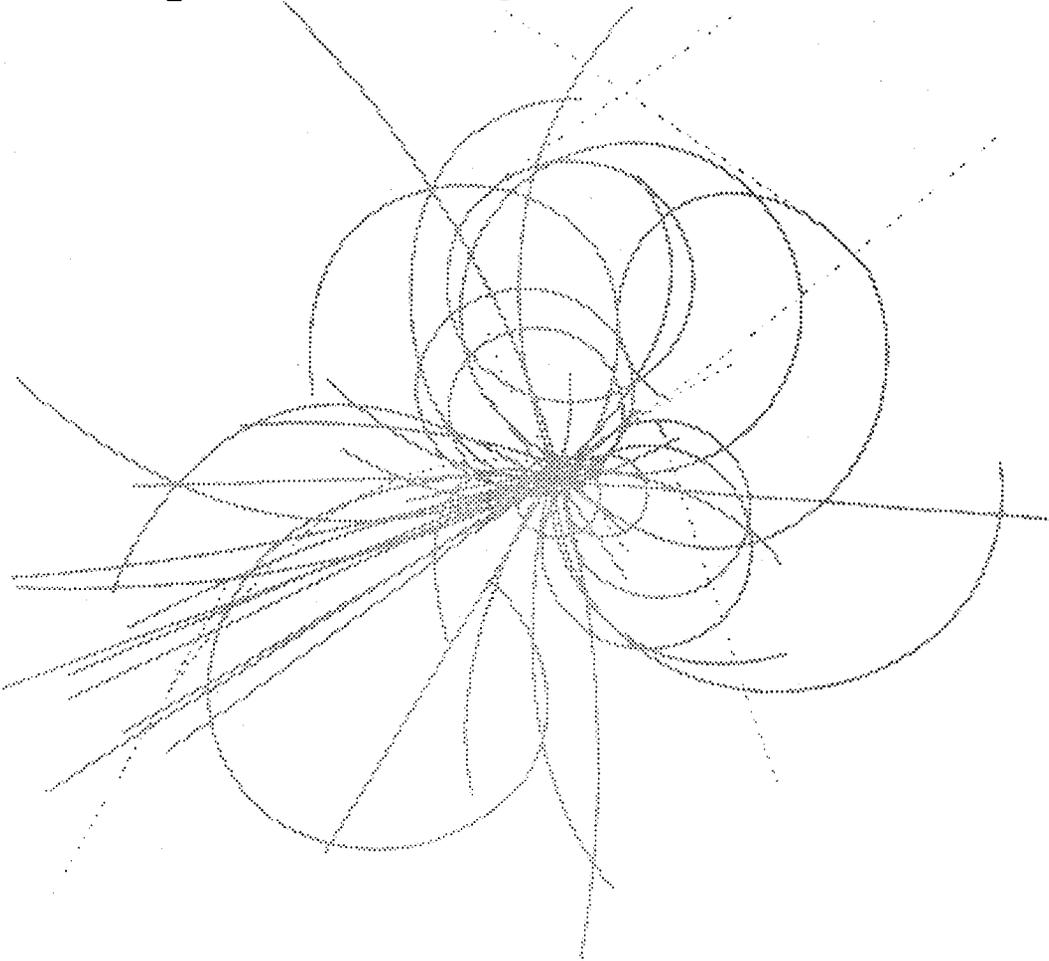


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Superconducting Super Collider Laboratory



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T. J. Chester

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T. J. Chester

Superconducting Super Collider Laboratory[†]
2550 Beckleymeade Avenue
Dallas, Texas 75237

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MEDICAL SURVEILLANCE OF EMPLOYEE HEALTH AT THE SUPERCONDUCTING SUPER COLLIDER LABORATORY

Thomas J. Chester, M.D., M.P.H.

Medical Department
Superconducting Super Collider Laboratory*
2550 Beckleymeade Avenue
Dallas, TX 75237

Medical surveillance can best be defined as conducting specific, targeted medical examinations at pre-determined intervals for the purpose of assessing whether individuals have suffered work-related illness or injury. The objectives of the medical examinations are to determine if there is any evidence of illness or injury and to determine whether any illness or injury found is occupationally related. If illness or injury is found, the employee under medical surveillance can be referred for immediate treatment. Other employees in the same work group can be examined, and any hazardous defects in the workplace can be corrected.

