a simple reliable method for detecting anti-HCV antibodies in human serum that requires neither complex reagent preparation nor expensive instrumentation, could prove useful.

Nicole Cancré,* Gérard Grésenguet,† François-Xavier Mbopi-Kéou,‡ Alain Kozemaka,† Ali Si Mohamed,* Mathieu Matta, Jean-Jacques Fournel,§ and Laurent Bélec*

*Université Pierre et Marie Curie, Hôpital Broussais, Paris, France; †Centre National de Transfusion Sanguine, Bangui, République Centrafricaine; ‡London School of Hygiene and Tropical Medicine, London, United-Kingdom; and §Hôpital de la Pitié-Salpêtrière, Paris, France

References
1. Ndumbe PM, Skalsky J. Hepatitis C virus infection in different populations in Cameroon. Scand J Infect Dis 1993;25:689-92.
2. Xu LZ, Larzul D, Delaporte E, Bréchet C, Kremsdorf D. Hepatitis C virus genotype 4 highly prevalent in Central Africa (Gabon). J Gen Virol 1994;75:2393-8.
3. Fretz C, Jeannel D, Stuyver L, Herve V, Lunel F, Boudif a A, et al. HCV Infection in a rural population of Central African Republic (CAR): evidence for three additional subtypes of genotype 4. J Med Virol 1995;47:435-7.
4. Pawlotsky JM, Bélec L, Grésenguet G, Desforges L, Bouvier M, Duval J, et al. High prevalence of hepatitis B, C and E markers in young sexually active adults from the Central African Republic. J Med Virol 1995;46:269-73.
5. Aceti A, Taliani D. Hepatitis C virus testing in African sera. Ann Intern Med 1992;116:427.
6. Callahan JD, Constantine NT, Kataaha P, Zhang X, Hyams KC, Bansal J. Second generation hepatitis C virus assays: performance when testing African sera. J Med Virol 1993;41:35-8.
7. Kodama T, Ichiyama S, Sato K, Nada T, Nakashima N. Evaluation of a membrane filter assay system, Ortho HCV Ab Quik Pack, for detection of anti-hepatitis C virus antibody. J Clin Microbiol 1998;36:439-40.
8. Young KKY, R. Resnick RM, Myers TW. Detection of hepatitis C virus RNA by a combined reverse transcription-polymerase chain reaction assay. J Clin Microbiol 1993;31:882-6.

Immunization of Peacekeeping Forces1

To the Editor: The immunization status of military contingents arriving from different nations for peacekeeping missions may vary widely. This variation results from lack of information, coordination, and financial support.

For larger missions, the United Nations (UN) Headquarters issues recommendations about needed vaccines; recently, operations officers have consulted World Health Organization experts before issuing recommendations, and their advice, which takes into account epidemiologic data in the host country, has improved. Medical officers who develop recommendations for smaller missions must consider the pathogenic agent; environment; host efficacy, safety, and price of preventive measures; and legal and ethical aspects.

Data on the incidence of vaccine-preventable diseases within a military population that had similar duties in the same location are rarely available. When data from the respective region are not available, disease incidence or prevalence in the host country may be substituted. These data, however, may be misleading since the military often does not have the same lifestyle as the native population. Plague, for instance, had an incidence rate of 8 per 100,000 in Namibia, but not a single case was reported in the South African Armed Forces (unpub. SAMS report: Disease Profile of South West Africa, 1989). If epidemiologic documentation for a host country is not available, data from neighboring countries may be useful.

Traveler’s diarrhea is the most frequent health problem abroad (1,2). Although the diarrhea is self-limited and lasts an average of 1 day with appropriate treatment (4 days without), the unproductive time may be detrimental to a military mission. Oral vaccines against the three most frequent causes of traveler’s diarrhea (enterotoxigenic Escherichia coli, Campylobacter spp., and rotavirus [1,2]) are being developed; the latter will be available soon (3). Hepatitis A, most frequent among the vaccine-preventable diseases (4), is 10 to 100 times more frequent than typhoid fever (4,5). Hepatitis B occurs mainly in expatriates, but infections have also been observed in tourists who have had unprotected casual sex (6). The incidence rate of rabies is unknown, but animal bites that may result in rabies virus transmission and thus necessitate postexposure prophylaxis are frequent (7). Only anecdotal cases of diphtheria, tetanus, and tuberculosis have been reported (8). Poliomyelitis, yellow fever, Japanese encephalitis, and plague occur only in limited parts of the world (5). The situation may rapidly change as

---

1Presented in part at the NATO Research & Technology Organization, Aerospace Medical Panel Symposium on Aeromedical Support Issues in Contingency Operations, Rotterdam, The Netherlands, 1 October 1997.
epidemics occur (e.g., diphtheria in eastern Europe in the early and mid-1990s) (9). If needed, the World Health Organization can provide information on confirmed and unconfirmed epidemics on a weekly basis.

