Safety & Health Regulations to Higher Education in Korea

韓國高等教育適用之安全衛生法規

May 9, 2022

Jeongim Park 朴貞任
Dept. of Environmental Health Sciences
SoonChunHyang University, Asan, S. Korea
韓國順天鄉大學

大綱

- Topic 1.

  Safety & Health related regulations &
  "Laboratory Safety Act"

主題一

安全衛生相關法規 和
「實驗室安全法」

- Topic 2.
  Current statistics & what still matters
  - National statistics & Public announcement
  - Newly added regulations since 2021
  - What still matters

主題二

現況及重要事項

- 全國統計資料及公告事項
- 自2021以來新增的法規
- 重要事項

University is a universe of all kinds of accident!

- Routine and non-routine accidents
- Facility accidents
- Traffic accidents
- Fire
- Field trip accidents
- Dormitory accidents / violence/ bullying /sexual harassment
- Laboratory accidents
- Cafeteria food service related
- And more…

大學中會發生各式各樣的意外事故

Safety & Health related Laws applicable to Colleges/ Universities 大專校院適用的安全衛生相關法規

Act	Department	Purpose (目的)	note
Act on the safety and maintenance of education facilities 教育設施安全和維護法	Education	to contribute to the creation of a safe and comfortable educational environment and improvement of the quality of education by providing for the duties of the State and local governments regarding educational facilities and matters necessary for the comprehensive management and promotion of educational facilities.	創造安全和舒適的教育環境和提高教育品質
School health act (since 1967) 學校衛生法	Education	to protect and promote the health of students and teachers and staff 促進和保護學生和教職員工的健康	"School" includes colleges/universities …

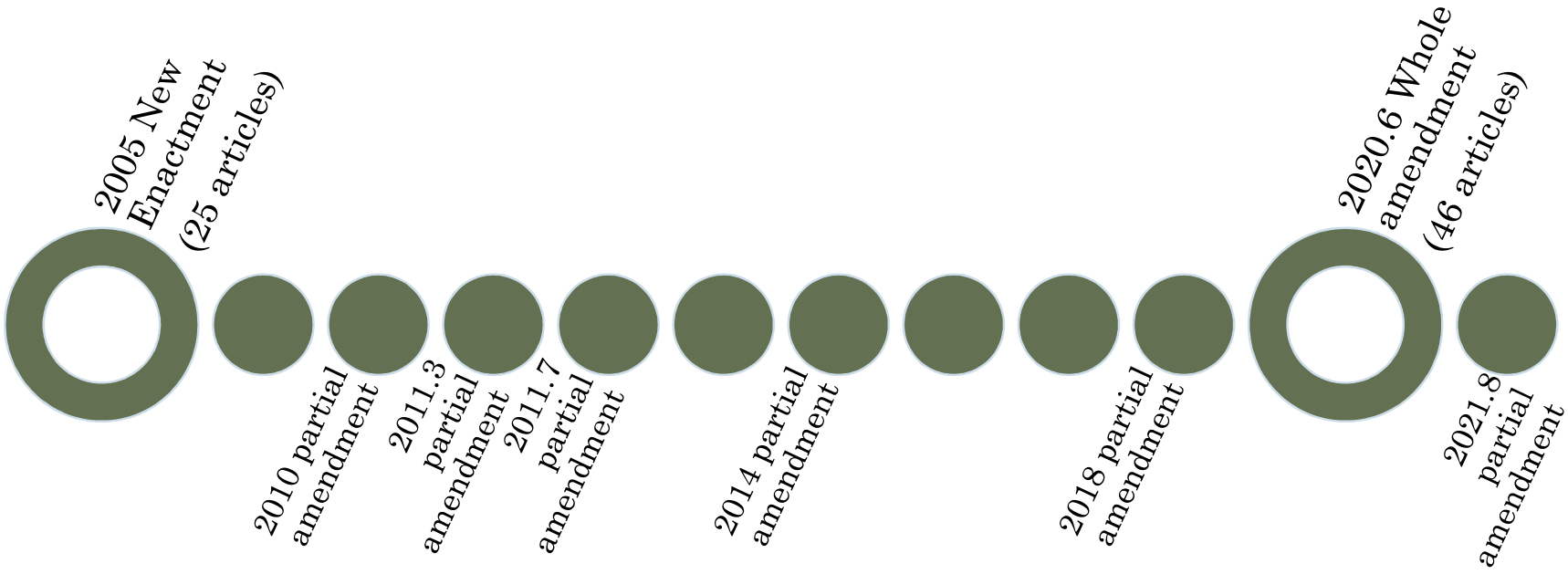
Safety & Health related Laws applicable to Colleges/ Universities 大專校院適用的安全衛生相關法規