Additional objectives of these periodic examinations are to determine whether the employee's health status and physical fitness continue to be compatible with the safe performance of his assigned job tasks; to contribute to employee health maintenance by providing the opportunity for early detection, treatment, and prevention of disease or injuries; and to provide a documented record of health status that can be used in analysis of the health of the work group as a whole.

Medical surveillance is one of several measures used in a good occupational health and safety program to prevent occupational illness or injury. Table 1 represents a hierarchy of preventive health and safety programs. The earlier in the list a program appears, the more basic it is to the prevention effort and the more likely it is to prevent occupational illness and injuries with the least risk and least expense. A good occupational safety and health program contains all of these elements.

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**Table 1. Occupational Health and Safety Programs:
Prevention Hierarchy.**

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- System safety-design review
 - Health and safety procedures
 - Operational readiness review
 - Management safety awareness
 - Employee safety awareness
 - Periodic professional inspections
 - Industrial hygiene
 - Health physics
 - Safety
 - Fire
 - Medical
 - Industrial hygiene/health physics monitoring
 - Medical surveillance examinations
 - Epidemiologic analysis
-

A good program of occupational safety and health starts with a system safety design review. When a new facility is being built or changes are being made to an existing facility, all designs and operational procedures should be reviewed by system safety engineers to assess the risks and hazards involved and to alter the designs to minimize these risks and hazards. During construction, the facility should be constantly monitored for adherence to the system safety design. Also, during the design and construction phases, operational procedures should be developed and reviewed in order to minimize risks and hazards in the operation of the facility. Prior to beginning operation of the facility, an operational readiness review should be conducted to ensure that the facility meets specifications and that there are no noticeable safety defects.

Both management and employees must be made fully aware of the safety risks and hazards involved in the facility and of the correct operational procedures to minimize these risks and hazards. Management and employee training should be conducted in such a manner as to instill in both groups an understanding of the need for safe operations and an awareness of safety and recognition of hazards. Safety is to a large extent an attitudinal or cultural phenomenon in which the culture engenders an awareness of safe operational procedures and of the need to rectify hazardous situations.

Safety and health professionals should conduct periodic inspections of every facility to include industrial hygiene/health physics, safety, fire protection, and medical/toxicology. A regular program of industrial hygiene and health physics monitoring should be conducted to ensure that levels of hazardous agents are kept below acceptable thresholds.

As an additional check on the effectiveness of health and safety measures, employees working in potentially hazardous areas should be placed under medical surveillance, with periodic examinations intended to detect any occupational illness or injury that may have resulted from hazards or risks in the workplace. In addition, the data from medical surveillance and industrial hygiene/health physics monitoring should undergo epidemiologic analysis on a periodic basis to ensure that there are no subtle trends caused by workplace exposures that were not detected in the individual medical surveillance examinations.

Although medical surveillance and epidemiologic analysis provide a final check on workplace health and safety, in most situations where thorough attention is paid to health and safety and all of the earlier steps are carried out diligently, there should be a minimum

of occupational illness or injury detected in medical surveillance or epidemiologic analysis. Unfortunately, in the real world it is possible that untoward effects of the workplace may occur; it is, therefore, essential that proper medical surveillance and epidemiologic analysis be conducted. Although these methods detect problems after the occurrence of illness and injury, it is hoped that medical surveillance will detect the problems early enough for the illness or injury to be reversible. Also, early detection of an illness or injury in a small number of employees should allow corrective action to be taken before the remainder of the work group is seriously affected.

Medical surveillance and epidemiologic analysis are particularly important for detecting untoward effects from exposures that were not previously known to be hazardous. Examples of such previously unknown effects discovered through medical surveillance and/or epidemiologic analysis include vinyl chloride monomer, which causes angiosarcoma of the liver, and acrylonitrile, which causes cancer of the lungs and colon.

The Superconducting Super Collider Laboratory (SSCL) Medical Office conducts several types of examinations as part of its medical surveillance program (see Table 2). The Employment Entrance Examination and Employee Transfer Examination serve mainly to ascertain the physical fitness of the employee to perform his or her job tasks safely. They also contribute to the medical surveillance program by providing baseline data on the employee's health status to which future medical surveillance examinations can be compared.