Travel and peacekeeping mission statistics share similarities. In Namibia, the South African Armed Forces had most often observed hepatitis (unspecified), with rare cases of tuberculosis, typhoid, and meningitis (unpub. SAMS report: Disease Profile of South West Africa, 1989), as did the UN mission to Namibia, where within 12 months and with 7,114 employees, seven cases of hepatitis (mostly hepatitis A, some unspecified) occurred (10). No other vaccine-preventable infections were diagnosed in this UN mission.

Considering both risk (on the basis of incidence rates) and impact of infection, the priority for immunization (from highest to lowest) is as follows: hepatitis A, hepatitis B, rabies, poliomyelitis, yellow fever, typhoid fever, influenza, diphtheria, tetanus, meningococcal disease, Japanese encephalitis, cholera, and measles. To administer all vaccines would be extremely costly and may also result in an increased rate of adverse side-effects. Immunizations against the more frequent, more severe infections should be given priority.

If a mission is limited to one season, environmental factors of that respective season should be considered. This general rule is more important for vector-borne than for vaccine-preventable infections, except for influenza and meningococcal disease.

Persons who are already immune (because of previous immunization or immunity after infection) need not be vaccinated. The latter cause is particularly often true of hepatitis A; troops recruited in developing countries have an anti-hepatitis A virus seroprevalence rate close to 100% (11). Hepatitis B immunization, except for non- and low-responders, probably grants lifelong protection (12); the same is likely for measles vaccine.

Sometimes the host country may require proof of some specific vaccination based on the International Health Regulations (13), currently under fundamental revision to become a more effective tool in preventing the spread of infections that may be a global hazard (14).

In addition to adequate epidemiologic information and coordination between the military, international health organizations, and the host country, successful intervention efforts require thorough knowledge of vaccine characteristics with varying rates of efficacy and duration of protection. Cost-benefit evaluations, which would be very desirable, are unlikely in areas of political instability.

Robert Steffen
Institute for Social and Preventive Medicine of the University, Zurich, Switzerland

References
1. DuPont HL, Ericsson C. Prevention and treatment of travelers' diarrhea. Drug Therapy 1993;328:1821-7.
2. Farthing MJG, DuPont HL, Guandalini S, Keusch GT, Steffen R. Treatment and prevention of travellers' diarhoea. Gastroenterology International 1992;5:162-75.
3. Levine MM, Svennerholm A-M. Prioritization of vaccines to prevent enteric infections. In: DuPont HL, Steffen R, editors. Textbook of travel medicine. 1st ed. Hamilton: B.C. Becker Inc.; 1997. p. 370.
4. Steffen R, Kane MA, Shapiro CN, Schoellhorn JK, Van Damme P. Epidemiology and prevention of hepatitis A in travelers. JAMA 1994;272:885-9.
5. World Health Organization. International travel and health. Geneva: The Organization; 1999.
6. Steffen R. Risk of hepatitis B for travellers. Vaccine 1990;8:31-2.
7. Hatz CF, Bidaux JM, Eichenberger K, Mikulics U, Junghanss T. Circumstances and management of 72 animal bites among long-term residents in the tropics. Vaccine 1994;13:811-5.
8. Steffen R. Travel medicine prevention based on epidemiological data. Trans R Soc Trop Med Hyg 1991;85:156-62.
9. Hardy IRB, Dittmann S, Sutter RW. Current situation and control strategies for resurgence of diphtheria in newly independent states of the former Soviet Union. Lancet 1996;347:1739-44.
10. Steffen R, Desaules M, Nagel J, Vuillet F, Schubarth P, Jeanmaire C-H, et al. Epidemiological experience in the mission of the United Nations Transition Assistance Group (UNTAG) in Namibia. Bull World Health Organ 1992;70:129-33.
11. Centers for Disease Control and Prevention. Hepatitis A immunization. MMWR Morb Mortal Wkly Rep 1996;45(RR-15):7.
12. Hall Ad. Hepatitis B vaccination: protection for how long and against what. BMJ 1993;307:276-7.
13. World Health Organization. International health regulations. 3rd annotated ed. Geneva: The Organization; 1985.
14. World Health Organization. Revision of the international health regulations. Wkly Epidemiol Rec 1997;72:213-5.

Sexually Transmitted Diseases in Ukraine

To the Editor: With the political changes in eastern Europe in the last 10 years have come social and economic changes (1). Ukraine not