Act	Department (主管機關)	Application scope (適用範圍)	In charge of (當責者)
Laboratory safety act 實驗室安全法	Science and ICT	any laboratory established by a university, research institute, etc. in order to conduct research activities 大學、研究機構的實驗室	Heads of research entities 研究機構負責人
Occupational Safety and Health act 職業安全衛生法	Employment and labor	all business 所有行業	Business owner 業主
Framework act on the management of disasters and safety 災害與安全管理框架法	Public safety and security	State & local governments 州和地方政府	Disaster management agency 災害管理機構
Safety control and maintenance of establishment 設施的安全控制和維護	Land, infrastructure and transport	any structure built through construction works, including a bridge, tunnel, harbor, dam, and building, and facilities incidental to such structure, which is classified into a Class-I, Class-II, and Class-III establishment 建築工程建造的任何結構體	Management authority 管理當局
Fire service act 消防法	National Fire Agency	Local government 地方政府	

“Laboratory Safety Act” 實驗室安全法

- “ACT ON THE ESTABLISHMENT OF SAFE LABORATORY ENVIRONMENT” under the Ministry of Science and ICT since 2006

  「建立安全實驗室環境的法規」始於 2006年，主管機關為科學和資訊及通訊科技部。



Laboratory Safety Act – hazard specific regulations

與實驗室安全法中危害有關的其他法規

Hazard	Related regulations
Chemicals	Chemical Substances Management Act (Ministry of Environment) 化學物質管理法
	Act on the safe control of hazardous substances (Public safety and security) 危害物質安全管制法
LMO	Transboundary movement of living modified organisms act (Trade, Industry and Energy) 改造活生物體跨境轉移法
Gas	High-pressurized gas safety control act (TI&E) 高壓氣體安全管制法
Waste	Radioactive waste/Waste management (MoE) 放射性廢棄物/廢棄物管理
Physical, tools etc.	Occupational Safety and Health Act (MOL) 職業安全衛生法

Laboratory Safety Act 2020 實驗室安全法, 2020

- Chapter 1 General Provisions **(一般規定)**
  1. Purpose (目的)
  2. Definitions (定義)
  3. Scope of application (適用範圍)
  4. Responsibilities of the state (國家的責任)
  5. Responsibilities of heads of research entities (研究機構負責人的責任)

- Chapter 2 Laying foundation for safe laboratory environments **(為安全的實驗室環境奠定基礎)**
  6. Master plans to create safe laboratory environments (創建安全實驗室環境的總體規劃)
  7. Laboratory safety deliberative committee (實驗室安全審議委員會)
  8. Informatization of safe laboratory management (實驗室安全管理資訊化)
  9. Designation and operation of laboratory directors (實驗室主管的指定和運作)
  10. Designation of laboratory safety and environment officer (實驗室安全和環境主管的指定)
  11. Laboratory safety management committee (實驗室安全管理委員會)

Laboratory Safety Act 2020 實驗室安全法, 2020

- Chapter 3 Laboratory safety measures **(實驗室安全措施)**
  12. Formulation and observance of safety management regulations (安全管理規定的訂定和遵守)
  13. Guidelines on safety inspections and precise safety diagnosis (安全檢查與精確安全診斷指引)
  14. Implementation of safety inspection (安全檢查的實施)
  15. Implementation of precise safety diagnosis (精確安全診斷的實施)
  16. Reporting and publication of findings of safety inspections and precise safety diagnosis (安全檢查和精確安全診斷結果的報告和公告)
  17. Registration of safety inspection agencies and precise safety diagnosis agencies (安全檢查和精確安全診斷機構的註冊)
  18. Obligations of persons who conduct safety inspections and precise safety diagnosis (執行安全檢查和精確安全診斷人員的義務)
  19. Implementation of preliminary risk analysis of hazardous factors (實施危險因子的初步風險分析)
  20. Education and training (教育及訓練)
  21. Health examination (健康檢查)
  22. Bearing of expenses (經費的承擔)

