation period, 50–200 days (SH virus, virus B), which was thought to be transmitted exclusively by transferring the blood, blood fractions (except gamma globulin), cells, tissues, tissue fluids or exudates from one individual through the skin of another. In general, it is still correct to regard the viruses as distinct.

TABLE I
DIFFERENTIAL FEATURES OF INFECTIOUS AND SERUM HEPATITIS VIRUSES

	Infectious Hepatitis (IH: Virus A)	*Serum Hepatitis (SH: Virus B)*
Clinico-pathological aspects		
Incubation period	15–45 days	50–200 days
Onset	acute	slow
Arthralgia, rash	—	Often present as a prodrome
Fever	common	rare
Main prevalence	6–25 years	all ages
Mortality	0.1—1 per cent.	1—37 per cent.
Raised SGOT	3–19 days	35–200 days
Raised IgM	common	rare
Thymol turb./flocc.	+++	±

Recently, however, it has been shown that a variety of hepatitis with an incubation period similar to that of serum hepatitis (virus B), namely Krugman's MS2 strain of hepatitis virus, can be transmitted by feeding infected serum to volunteers. Also that other volunteers in contact with those inoculated with MS2 by the intramuscular route also developed hepatitis. It must be presumed from this limited and not yet decisive evidence that virus B *may* be present in stools, urine or even nasopharyngeal or oral secretions; and consequently on common sense grounds these excreta and secretions from cases of serum hepatitis should be *treated as potentially infectious.*

Although there are differences in the onset, clinical course and pattern of biochemical tests in infections with viruses A and B (*see* table I) these are rarely diagnostic in the individual

case. Any collection of sporadic cases of viral hepatitis in the general population will almost certainly be a mixture of ordinary infectious hepatitis and of serum hepatitis with of course a preponderance of the former which shows its greatest incidence in children.

TABLE II

DIFFERENTIAL FEATURES OF INFECTIOUS AND SERUM HEPATITIS VIRUSES

	Infectious Hepatitis (IH: Virus A)	*Serum Hepatitis (SH: Virus B)*
Virus in body		
Blood	*7 days before onset and during acute illness	*87 days before onset, during and after illness
Faeces	*16 days before to 8 days after onset neg. 19–33 days	Vol. tests neg. (antigen present
Urine	*Present acute phase	Unknown (antigen present)
Liver	†	'virus' (20 nM) in nucleus. Antigen in nucleus and cytoplasm.
Nasopharynx	**	*One positive obs.
Immunity	Homologous only	Homologous only
Carriers		
Blood	Rare: 8 months*	up to 13 years (? lifelong)
Faeces	Rare: 5 and 15 months*	†

* Limited observations with volunteers

† Some positive observations recorded but not repeated

** Particles resembling a 'corona' virus (80–100nM) seen; significance not yet certain

The virus of serum hepatitis is present in the blood during the long incubation period of the disease and may persist for long periods after the illness; a carriage which may be symptomless or associated with greater or lesser indications of chronic, disturbed hepatic function.

Gamma globulin is known to be protective against virus A (infectious hepatitis) but is of little or no value against virus B, at least in the prevention or amelioration of post-transfusion hepatitis. Cross challenge experiments with volunteers suggest that an infection with virus A produces an homologous immunity but does not protect against virus B. Similarly volunteer studies suggest that there is an homologous immunity to virus B but this does not protect against virus A. There are some fragmentary observations that, in situations other than with post-transfusion hepatitis, while not preventing infection with virus B, may mitigate the severity of the subsequent illness and on the basis of these very slender observations its administration has been recommended in 'accident' situations.

Serological tests for 'Australia' antigen, when positive, indicate that the individual is infected with the virus of serum hepatitis. A negative test does not exclude infection.