Table 2. Types of Examinations Provided by the SSCL Medical Office.

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- Employment Entrance Examination
 - Employee Transfer Examination
 - Periodic Examination
 - Hazard Examination
 - Post-Injury/Illness Examination
 - Termination Examination
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The post injury/illness examination is mainly intended to ensure that the employee is physically fit to return to work after an illness or injury. It also provides an opportunity to determine any relationship between the employee's illness or injury and the workplace.

Periodic examinations are offered on a voluntary basis annually to all employees age 45 and over and biennially to employees under age 45. While this is a voluntary program, there is sufficient representation among program participants to allow adequate assessment of many work groups at the SSCL.

Termination examinations represent a final opportunity to assess the employee's health status before leaving employ at the SSCL. This examination can be considered to be the final examination of the medical surveillance program and can be considered to be part of both the periodic and the hazard examination programs.

Hazard examinations are mandatory and are offered in response to specific hazardous conditions that may occur at the SSCL. Examples of the hazard examinations provided at the SSCL are listed in Table 3.

Table 3. Hazard Examinations Performed by the SSCL Medical Office.

PRESENT:	<ul style="list-style-type: none">• Oxygen Deficiency Hazard• Respirator Certification• Surface Rescue Team Certification• Drivers and Mobile Equipment Operators
FUTURE:	<ul style="list-style-type: none">• Hearing Conservation Program• Underground Work• Underground Rescue Team

Oxygen deficiency hazard examinations are performed annually on employees who work in an area where the risk of oxygen deficiency has been deemed to be significant. Employees are examined to determine their physical fitness to withstand a short period of oxygen deficiency while putting on their self-rescue apparatus and exiting the building.

Respirator certification is required annually for those employees who must wear respirators to protect them from inhaling hazardous substances in the workplace or for those individuals who must wear self-contained breathing apparatus in order to conduct rescue operations in areas of oxygen deficiency. Annual examination affords the SSCL Medical Office the opportunity to assess each employee for any physical effects that may have been caused by the toxic substances in question.

Surface rescue team certification is conducted annually for those employees who participate in the surface rescue team. This volunteer team is trained and equipped to conduct rescue operations in oxygen-deficiency hazard areas.

Driver and mobile equipment operator examinations are conducted annually to ensure that operators are physically fit to operate such equipment safely. Particular attention is paid to vision and hearing.

Although the SSCL does not currently have any underground operations in progress, strict medical criteria will be applied to the physical fitness necessary for underground access, and those working underground will be placed in an annual medical surveillance program. An underground rescue team to be developed in the future will meet even more stringent physical criteria and medical surveillance examinations.

At present, the SSCL hearing conservation program does not have any participants because there are no positions currently in the Laboratory that expose an employee to noises above the eight hour time weighted average (8 hr. TWA) threshold required for participation in such a program. In the future, individuals working in areas meeting the hearing conservation program criteria will be placed in a medical surveillance program with audiograms at least annually to help ensure that any effects of the noise exposure are minimized.

The SSCL Medical Office, in conjunction with other elements of the SSCL Environmental Safety and Health Department, is currently working to acquire a commercially available computerized occupational safety and health program. This program will capture all medical surveillance data, industrial hygiene/health physics monitoring data, and employee job assignment data.

The heart of this program will be the employee work history section, which captures data about an employee's job assignments. This is crucial over a long period of time, because as employees move from one position to another, are promoted, or are transferred to other departments, they will be exposed to different hazards and risks. The coding scheme used to define these job transfers and promotions will be the same as that used for identifying the particular jobs and positions in the industrial hygiene/health physics monitoring database.

The industrial hygiene/health physics monitoring database will contain both monitoring data and assessments of an employee's exposure to hazardous conditions in the workplace.

The medical surveillance module of the computer system will contain the results of medical examinations, including laboratory results. Using such a system, one can gather information on the degree of exposure of a work group to any monitored substance or substances in the workplace and compare these on a statistical basis to the results of the medical surveillance examinations performed on the group of workers. Such analysis will enable determination of trends and health data that could not be detected on the individual physical examinations and may reveal correlations between exposures and subtle health effects before clinical illness is apparent.

This system of workplace monitoring, medical surveillance examinations, and epidemiologic analysis provides additional assurance of no untoward effects from workplace exposures.