Laboratory Safety Act 2020 實驗室安全法, 2020

- Chapter 4 Response to and compensation for laboratory accidents **(實驗室事故的應變和賠償)**
  23. Reporting laboratory accidents (實驗室事故的通報)
  24. Conduct of investigations into accidents (進行事故調查)
  25. Restrictions on use of laboratories (限制使用實驗室)
  26. Subscription to insurance (保險)
  27. Submission of insurance-related data (提交保險相關資料)
  28. Certification of exemplary laboratories in safety management (安全管理示範實驗室的認證)

- Chapter 5 Support for creation of safe laboratory environment **(對建立安全實驗室環境的支持)**
  29. Support for universities and research institutes (對大學和研究機構的支持)
  30. Designation and operation of regional safe research support centers (區域安全研究支援中心的指定和運作)
  31. Inspections (檢查)
  32. Presentation of certificates (證書的頒發)
  33. Corrective orders (糾正指令)

Laboratory Safety Act 2020 實驗室安全法, 2020

- Chapter 6 Laboratory safety manager **(實驗室安全管理經理)**
  34. Laboratory safety supervisor qualifications and tests (實驗室安全管理人資格和測驗)
  35. Duties of laboratory safety managers (實驗室安全經理的職責)
  36. Grounds for disqualification (取消資格的理由)
  37. Sanctions against cheaters in tests (對測驗作弊者的處罰)
  38. Disposition of revoking or suspending license (吊銷或暫停證照的處分)
- Chapter 7 Supplementary provisions **(補充規定)**
  39. Reporting (報告)
  40. Confidentiality (保密)
  41. Delegation and entrustment of authority and duties (授權和委託)
  42. Legal fiction as public officials in application of penalty provisions (公職人員適用處罰規定的法律擬制)
- Chapter 8 Penalty provisions **(處罰規定)**
  43. Penalty provisions (處罰)

"Laboratory Safety Act" (Article 1) Purpose

實驗室安全法 第一條 目的

- (2006) **To efficiently manage research resources and thereby to contribute to the revitalization of scientific and technical research and development activities** by ensuring the safety of laboratories in the fields of science and technology established in a university, research institute, etc. and ensuring proper compensation for damage caused by a laboratory accident

有效的管理研究資源，藉由確保實驗室的安全，並對實驗室意外造成的損害進行賠償，來為科學研究和發展做出貢獻。

- (2020) **To protect the health and life of research workers and create a safe research environment** by ensuring laboratory safety in the fields of science and technology at universities, research institutes, etc. and providing proper compensation for damage caused by laboratory accidents, thereby contributing to promoting research activities.

藉由確保實驗室的安全，並對實驗室意外造成的損害進行賠償，保護研究人員的健康和生命，創造安全的研究環境，從而有助於促進研究活動。

Government shall… 政府應該…

- (1) formulate and execute necessary policies, such as supporting research activities to ensure safe laboratory environments. (制定和執行必要的政策)
- (2) promote research and development to advance safety management technologies, and prevent accidents in laboratories, and pro-actively devise support policies to create safe laboratory environments, such as by developing and disseminating **standardized safety management protocols** and **teaching materials** for safety education for each type of laboratory. (促進先進安全管理技術的研究和發展、預防實驗室事故，並積極制定支持政策以創造安全的實驗室環境)
- (3) **investigate the current level of safety** of laboratory environments and the safety management in laboratories in universities, research institutes, etc. (調查大學、研究單位等所屬實驗室環境目前的安全水準，及安全管理情況)
- (4) **The Minister of Education** shall require universities to include the details of safety management in their **information disclosure** to ensure safety in the laboratories of such universities. <Newly Inserted, Dec. 30, 2014> (教育部應要求大學在其所揭露的資訊中包含安全管理的細節，以確保大學實驗室的安全)

Government shall… 政府應該…

- (5) formulate and implement a **Master plan** to create a safe laboratory environment to prevent accidents and to create a safe research, EVERY FIVE YEARS
  - 1st Master plan 2008-2012
  - 2nd Master plan 2013-2017
  - 3rd Master plan 2018-2022 : aligning with 'the 3rd National Science & Technology Master Plan' and 'the 3rd National Master Plan for Human Resources in Science & Technology "

