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### Abstract from the Literature

by  
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**Griffiths GD, Lindsay CD, Allenby AC, Bailey SC, Scawin JW, Rice P, Upshall DG. Protection against inhalation toxicity of ricin and abrin by immunization. *Human and Experimental Toxicology* 1995; 14:155-64**

1. Abrin and ricin are highly toxic plant proteins which are very similar in structure and function and inhibit protein synthesis in eukaryotes.
2. Rats have been immunized against either toxin using formaldehyde-toxoids by three subcutaneous injections at intervals of 3 weeks. For abrin, serum titres in 14 out of 15 rats were raised to between 1:12 800 and 1: 51 200 after two injections, 6 weeks from the start of the experiment. Titres of between 1: 256 and 1: 1024 were also measured in lung washes after challenge with active abrin toxin.
3. The three major antibody classes, 1gG, 1gA only were detected in lung washes. The proportion of 1gA to 1gG was higher in the lung fluid than in sera. Rats immunized by abrin toxoid were protected against 5 LCt50's of abrin by inhalation but other exposed to ricin were not.
4. For ricin, serum titres ranged from 1: 800 to 1: 25 600 after two injections and after a third injection the titre range was the same but population samples were weighted towards the higher titres. All rats immunised with ricin toxoid survived the challenge of 5 LCt50's of ricin toxin by inhalation over the observation period of 28 days post-challenge.
5. Representative immunised rats (abrin toxoid) were taken at various times post-exposure humanely killed and tissues were examined for pathological changes. It was concluded that an apparently severe lung lesion occurred at a later time than in non-immunised, toxin challenged rats. This damage was not lethal over the experimental observation periods.
6. Immunisation by the sub-cutaneous route, therefore, protects against lethality from challenge by inhalation of ricin or abrin toxins but does not prevent significant lung damage.

**Griffiths GD, Rice P, Allenby AC, Bailey SC, Upshall DG. The inhalation toxicology of the castor bean toxin, ricin and protection by vaccination. *J Defence Science* 1996; 1(2):227-35**

Ricin is an extremely toxic protein extracted from the seeds of the castor oil plant. It was implicated in the assassination of the Bulgarian journalist Georgi Markov, and it is seen as a potential chemical warfare hazard. This paper describes the toxicity of ricin when administered by inhalation of aerosol. The toxicity of ricin from two sources has been compared. Both types were extremely toxic by inhalation – fatalities occurred at doses of less than 10 micrograms per kilogram body weight. Histopathological study showed that damage was entirely restricted to the lung. Death resulted 1-3 days after exposure, from severe inter-alveolar oedema (fluid in the lung) and consequent hypoxia (lack of oxygen) in the majority of cases. There was a latent period of about 18-24 hours before overt signs of poisoning, but studies using cells in culture showed that cells were committed to lethal biochemical lesions within 1 hour of addition of toxin to the growth medium. For this reason, a pretreatment would be the best way for protection of personnel against ricin poisoning. CBDE has developed a ricin vaccine offered very effective protection against the lethal effects by inhalation.

**Comment:** *These two papers detail some very encouraging work from the researchers at Forton Down on ricin and abrin, two plant toxins. Problems persist with lung lesions in immunised animals but research on the use of microencapsulation and oral routes may alleviate these problems.*

**Al Mulla KMA, Pugh RNH, Hossain MM, Behrens RH. Travel-related AIDS awareness among young Gulf Arab men. *J Travel Med* 1996; 4:224-6**

**Background:** The Federal Ministry of Health of the United Arab Emirates (UAE) has a vigorous AIDS control programme to reduce the incidence among its citizen and ensure a low frequency of spread by the sexual route. This is in keeping with cultural factors perceived to have withstood the potential for sexual spread in the Arabian Gulf area. However, there is acknowledged concern for the risk to young male citizens while travelling abroad to popular destinations such as India, Thailand and the Philippines.

**Methods:** The authors attempted to determine the knowledge and attitude about AIDS among Emirati males (aged 18-25 years) by confidential, self-administered questionnaire (modification of a tested approach in the UK). A total sample of 298 subjects participated (94% response), comprising 47 medical students (16%), 197 non-medical students (65%) and 57 school graduates (19%). Of all participants, 253 (85%) were unmarried.

