# The ASA Review

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Reviewers will examine the article for content (science, policy, etc.) and readability and will recommend either publishing as is, publishing with minor modifications, publishing after major modifications, or not publishing with a reason. These reviews are used by the Editor in making the final decision about the article. The Editor's decision is then sent directly to the author.

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Detailed guidelines are available by e-mail, fax or post upon request.

- Please note to ASA if article is submitted for **ASA Review**
- Prepare paper with audience and the **ASA Review** in mind .
- Clearly state in introduction the purpose of work and put in perspective with earlier or related work.
- Write concisely and use illustrative data rather than detailed data where appropriate.
- Suggest names of reviewers for paper, if appropriate
- Initial recommended guidelines for paper include two to four pages in length, 2500 words, three tables and/or figures. Up to 12 references will be published with remainder to be available upon request.

References are very important.

- Documents are preferred on 3.5 inch diskette or by e-mail. When possible send hard copy to ensure proper formatting. Acceptable electronic formats include ASCII, WordPerfect, MS Word, or Claris. Other formats possible but please send text in ASCII as well. Submit photos and graphics in camera-ready hardcopy.

The following paper is an updated version of an original paper presented at the CBMTS-Industry II meeting in Dubrovnik, Croatia in April 2001. Please see Editor's Note at end of article.

## Statistical Views on Late Complications of Chemical Weapons on Iranian C.W. Victims

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**Summary**

During the 8 years Iran - Iraq war (1980 - 1988) chemical weapons had been frequently used by Iraqi army against the Iranian military personnel[1] and against the civilian population of Iranian border towns and villages[2-10]. During these chemical attacks, several kinds of chemical agents (nerve agents, blistering agents, mixed agents) were used[11].

According to the recorded data from field emergency units, field hospitals in the battle zones and the list of evacuated CW victims from the front, more then 100,000 military and civilian personnel had received treatment for the acute effects of CW agents in those medical centers and in other hospitals and cities behind the front (both in- and out-patient treatment). Today, more than 13 years after the end of the Iraq - Iran war, approximately 34,000 Iranian military and civilians are still suffering from the long term effects of chemical weapons deployed by Iraq (especially mustard gas), and they are receiving medical treatment services by the organization of Veterans' Affair, the Janbazan organization[12].

The severity of these late complications in CW victims depends on the rate of exposure, type and dose of CW agents[13], so we have a method in the Janbazan organiza-

tion for categorizing the severity of complications in the CW victims. According to this method (based on severity of late complications and the clinical status), there are three categories of patients: patients with mild, moderate and severe complications. In this article the criteria used in this categorizing method and the statistical results of this categorizing are discussed.

**Introduction**

**A brief history of chemical warfare to include the use of CW by Iraq during the Gulf War:**

The use of poisons as weapons and efforts to ban them dates from ancient times. Despite the Hague convention (1899/1907) and Geneva protocol (1925), chemical weapons were used in World War (WW)1, the Iran-Iraq war, by Italy in Ethiopia, by Japan in China and various other conflicts, and, today they still remain a serious threat for civilian and military personnel.

During the Iran-Iraq war (1980-1988) there were, initially, many unconfirmed reports that Iraq had been using chemical weapons, but the international community was slow to react. However, UN fact-finding teams did confirm that Iraq had indeed been using chemical weapons on a massive scale and that Iran had suffered thousands of military and civilian casualties as a result of these attacks [14].

The first UN mission came to Iran in March of 1984 and released its official report (No: S/16433). They returned to Iran in 1986 and released their second report (No: S/17911) and the third mission took place on 1987 and the third report released in May 1987(No: S/18852)[15].

The conclusions, based on field inspections, clinical examinations of casualties and laboratory analyses of chemical ammunition, can be summarized as follows:

a. chemical weapons, in the form of aerial bombs, had been used in the areas inspected in Iran by the official UN team,

b. the main type of chemical agent used was bissulfide or mustard gas,

c. and on some occasions evidence was found for the use of the nerve agent ethyl N, N-dimethylphosphor amidio cyanidate, or tabun[16]. These reports renewed attention to the dangers of chemical weapons proliferation and to the horrors of chemical warfare[17].