  (每五年制定和實施總體計劃，來創造安全的實驗室環境、防止事故並創建安全的研究)

- (6) **Laboratory Safety Deliberative Committee** established under the jurisdiction of the Ministry of Science and ICT, headed by the Vice-Minister of Science and ICT **(實驗室安全審議委員隸屬於科學和資訊及通訊科技部，並由其副部長負責領導)**

- (7) **Laboratory Safety Information System**: collate statistical data on laboratory accidents, policy information, hazard factors in laboratories, and systematically manage such data and information **(實驗室安全資訊系統：整理實驗室事故、政策資訊、實驗室危險因子等統計數據，系統化管理這些數據和資訊)**

Article 8 (Informatization of Safe Laboratory Management)

第八條 實驗室安全管理資訊化

Surveillance of lab safety management

實驗室安全管理監管

(5) Yearly publication on "laboratory safety information system" by each entity

- General characteristics
  - Number of labs, research workers statistics
- Safety management
  - Health examination
  - Safety training
  - Insurance
  - Regular inspection
  - Corrective actions and follow-ups
  - Preliminary hazard analysis
  - Safety management structure
  - Lab accident statistics
  - Exemplary labs
  - Safety budget

每年經由「實驗室安全資訊系統」發布

- 基礎的特徵描述
  - 實驗室的數量、研究人員的相關統計資料。
- 安全管理
  - 健康檢查
  - 安全訓練
  - 保險
  - 定期檢查
  - 矯正措施和追蹤
  - 初步危害分析
  - 安全管理架構
  - 實驗室事故統計
  - 示範實驗室

"Laboratory Safety Survey" 實驗室安全調查

Characteristics (特徵項目)

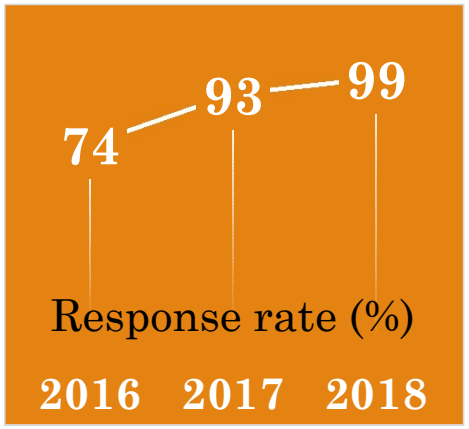
- Basic info (id, type, location, contacts, etc.)
- Lab workers statistics (composition by variables)
- Lab facilities by sector / hazard level statistics, etc.

Compliance (符合性項目)

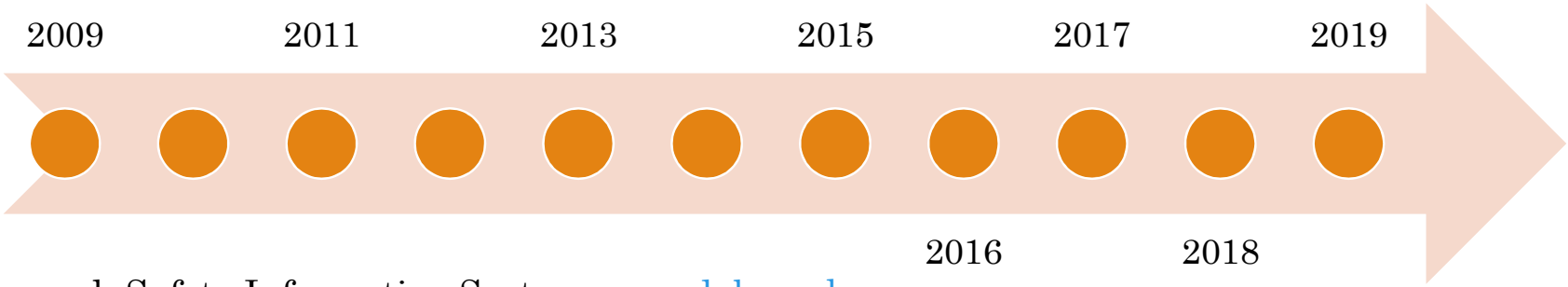
- Lab manager
- Hazard analysis
- Management structure/system
- Lab safety management council
- Compensation insurance
- Safety training
- Health examination
- Safety inspection
- Budget allocation