In planning precautions in the practice or side room (laboratory) it is important to keep the new information on the possible faecae-oral spread of serum hepatitis (virus B) in perspective and to recognize that spread by the parenteral route *is still overwhelmingly the major and preventable hazard.* Spread by the oral route may occur (*e.g.*, by aspirating infected blood or serum into the mouth; licking contaminated labels, smoking at the bench, eating in the laboratory area without washing hands or changing clothing, etc.) and has to be guarded against on common sense grounds; however, splashing blood on to the skin, into small abrasions, cutting oneself on contaminated instruments, or pricking oneself with a contaminated needle are really substantial dangers. No epidemiological evidence has been found that this virus is highly communicable by aerial spread in the same way as are the respiratory viruses.

For completeness at this point it may be noted that staff in the late incubation period of viral hepatitis may be a hazard to patients; there are a few recorded incidents in which a nurse or surgeon have transmitted, by mechanisms unknown in detail, infection to patients to whom they have given injections or on whom they have operated.

The viruses of infectious and serum hepatitis are hardy ones; particularly the latter. Disinfectants based on phenol or surface active compounds are not likely to be effective and solutions with chlorine are preferable (Chloros; Domestos; Diversol etc.). Serum hepatitis

virus is more heat resistant than most viruses. Autoclaved or presterilized equipment is desirable. If boiling has to be used it should be for at least 30 minutes.

General practice problems

The uncertain duration of the period of infectivity and the lack of specific methods of treatment of hepatitis are causing concern. As indicated the virus may be present in the blood during the long incubation period and after recovery; in addition about 1/800 of the healthy population are symtomless carriers.

In handling potentially infected specimens, the general practitioner may be satisfied with his own safety. Regarding his staff he carries a special responsibility which can only be considered as having been met properly if adequate precautions have been laid down, taught and insisted upon. This is particularly relevant as much of the information regarding the need for such precautions is subsequent to most of todays' practitioners and their staffs' training.

With this in mind the restatement of guide lines and actions may be helpful.

High risk samples. Epidemiological and other experience suggests that whole blood, plasma or serum specimens in particular, and, rather less certainly, tissue samples, fluid from body cavities from certain categories of patient may be unusually hazardous as a source of infection for staff. Although there is at present no definitive evidence it would be wise to treat faeces and urine from these patients as if they also contained the virus; particularly if the excreta contain blood. The categories of patient are:

(a) patients with chronic renal failure in units (chronic renal dialysis; kidney transplant) in which serum hepatitis virus is or has been present
(b) patients suffering from viral hepatitis, jaundice as yet undiagnosed, or polyarteritis nodosa
(c) patients with altered or defective immunological competence; leukaemia, and Down's syndrome
(d) patients who have received repeated and large transfusions of blood—viz. aplastic anaemia haemophilia, cardiac surgery.

All of these categories should be tested for Australia antigen (HAA) and would clearly be considered as 'high risk' if found to be positive.

A. Specimen collection and transport to laboratories

1. Regardless of the nature of the specimen, care must be taken not to soil the exterior of the container or the request form; if soling occurs, or if there is obvious leakage of the specimen after the container has been 'sealed', the specimen must be transferred to a fresh container.

2. Specimens must then be wrapped in a safe manner, e g in stout cardboard containers supplied by the laboratory; the request form should not be placed inside this outer container but must be wrapped round the exterior and secured with a rubber band. A request form accompanying any specimen from a suspect or known high risk case must clearly indicate the risk; the specimen container from such high risk cases should be enclosed in a plastic bag which is then sealed with sello or adhesive tape before being put into the final cardboard container.

3. It is a legal offence to send a leaking container through the post.

4. It is useful to contact your laboratory to discover how they would like their specimens packed; laboratories are reviewing their procedures or have recently done so.

5. Special arrangement should be made with local authorities in regard to uplifting materials from post-hepatitic patients on home dialysis (these are normally made by the director of the parent renal unit prior to discharge home).

B. Handling guide lines for side-room tests in the practice premises

1. For tests on specimen from known high risk cases the question should be asked seriously: "Why should this test be carried out at the practice premises?" Only rarely should this be found to be necessary to do this.