**THE CATEGORIZING METHOD**

Today, more than 13 years after the end of the Iraq-Iran war, approximately 34,000 Iranian military and civilian people are still suffering from the long term effects of chemical weapons (especially sulfur mustard) used by Iraq, and they are receiving medical treatment by the organization of veterans affair (Janbazan org). The severity of these late complications in those chemical warfare victims (CWV) depends on the rate of exposure to chemical agents and the type and dose of agents. We have developed a method for categorizing the severity of complications in these CWV. According to this method there are three categories of patients with chronic effects: mild, moderate and severe complications. The treatment and rehabilitation services and also the disability are based on the result of this categorizing method, so the criteria for this method for each category has been discussed in several professional and scientific committees and evaluated by the results of other researchers in this field. The method is compatible with scientific resources and textbooks and is principally based on physical examination, laboratory and paraclinic findings and the clinical status of patients. In order to avoid any misinterpretation in the paraclinic findings and discrepancies in evaluating physical examination findings, there is a standardized instruction, which is the basis of our clinics' performance.

**PRINCIPLES OF THE CATEGORIZING METHOD**

**• DETERMINING OF SEVERITY IN PULMONARY SYSTEM LESIONS:**

**a. Mild lesions**: spirometry: 65 =<FEV1<80 or 65 =<FVC<80
physical exam : abnormal lung sounds

**b. Moderate lesions:** spirometry: 50 =<FEV1<65 or 50 =<FVC<65
physical exam : abnormal lung sounds

**c. Severe lesions:** spirometry: 40 =<FEV1<50 or 40 =<FVC<50
physical exam: abnormal lung sounds probably with sciatnosis and intercostal retraction or tracheal stenosis in bronchoscopy

**• DETERMINING OF SEVERITY IN SKIN LESIONS:**

**a. Mild lesions:**
1) Itching or burning without clinical lesions
2) Dry skin .
3)Hypo or hyper pigmentation or both or depigmentation less than 18% of body surface or in covered area.
4) Alopecia areata totalis or universalis.
5) Generalized vitiligo.
6) Psoriasis (less than 20% of body surface).
7) Lichen simplex and limited prurigo.
8) Limited and mild eczema.
9) Limited scars in covered area .
10) Single keloid without limitation in rang of motion and in covered area.
11) Severe acne vulgaris and nodulous or suppurative hidradenitis.

(cont. p. 18 - **CW victims**)

(from p. 17 - **CW victims**)

12) Chronic hives or angioedema.
13) Vesicant lesions (localized).
14) Recurrent superficial fungal disease (chronic resistant dermatophitosis).

**b. Moderate lesions:**

1) Hypo or hyper pigmentation or both or depigmentation more than 18% of body surface or in uncovered area.
2) Severe and diffuse eczema.
3) Generalized prurigo.
4) Diffuse scare ( or in uncovered area ).
5) Keloid with limitation in range of motion and in uncovered area.
6) Generalized recurrent vesicant lesions.
7) Generalized and chronic itching with clinical lesions
8) Psoriasis(more than 20% of body surface).
9) BCC

**c. Severe lesions:**

• skin or mucosal cancer (except BCC)

**• DETERMINING OF SEVERITY IN EYE LESIONS:**

**a. Mild lesions:**

(Complaints) photophobia- foreign body sensation- tearing- burning- itching - red eye - blurred vision - visual loss - pain - problem in reading (signs) conjunctival inflammation and hyperemia - sub conj. hemorrhage - vessels swelling - blepharitis - Meibomian glands dysfunction - papillary change

**b. Moderate lesions:**

Above complications + mild corneal involvement: epithelial and sub epithelial opacity - anterior stroma in peripheral cornea - perilimbal hyper pigmentation - iron deposit in cornea - band keratopathy - pannus<2mm - no melting - BUT : 5-10 sec -Schirmer(with anesthesia) : 5-10 mm - red reflex : 9/10 - 10/10