National Research Safety Information System, www.labs.or.kr
國家科研安全資訊系統

“Laboratory Safety Survey” 實驗室安全調查

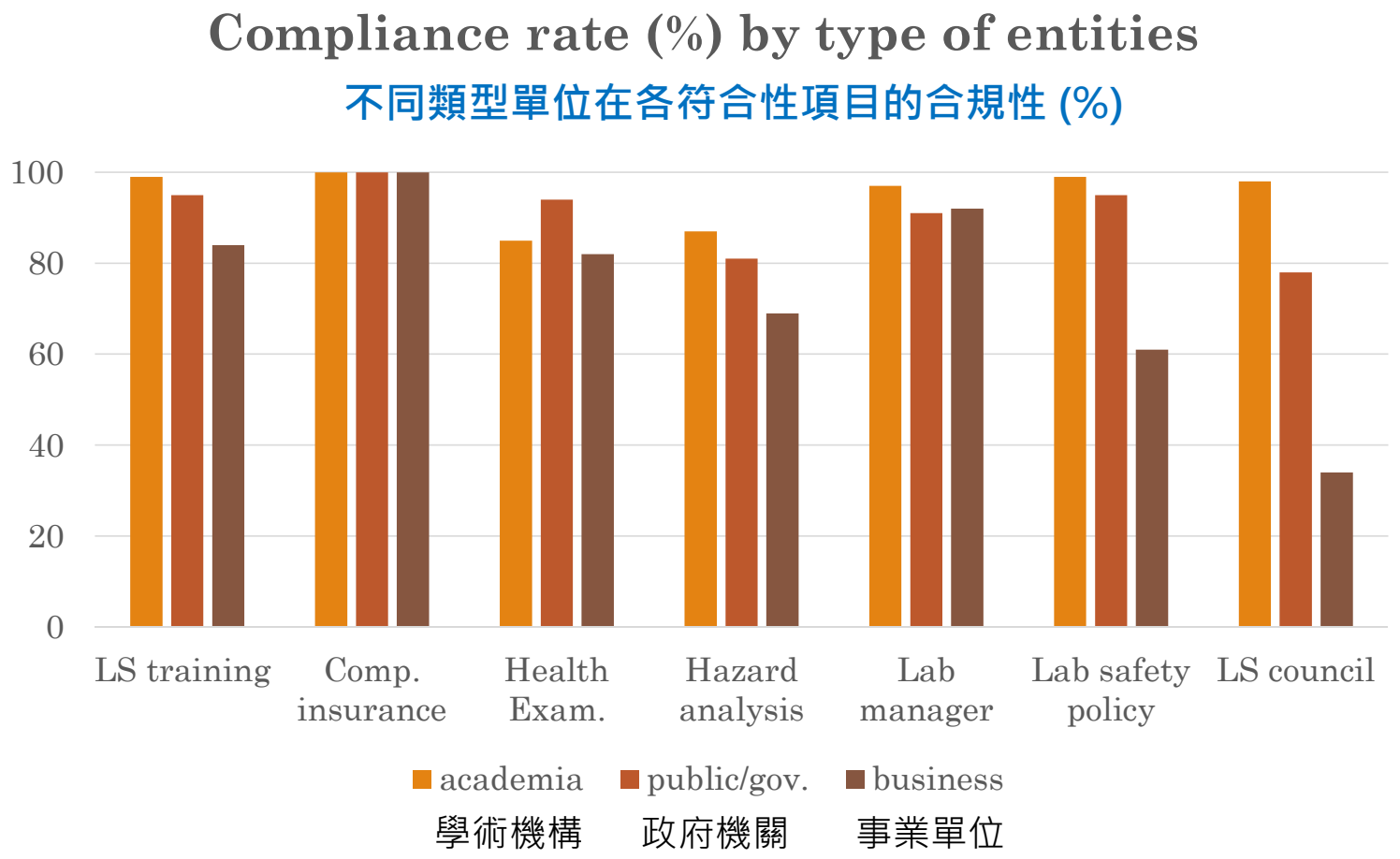


回應率



National Research Safety Information System, www.labs.or.kr

Survey 2018 says… 2018年調查結果發現...



