

fection was implicated in a form of zidovudine-responsive uveitis [17-19]. Our observation of an intraocular HIV-1 isolate tropic for primary neural cells further suggests that a neurotropic strain of the virus infects the eye in some patients.

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HIV saliva test for surveillance and surveys

Although people are reluctant to give blood specimens for HIV antibody testing, they often will not act to reduce HIV until they perceive that the virus has come to their community or infected their sexual partner [1]. Saliva testing is an ideal medium for surveys and surveillance because of its non-invasive nature, ease of collection, and safety for health and laboratory workers [2,3]. Important to public-health agencies are the cost, sensitivity and specificity of the test. As part of our attempt to find a low-cost testing scheme, we evaluated the Omni-Sal saliva collection device (Saliva Diagnostic Systems, Inc., Vancouver, Washington, USA) and the Detect HIV 1/2 assay (BioChemical ImmunoSystems, Inc., Montreal, Canada) using specimens collected in Thailand in the largest comparative study ever performed worldwide on saliva [4]. For our blind re-analysis, we selected 986 saliva specimens from two out of four sites in Thailand. Known to two of us (R.R.F., N.S.) but blind to the laboratory staff, 172 saliva specimens were previously determined to be true HIV-positive and 814

to be true HIV-negative by linked-serum enzyme-linked immunosorbent assay and Western blot confirmation.

Saliva specimens were measured with Detect HIV 1/2 up to three times; HIV reaction was defined as an optical density-to-cutoff ratio (OD : CO) of ≥ 1.0 by at least two of the three potential assays. Whereas the Omni-Sal typically collects 1 ml saliva, each Detect HIV 1/2 assay requires only 0.15 ml saliva, or a maximum of 0.45 ml for the three assays. The package insert recommendations for the Detect HIV 1/2 assays were followed with two exceptions appropriate to saliva: (1) sample volume was increased to 150 μ l, and (2) sample diluent volume was decreased to 50 μ l. After the laboratory staff completed their analysis, the results were sent to Los Angeles for computer linkage of saliva to matching serum. Following these criteria, 168 out of 172 confirmed HIV-positive samples were correctly identified (sensitivity, 97.7%) as were all 814 confirmed HIV-negative samples (specificity, 100%).

Given these findings, if the true HIV prevalence in a tested group was 1.0, 5.0 or 10.0%, investigators using the Detect HIV 1/2 saliva test would observe a prevalence of 0.98, 4.88 or 9.77%, respectively. For subjects with a positive Detect HIV 1/2 saliva test, the predictive value of having HIV antibodies present in serum would be 97.7%, the same as the sensitivity because the specificity is 100%. On the basis of these results, we feel that the Omni-Sal saliva collection device and Detect HIV 1/2 assay are an ideal combination for surveillance programs [5,6], prevalence studies of prisoners [7], community surveys, follow-up intervention or prevention trials, and for investigations of highly mobile and elusive groups such as drug users [8,9], homeless persons, or commercial sex workers [10].

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Syringe cleaning techniques and transmission of HIV

Since the association of HIV with AIDS, the risk of transmission of the virus through sharing of equipment by injecting drug users (IDU) has been well documented [1–3]. Several geographic pockets exist where the major risk group for HIV infection is IDU. For example, in Italy 70% of AIDS cases notified to date originate from this group [4]. Plasma HIV titres can reach as high as 10^4 /ml, depending on the disease stage of the HIV-infected individual [5–7]. The titre is especially elevated at seroconversion or during end-stage disease. In addition to this cell-free virus, blood also contains between 0.01 and 1% peripheral blood cells in which the HIV genome is integrated [5–7]. Thus, transmission of virus is possible if cleaning of contaminated injecting equipment is inadequate. In the absence of new disposable injecting equipment, IDU re-use or share needles and syringes to inject drugs. To assess the risk of transmission of HIV through re-used injecting equipment, we applied various cleaning techniques (including those currently recommended in Australia [8]) to syringes that had been spiked with chronically HIV-infected lymphocytes suspended in blood, then attempted to re-isolate HIV.

When (illicit) drugs are administered by the intravenous route, a common practice is to inject into the vein, withdraw a volume of blood (up to 200 µl) into the syringe chamber, then re-inject this volume to ensure a maximum amount of drug is removed from the syringe. This procedure is known as 'jacking', and results in contamination of both the needle and syringe with almost undiluted blood. Current recommendations in Australia

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are to disinfect injecting equipment using a '2×2×2' protocol consisting of 2× water washes, 2× bleach (containing 5.25% weight/volume available chlorine) washes followed by 2× water washes [8]. Each wash with bleach should include 30 sec of contact before expulsion. The recommended bleach is full strength household bleach or 'fit cleaning' sachets containing powdered bleach (including instructions for use) which are dispensed at needle-exchange sites.

In an attempt to mimic the injection practice described above, 100 µl unclotted human blood spiked with chronically HIV-infected lymphocytes (10^6 H9-HTLV-III_B cells per ml) was drawn into a 1 ml syringe (Terumo; Terumo Medical Corporation, Elkton, Maryland, USA) via a microtitre tip inserted into the syringe tip. This prevented exterior contamination of the syringe housing, thus avoiding false-positive HIV isolation results and the possibility of needle-stick injury to the operator. Following expulsion of this contaminated blood, a volume of 25–50 µl remained in the syringe-tip housing. Syringe washing experiments were performed either immediately following contamination of the syringe or 3 h later after the equipment had been left at room temperature. These parameters were chosen to represent best-case (minimal likelihood of transmission) and worst-case (increased likelihood of transmission) scenarios, respectively. The washing procedures performed on the contaminated syringes varied from water alone to combinations of water/bleach/water (Table 1). One wash was defined as complete filling of the syringe with