**c. Severe lesions:**

Above complications + severe corneal involvement: Thinning - melting - severe hyaline like deposit - corneal vascularization, BUT <5 sec - Schirmer (with anesthesia)<5 mm - red reflex: 1/10-4/10

**d. Very severe:**

- above complication AND very severe corneal involvement: Diffuse corneal opacity - severe thinning - dermatocel - severe vascularization - red reflex<1/10 - retina is not visible

## CONCLUSIONS

Chemical weapons have a broad spectrum of harmful damage on different human organs. According to the results of our evaluations on the clinical status of Iranian CWVs, and the categorizing the severity of late complications in them (Table 1), the most common complications in these patients are the pulmonary complications (from mild lesions to severe lesions). In general about 42.5 percent of Iranian CWV population are suffering from pulmonary complications (37% mild lesions - 4.5% moderate lesions - 1% severe lesions) (Graph 1). On the other hand as the nature of pulmonary complications of mustard gas is progressive and some late complications appear many years after exposure, the number of patients with these complications will rise. Graphs 2 and 3 show the percent of complications to the eye and skin. Managing this large number of patients with different complications (mostly with mixed complications) is impossible without a well-organized care system. So in our country there are now several special clinics and well equipped medical centers for observing these patients, as well as a standard medical care program for management of late complications in these patients (by the periodical visits and follow up of patients).

## REFERENCES:

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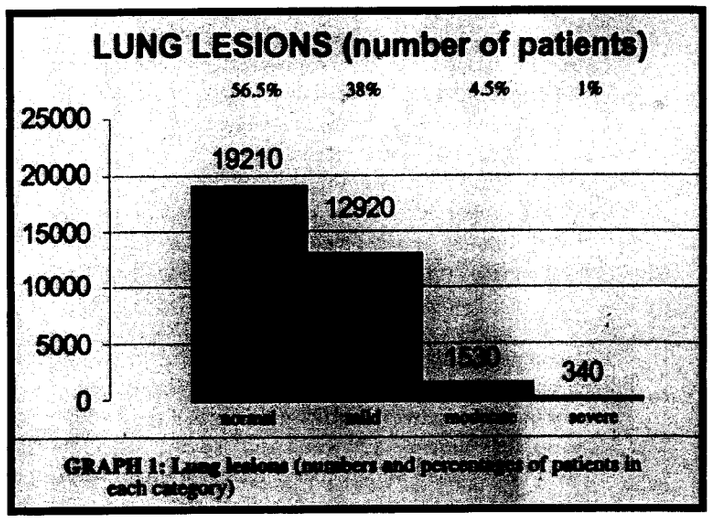
## KEY WORDS

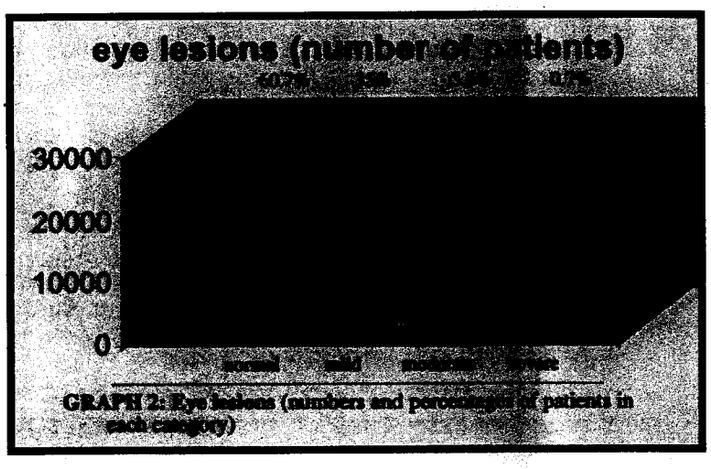
late complications, mustard gas, categorization method, Iran, Janbazan, CW victims