Lab safety act & beyond since 2021

2021年以後的實驗室安全法

Severe explosion during waste disposal campaign

某大學化學實驗室
廢物處理導致嚴重爆炸

- 2019.12.27
- A chemistry research lab at K university
- 1 undergraduate, 4 graduate students
- 4 victims with burns (四名學生燒燙傷)
  - #1 : 2-3 degree burn on 20% body surface
    - USD 160,000 medical expenses
  - #2 : 3 degree burn on 89% body
    - 7 weeks in ICU
    - 10 times operation for skin graft
    - USD 1,000,000 medical expenses vs. USD 50,000 from the insurance of LSA

Student researcher is NOT employed?

學生身分研究人員不算是僱員？

Industrial Accident Compensation Insurance Act (amendment 2021.4)

工傷賠償保險法 (2021.4 修正案)

- Article 123-2 (Special cases concerning "student researcher")
  Students participating to funded R&D projects are subject to this Act and shall be deemed employees hired for the business when applying this Act

  第 123 條之二 (學生研究員的特殊情況) 參加補助性研發項目學生適用本法，且視為該事業之僱員。

- Any accidents suffered by student researchers shall be deemed occupational accident, and student researchers shall be compensated under this Act

  學生研究人員發生意外事故視同工傷，依本法規定給予賠償。

Laboratory Safety Act
(2021 partial amendment)

實驗室安全法
(2021年部分修正)

- Article 5 (Responsibilities of Heads of Research Entities) ② The head of a research entity shall work to relieve research workers from injuries or death from laboratory accidents

第 5 條 (研究單位負責人的職責) ② 研究單位負責人應努力避免研究人員因實驗室事故而傷亡。

- Article 26 (Subscription to Insurance, etc.) ③ The head of a research entity should provide medical expenses for the victims when the insurance compensation is insufficient to fully cover the medical cost

第 26 條 (投保) ③ 保險賠償不足以支付醫療費用時，研究單位負責人應為受害者提供醫療費用。

- Article 27 (Submission of insurance-related data, etc.) The Minister of Science and ICT may order an insurance company and the head of a research entity to submit data concerning the current status of insurance purchase, compensation and medical expenses for laboratory accidents, and other matters prescribed by Ordinance of the Ministry of Science and ICT.

第 27 條 (提交保險相關數據等)科學和資訊及通訊科技部可要求保險公司和研究機構負責人提交有關投保、賠償、實驗室事故醫療費用的數據、及其他所規定的事項。

Serious Accidents Punishment Act (SAPA)

嚴重事故處罰法 (SAPA)

- Passed by the National Assembly on January 8, 2021, is intended to prevent serious workplace accidents and man-made disasters.

  於 2021 年 1 月 8 日通過，旨在防止嚴重的工作場所事故和人為災難。

- It requires businesses (and government entities) to adopt health and safety management systems to prevent such accidents and imposes heavy criminal and administrative liability on companies and their senior officers if failure to do so results in serious accidents. (cf. UK's Corporate Manslaughter and Corporate Homicide Act 2007)

  該法規要求企業 (和政府機關) 採用安全衛生管理系統來預防事故，若未採行管理系統而導致嚴重事故，公司及其管理高層將承擔重大刑事和行政責任。 (參見英國 2007 年公司過失殺人和公司殺人法)

Serious Accidents Punishment Act (SAPA)

嚴重事故處罰法 (SAPA)

- SAPA provides broad outlines for a new system of criminal liability for workplace injuries and public disasters.
  SAPA 為工殤和公共災害的刑事責任制度提供了概廓。
- Serious accidents (嚴重事故)
  - ≥ 1 fatality (死亡)
  - ≥ 2 injured with medical attention for more than 6 months (超過2人傷且就醫超過6個月)
  - ≥ 3 diseases from the same hazards within a year (一年內超過3人因相同危害致病)
- Penalty (in case of university accidents) 罰則
  - President (public/national university), 校長 (公立/國立大學)
    Board chairman (private university) 董事長 (私立大學)
  - ≥ 1 year imprisonment or ≤ USD 1million fine (cf. KOSHAct, ≤ 7 years imprisonment or ≤ USD 0.1 million fine)