2. Mouth pipetting must not be undertaken; rubber teats or bulbs or similar methods must be used (disposable mucous extractor is a useful aid to this problem). Ageing rubber tubing must be discarded, as it cracks and is impossible to clean.

3. Side-room tests should be conducted on an impervious surface, e g a sheet of formica or in a flat-bottomed sink so that if contamination occurs cleansing can be easily performed. If spillage or contamination does occur this should not be dealt with until the examiner has donned disposable plastic gloves; a satisfactory method of decontamination is with 'cellosene' wadding soaked in 10 per cent Chloros. Chipped porcelain sinks are an absolute contra indication for

such a use. Other than formica surfaces acting as a test bench can be made safer by use of disposable paper towels.

4. Surfaces used for performing side-room tests should be mopped down as in (3) above at the end of each test session.

C. Disposal of waste materials

1. *Specimens:* Faeces, urine, blood and other fluid specimens should be retained until the end of each testing session when they can be disposed of in a sluice or toilet pan; specimens should be carefully decanted to reduce splash back. Disposable gloves must be worn during this procedure.

2. *Specimen containers for collecting specimens to be tested in the surgery.* When non-destructible laboratory specimen containers have been used they should be returned to the laboratory for processing and should be clearly marked USED & SOILED.

Non-destructible, non-standard containers not obtained from a laboratory, or plastic containers. After emptying these should be submerged in a plastic pail containing 10 per cent Chloros overnight and then removed, or better still drained and left with other refuse for collection by the local authority. Gloves must be worn when placing such containers into and removing them from the Chloros which should be carefully decanted into a sluice or toilet pan after the articles have been extracted from the pail.

3. *Disposable syringes and needles.* The destruction of such equipment by snapping the seating of the needle and the needle itself is not a safe procedure because of:

(a) risk of injury to the operator
(b) spray of droplets.

To prevent re-use by unauthorized persons the emptied syringe with needle *in situ* can be rendered safe by replacing the needle guard which can be annealed quickly to the syringe and needle by gentle heat. (Spirit flame or bunsen burner). The assembly can then be placed with other refuse for collection; where facilities exist the assembly should be incinerated on practice premises. Stylletes offer a problem regarding disposal; it is suggested that these are jettisoned into a stout cardboard box or elastoplast tin and at frequent intervals the box should be firmly sealed for collection with other refuse.

4. *Soft waste*, e g swabs paper, tissues, cotton wool, should be collected in a soiled dressing bin lined with a stout polythene bag. On removal the bag should be sealed either by knotting the neck or sealing with adhesive tape or stapled with an ordinary paper stapler every 2 cm before collection with other refuse. Aesthetically an opaque polythene liner should be used since this has the merit of hiding blood-stained or other soiled dressings.

D. Other precautions

In addition to the use of disposable plastic gloves and other suggestions made above, frequent hand-washing should be encouraged, e g by ensuring a plentiful supply of paper towels, and a dispenser of disposable gloves within handy reach of the staff.

When an accident occurs, e g a finger prick, the circumstances should be recorded and, if necessary, advice regarding prophylactic procedures should be obtained from the bacteriological laboratory staff. In preparing specimens for transmission, labels, envelopes, stamps should not be licked but should be moistened with a suitable pad.

Specimens handed into the practice premises reception should be placed in a suitable communal container eg an empty biscuit tin and remain there until taken for examination or onward transmission.

In a short review of the problems and actions to be taken, much must be left undiscussed and by the same token these suggestions are in no way comprehensive. Many of the procedures outlined are obvious, but it is worth stressing that every patient is a possible carrier of the Au–SH antigen and a few may even be incubating the disease. An incorrect attitude towards the handling of laboratory specimens by the doctor or his staff could well cause a long period of incapacity or even more serious consequences. We are responsible for our staff.

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