## TABLES AND FIGURES

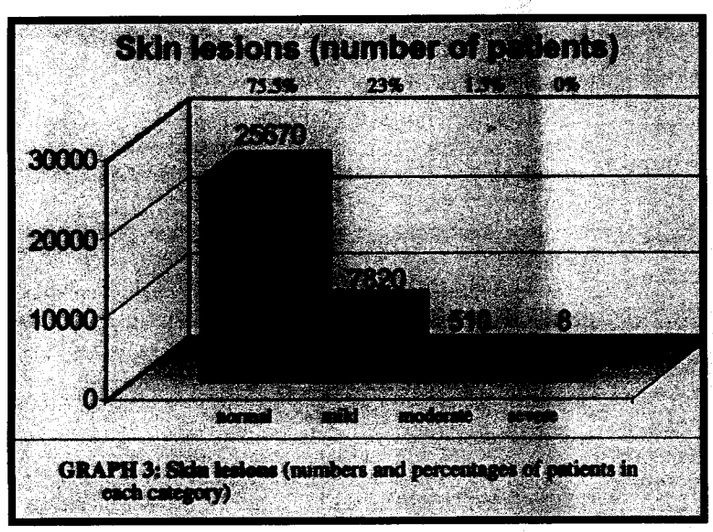
TABLE 1: results of categorizing the late complications (severity of lesions)
GRAPH 1: lung lesions
GRAPH 2: eye lesions
GRAPH 3: skin lesions




GRAPH 1: Lung lesions (numbers and percentages of patients in each category)




GRAPH 2: Eye lesions (numbers and percentages of patients in each category)




GRAPH 3: Skin lesions (numbers and percentages of patients in each category)

**TABLE 1. The severity of lung, eye and skin complications in Iranian CW victims.**

| | Lung | Eye | Skin |
|---|---|---|---|
| **Normal** | 19550 (56.50%) | 20638 (60.70%) | 25670 (75.50%) |
| **Mild** | 12580 (38%) | 11900 (35%) | 7820 (23%) |
| **Moderate** | 1530 (4.50%) | 1224 (3.60%) | 510 (1.50%) |
| **Severe** | 340 (1%) | 238 (0.70%) | 8 rare |

**Editor's Note:** Professionals in medicine and science that attend the Chemical and Biological Medical Treatment Symposia (CBMTS) series have been very fortunate in being able to share results of Iran's efforts at investigating, treating, monitoring and documenting CW casualties. Iran's papers began in CBMTS I at the AC-Laboratorium Spiez (now Spiez Laboratory), Switzerland, in December 1994.

At this first meeting Prof. Dr. M. Balali-Mood's paper was an "Overview on Treatment of Classical Chemical Warfare Poisoning" which was followed by Dr. Nasser Jalali with "Emergency Management of Chemical Warfare Casualties". Prof. Dr. Hamid Sohrapour then gave his paper on "Current Status of Mustard Gas Victims in Iran" and he discussed the building of their current data base where 100,000+ Iranians were identified as victims of CW. Approximately 10% of these victims had died after exposure and from the remainder, approximately 60,000 hospital records were collated from various service organizations. Over 30,000 of these records records were then put into a permanent data base. The problem of having and maintaining an adequate data base at the beginning of and during the war was to be echoed again in the second Gulf War by the Allies.

Papers at CBMTS II, AC-Laboratory Spiez in July 1996 included: Prof. Balali-Mood's "Delayed Toxic Effects of Sulfur Mustard in 1428 Patients"; and Prof. Sohrapour's "Comparison of Bronchodilator Effect of Salbutomol vs. Combivent in Mustard Induced Chronic Bronchitis" At CBMTS III in Spiez in May 2000 Prof. Haghighi's paper was "A Review of Infections among Iranian Combatants in the Iran-Iraq War". At CBMTS-Industry II in Dubrovnik, Croatia in April 2001 Dr. Khateri presented his paper "Statistical Views on Late Complications of Chemical Weapons on Iranian CW Victims" and Dr. Ghanei's papers on "Late Haematologic and Late Pulmonary Complications of Mustard Gas".