    一年以上有期徒刑或最高100萬美元罰款
    (韓國職業安全衛生法: 七年以下有期徒刑或最高10萬美元罰款)

SAPA cases since Jan.27, 2022

중대법 1호 적용 여부는 수사 뒤 결론
'낙석 예방' 등 재해방지 조처 여부 관건

1일 경기 양주시 은현면 도하리 삼표산업 채석장 붕괴매몰사고 현장에서 구조당국이 금속탐지기를 이용해 실종자를 수색하고 있다. 소방청 제공, 연합뉴스

https://www.hani.co.kr/arti/society/labor/1031634.html

승강기 설치하다 2명 숨져...삼표산업 이어 '2호사건'

8일 경기 성남 판교제2테크노밸리의 한 건물 신축 현장에서 추락사고가 발생해 작업자 2명이 숨졌다. 연합뉴스

Feeling safe?
Getting safer?
Really?

覺得安全？

變得更安全？

真的嗎？

- Survey from women research workers in Korea, 2018 (2018 年韓國女性研究人員之調查)
- An episode from a research worker died of blood cancer (研究人員血癌致死案例)

KOFWST survey 韓國婦女科學技術協會聯合會的調查

- Korea Federation Women's Science & Technology Associations (KOFWST), 2017
- 796 women researchers in Korea answered (796名女性研究人員參與)
- 1 of 5 feeling unsafe in their labs (每5人中有1人認為在其實驗室感覺不安全)
- 2 of 5 being hesitated to get pregnant due to the worries about lab environment (由於擔心實驗室環境，每5人中有2人會猶豫是否要懷孕)
- 1 of 2 requesting for more information on toxic chemicals to childbearing age women, pregnancy, and breastfeeding

  (每2人中有1人要求提供更多與育齡婦女、懷孕和母乳哺育有關的毒性化學物質資訊)

http://www.kofwst.org

研發工作的受害者

https://www.khan.co.kr/national/labor/article/201901311637001

A victim of R&D works (2019.1.29, S. Korea)

- A R&D worker died of blood cancer, i.e., acute myeloid leukemia. He was 32 years old.
- Work history : 2014. 2 (graduated with a master degree) – 2017. 12
- Performance evaluation of new aromatic polymers on semiconducting surfaces
- "Known risk factors for AML include increasing age, male sex, prior chemotherapy, cigarette smoking, obesity, exposure to **benzene** (苯) and other chemicals including **formaldehyde** (甲醛)." (J Poynter, et al., Int J Cancer, 2017)
- Did his job cause the disease? Was the work environment polluted with benzene? Isn't it too short period of exposure to cause the disease?
- An unbreakable chain of hazardous exposures from learning to working, from school to work

Relative Mortality of Cancer among Chemists

化學家的癌症相對死亡率

Authors (year)	Population	Study period	No. of case	All cancer mortality	Lymph/ Haematopoietic cancer
Li et al (1969)	ACS members	1948–1967	3637	1.2 (1.1–1.3)	1.7 (1.4–2.0)
Olin GR (1976)	Chem. Eng. Graduate	1930–1974	58	1.7 (1.1–2.6)	3.5 (1.3–7.6)
Olin et al (1980)	RIT graduates	1930–1977	83	1.3 (0.9–1.8)	2.2 (1.2–4.5)
Walrath et al (1985)	ACS members	1925–1979	347	1.5 (1.1–2.0)	2.2 (1.2–3.8)

Carcinogen uses during lab works

實驗室工作中使用的致癌物

- Survey on the use of carcinogenic chemicals in 54 academic laboratories in Korea, 2012

IARC	No.	Chemicals	CAS No.	No. of Laboratories
1	1	Formaldehyde	000050-00-0	13
	2	Benzene	000071-43-2	11
	3	Nickel compounds	-	9
	4	Silica dust, crystalline, in the form of quartz or cristobalite	014808-60-7	6
	5	Chromium (VI) compounds (Cr)	018540-29-9	5
	6	Tamoxifen	010540-29-1	4
	7	Cadmium and cadmium compounds (Cd)	007440-43-9	3
	8	Mineral oils, untreated or mildly treated	-	3
	9	X- and Gamma-Radiation	-	2
2A	1	Acrylamide	000079-06-1	12
	2	Lead compounds, inorganic	-	5
	3	Chloramphenicol	000056-75-7	2
	4	Glycidol	000556-52-5	2