**Results:** Salient discriminatory findings were that medical students significantly differed from the other two groups in stating that AIDS could not be identified in a person by appearance ( $p=0.003$ ) and that the use of condoms were protective while travelling abroad ( $p<0.001$ ). The latter issue also reflected a significant difference between married and unmarried.

**Conclusion:** This study demonstrated a prevailing uncertainty about AIDS knowledge and a possible fear of AIDS, both of which tend to increase acceptance of special education programmes.

**Comment:** *This is one of the first papers I have seen addressing Arab attitudes towards HIV infection and AIDS. Given the continuing role of military forces in the region, this is useful paper for developing understanding of the perceived problems in the area.*

**Pohling-Brown P. Non-lethal weapons - Who pays if they kill? *Jane's Defence Contracts* 1996; (11):4-5**

**Comment:** *This interesting article provides both a good summary of the different types of non-lethal weapons whilst raising the spectre of a litigious public if allegedly 'non-lethal' weapons actually kill. Whilst this is principally a concern under the American legal system, such concerns should be factored in if Australia is to explore this area.*

**Levy CL, Sharp 1W. Medical challenges for deploying forces. *Marine Corps Gazette* 1997; 81(2):54-61**

Tomorrow's commanders may well be challenged by environmental conditions and diseases that pose a greater threat than the enemy to their forces.

**Comment:** *Whilst this is a well-beaten drum, the medical principles behind it bear repeating. Up until World War 11, there were more casualties to disease than to battle injury. Levy and Sharp have provided a good review of the dangers of diarrhoeal disease, malaria, arboviral disease (including Japanese encephalitis), and environmental hazards. They also provide a series of operational recommendations for the preparation of troops, preventative medicine during the deployment, and appropriate care post-deployment. The article is illustrated with good examples of what happens when these measures are not followed, including the out-break of malaria amongst Marines post-Somalia, diarrhoea outbreaks in the Gulf War and high rates of injury in Haiti.*

**Michaelson A, et al. Compliance with universal precautions among physicians. *J Occup Environ Med* 1997; 39(2):130-7**

This study characterised and assessed self-reported levels of compliance with universal precautions (UP) among hospital-based physicians, and determined significant factors associated with both compliance and non-compliance. The physicians (n=232) were a subgroup of a larger study population of hospital-based health

care workers recruited from three geographically distinct locations (n=1746), and were surveyed using a detailed confidential questionnaire that assessed personal, work- related and organisational factors. Compliance with UP was measured through 11 items that examined how often physicians followed specific recommended work practices. Compliance was found to vary among the 11 items: they were high for certain activities (e.g. glove use 94%, disposal of sharps 92%) and low for others (e.g. wearing protective clothing 55%, not recapping needles 56%). Compliance with all items was low (31 to 38%). Stepwise logistic regression revealed that non-compliant physicians were likely to be aged 37 or older, to report high work stress and to perceive a conflict of interest between providing patient care and protecting themselves. Compliant physicians were more likely to be knowledgeable and to have been trained in UP, to perceive protective measures as being effective, and to perceive an organisational commitment to safety.

**Comment:** *if this is the compliance in a controlled environment, with peer pressure, a OH&S program to reinforce it, with the potential for disciplinary action against those not complying, what is it like in General Practice...what about in the field, under battle conditions. The likelihood of significant compliance is very low.*

**Lebeda FJ. Deterrence of biological and chemical warfare: A review of policy options. *Mil Med* 1997; 162(3):156-61**

The deployment of biological and chemical weapons by aggressive states is not a hypothetical scenario but a life-threatening contingency. Although Iraq was deterred from using its biological and chemical weapons during Operation Desert Storm, what forms of deterrence must be considered in preventing the use of these weapons of mass destruction in the future? Traditional deterrents against their use have ranged from the threat of military response to the ratification of diplomatic treaties and agreements. An overall strategy to deter the use of these weapons includes an additional, less frequently discussed approach - force protection - which encompasses defensive biomedical countermeasures (e.g. antibiotics, drugs, vaccines, diagnostic tests) and non-medical protective devices (e.g. masks, specialised clothing/shelters, detectors). A combined, integrated approach to deterrence is reviewed in this article with regard to current policies and the roles played by Department of Defence research and development programs for biological and chemical defence.

**Comment:** *If getting bang for your buck is concerned, I wouldn't be putting much into current force protection measures. Far better to prevent the weapons being deployed at all, than hoping the measures in place would protect. The protective clothing and masks are of little protective value in a heavily contaminated area; they are hot and heavy, reduce communication and have bad psychological effects. Vaccines are of varied help - they can of course be used in a non- wartime scenario to help overall health status, but consider the anthrax vaccine, given that currently anthrax is viewed as the biological weapon most suited to being weaponised. To be properly vaccinated requires 6 injections over 18 months, followed by annual boosters. There are significant numbers of local reactions, to loose time from work and convince the sufferer not to return for more. And the cost – initial vaccinations of the US military is estimated to be US\$120 million. Think of what else that money could be spent on. The money could, for instance, be going into research for better force protection.*

**Doran CM, Sanson-Fisher RW. A cost- benefit analysis of the average smoker: a government perspective. *Aust NZ J Pub Health* 1996; 20(6)607-11**

The aim of this paper was to compare the benefit and costs of cigarette smoking from the government's perspective during a one-year period. This was undertaken by estimating, among other things, the publicly financed health care expenditure attributable to smoking and comparing it with tobacco taxes paid by smokers. This comparison of benefits and costs may provide a yardstick from which to measure the relative worth (in financial terms) an average smoker is to the government, an assessment that may be important when assessing health care priorities and any level of commitment to reducing smoking rates. It is estimated that in 1989-90 an average smoker cost the government \$203.57, while benefits received totalled an average of \$620.56 in the same year. If the government were serious about addressing cigarette smoking as a primary health objective its efforts would portray this. The results of this analysis suggest that the objective of raising revenue from smoking is more of a priority than reducing smoking rates.

**Comment:** *An interesting attempt to quantify smoking costs and benefits to government, but flawed in many ways. The government represents the society as a whole, and the overall costs incurred by a society should be reflected in the ledger. As the authors state, 'the human costs of cigarette smoking...associated with tobacco related illness far outweigh any benefits gained from smoking.' The difficulty in assessing costs means that costs are greatly underestimated, not even taking into account pain and suffering; enforcement of non-smoking policies and legislation; passive smoking litigation; smoking research and education; smoking related traffic accidents; welfare costs; ambulance costs; opportunity costs of tobacco consumption and production are not taken into account. Passive smoking costs are probably underestimated. The total costs are much lower than in several other investigations. The benefits are easy to de- fine, but costs are often ephemeral. There is evidence to suggest that maximising revenue from cigarette taxes has not been reached yet, and further increases in taxes could be imposed without reducing tobacco tax income. Eventually, that point will be reached where revenue will reduce as smoking prevalence decreases. I don't know the machinations of high office, but while revenue is important, I doubt whether good cost - benefit analysis is in the hands of bureaucrats to enable them to make informed decisions on this issue. And the argument suggesting that government is more interested in taxes than health relies on reliable data being in the hands of decision-makers. It is more likely that the special interest lobby remains formidable and an incremental approach is the one preferred by most governments.*

**Graner JL. S.K. Livingston and the Maggot Therapy of wounds. *Mil Med* 1997; 162 (4):296-300.**

Stanton K. Livingston was this country's (read United States) foremost authority on the maggot therapy of war wounds in the years following World War I. His contributions to the literature, including his methodology for raising flies and applying their maggots, are discussed. Prior to the antibiotic era, maggot therapy was the most effective means of promoting wound healing, and Livingston's research, albeit poorly reported by modern standards, was responsible for preserving the lives and limbs of hundreds of veterans.

**Comment:** *Highly recommended*

**Moon RE, Sheffield PJ. Guidelines for the treatment of decompression illness. *Aviat Space Environ Med* 1997; 68(3):235-43**

This is an abbreviated version of a 426-page monograph produced as a result of a combined Aerospace Medicine Association/ Undersea and Hyperbaric Medical Society Meeting. It describes pathophysiology, diagnostic techniques, initial treatment (prior to recompression) and definitive treatment. The recompression guidelines differ for altitude and diving related DCI.