Exposure to carcinogens during lab works

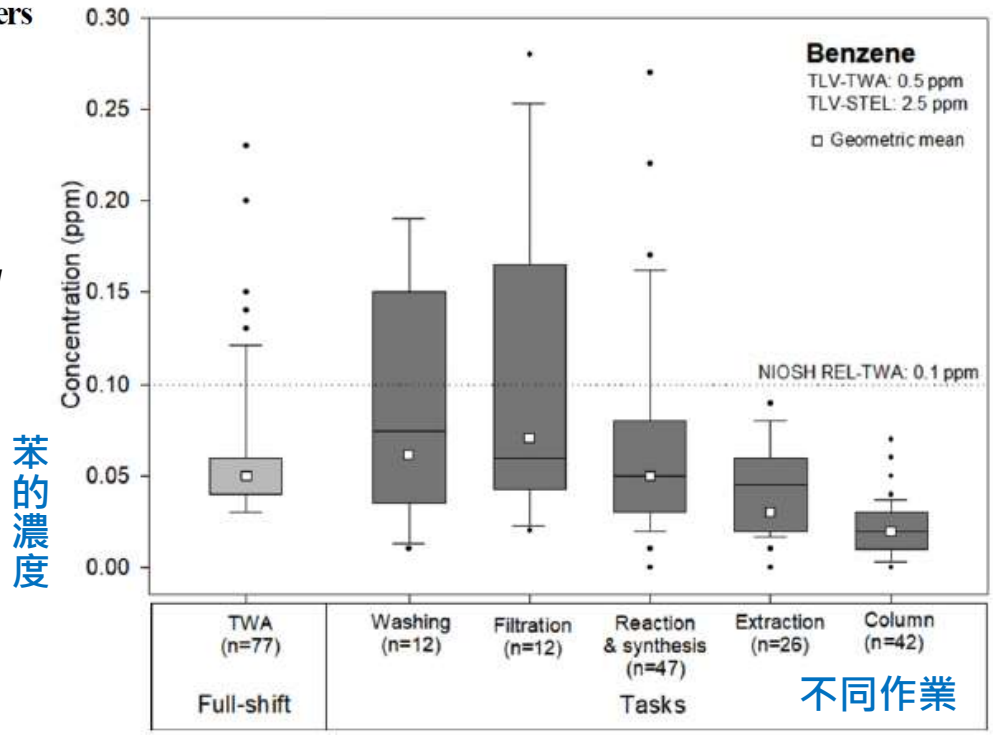
在實驗室工作中致癌物的暴露

Task-based Exposure Assessment among Laboratory workers in Organic Synthesis Laboratories

Youngeun Choi · Yeonhee Chu · Ikmo Lee[1] · Jeongim Park*

Department of Environmental Health Sciences, Soonchunhyang University
[1]Department of Chemistry, Inha University

Journal of Korean Society of Occupational and Environmental Hygiene, 2019



(h) Benzene

Food for thought 發人深省

- Top-down is not all good. Government, employers, managers, supervisors (PIs, professors), workers, students, and their representatives, and all those concerned with OSH) should do their shares.
- We need to collect and use lab safety, health and exposure data.
  - Recording and notification of laboratory accidents
  - Organizing lab workers' health surveillance and the collection, processing and communication of health-related data
  - Record keeping what you have used during your lab works
  - Task-based(lab activity-specific) exposure scenarios and matrix

- **政府、雇主、經理、主管 (PI、教授)、工作者、學生和他們的代表，以及所有與職業安全與衛生有關的人都應該儘自己的一份力量。**

- **需要收集和使用實驗室安全、衛生和暴露的數據。**
  - 實驗室事故的記錄和通知
  - 收集、處理和交流健康檢查結果及健康相關數據
  - 記錄在實驗室工作期間使用過的東西
  - 和作業 (實驗室的活動) 相關的暴露情境和工作-暴露矩陣

Thank you!

May 9, 2022

Jeongim Park
Dept. of Environmental Health Sciences
SoonChunHyang University, Asan, S. Korea