This is the best succinct discussion on the subject that I expect could be found. Some unanswered questions posed are:

- factors resulting in incomplete resolution of symptoms after initial hyperbaric treatment
- need for a uniform database for epidemiological data
- whether oxygen at ambient pressure ever provides sufficient treatment of diving related DCI
- relationship between treatment delay and ultimate outcome
- relationship between intravascular bubbles and tissue damage
- mechanisms of tissue damage
- role of adjunctive pharmacotherapy
- development of an animal model of DCI in which long term functional outcome can be assessed
- neuropsychiatric tests that can be administered in a recompression chamber

**Braithwaite M.G. The British Army Air Corps in-flight spatial disorientation demonstration sortie. *Aviat Space Environ Med* 1997; 68(4):342-5**

Following didactic instruction, most aircrew are able to experience some of the disorientating illusions and limitations of the orientational senses in a variety of ground-based devices. In order to reinforce instruction in spatial disorientation (SD) within the environment in which they operate, British Army Air Corps helicopter pilots also receive an airborne demonstration of the limitations of their orientation senses. Since 1982, a specific SD sortie has been programmed towards the end of the basic rotary-wing phase of flight training approximately 6 weeks after the aeromedical training module, and before students commence rotary-wing instrument flight training. Refresher sorties are flown every 4 years. The conduct of the SD sortie is described in detail. Analysis of helicopter accidents demonstrates that this training is operationally effective by contributing towards the reduction of SD-related mishaps. It is cost-effective and the addition of this type of in-flight demonstration to the aeromedical training syllabus is regarded as being of great value to British Army helicopter aircrew. Similar instruction could be readily adopted by other services.

**Comment:** *Malcolm Braithwaite has become something of a guru of Spatial Disorientation, especially practical attempts to increase awareness and reduce its impact. This assessment of a relatively inexpensive but effective training technique could well be considered carefully in Australia. Cost-benefit analysis be used suggests a cost of the sortie between 1982 and 1995 of US\$ 252000, less than one tenth the replacement cost of the least expensive in-service British Army helicopter. It would be hard 'to justify the purchase of a modern electro-mechanical demonstrator' such as the Advanced Spatial Disorientation Demonstrator in service with the USAF, in Australia where the through-put of students is much less.*

**Rosenfield JV. Neurosurgery in Rwanda during a United Nations Peace-Keeping Mission. *Mil Med* 1997; 162(5):311-4**

An analysis of the neurosurgical component of the medical support provided by a United Nations peace-keeping mission in Rwanda is presented. The Australian Defence Force contingent provided medical support to the United Nations and the civilian population. Eight hundred and thirty-eight procedures were performed during 12 months. A wide range of surgery was encompassed, with neurosurgery accounting for 17 (2%) of the total operations: compound depressed fractured skull, 5; intracranial pressure monitor, 2; burr holes for acute head injury and chronic subdural haematoma, 2; skull osteomyelitis debridement, 1; rib-graft cranioplasty, 1; scalp rotation flap, 1; congenital myelomeningocele, 2; occipital meningocele, 1; craniofacial approach to Le Fort III fracture, 1. A broad range of neurosurgical procedures have been performed. The overall numbers of neuro-surgical operations were small, but they were successfully performed by general surgeons. Familiarity with neurosurgery is necessary in pre-deployment training of military surgeons working in a remote location with limited resources.

**Comment:** *Further report on the Australian Defence Force experience in Rwanda. Probably the most interesting discussion is the utility of intracranial pressure monitoring and placement of ventricular drains. The argument put forward justifying repair of congenital defects: that it is 'a humanitarian pursuit that consumes minimal resources, requires a short hospital stay, saves lives, or offers the child a more normal life: I have considerable trouble with. There is the ever-present problem of mission creep; who decides, and how is the decision reached, as to who can be treated, and who can't; what happens if there is a complication, or an escalation of conflict. Such policy must be clearly and definitively worked out beforehand. Teaching of local health personnel, as was also done, is a more productive and less fraught idea.*