出國報告（出國類別：參加國際研討會）

「行政院國家科學委員會補助專題研究計畫經費」派員出國參加

2010 年 21 屆「國際環境流行病學研討會」出國報告

服務機關：大仁科技大學職業安全衛生系
姓名職稱：趙寶強 講師
派赴國家：韓國 首爾
出國期間：**99/08/28-99/08/30**
報告日期：**99/08/29**

摘　要

2010 年 21 屆「國際環境流行病學研討會 ISES-ISEE 2010（2010 Joint Conference of International Society of Exposure Science & International Society for Environmental Epidemiology）」由韓國環境衛生部（The Korean Society of Environmental Health and Toxicology National Institute of Environmental Research）主辦，業於 2010 年 8 月 28 日至 9 月 1 日於韓國首爾(COEX)會議中心舉行。

此次研討會主軸針對環境及職場衛生、暴露評估、流行病學研究等提供資訊與交流。因應大會環境職場安全衛生理念，依行政院國家科學委員會補助專題研究計畫經費核定，派任計畫內研究人員大仁科技大學職業安全衛生系趙講師寶強發表研究成果，發表題目爲：半導體產業低頻噪音評估與控制一以封測試製程爲例（Subjective annoyance from exposure to low frequency noise of semiconductor manufacturing in the packaging and testing processes）此篇文章主要研究台灣 IC 產業現場工作環境低頻噪音的暴露情形與改善方法，並與來至世界各國知名學者專家交換研究心得與經驗交流以提升未來研究品質。

與會後建議事項如下：

1、 期待政府有關單位可多爭取舉辦此類國際型研討會，不但可提升國內研究風氣與研究學者知名度，並提升台灣學術競爭力。

2、 增列預算鼓勵國內學者專家教授出國發表學術研究文章以提昇國內研究論文質與量。

3、 此次研討會與眾不同在於充分利用午餐時間，將各國學者齊聚一堂並邀專家演講，充分利用時間增加與會人士交流機會。

4、 大會各講堂與海報展覽處相距甚遠（分隔兩地），較不利與會專家學者於休息時間參觀與討論，如能將場地安排在同一處所相信效果更佳。

5、 舉辦單位充分展現認真態度與進步快速趨勢，期待國內學術單位增加交流次數，加速國內學術風氣成長。

目　錄

壹、目的

參與 2010 年 21 屆「國際環境流行病學研討會 ISES-ISEE 2010（2010 Joint Conference of International Society of Exposure Science & International Society for Environmental Epidemiology）」，研討會地點爲韓國首爾國際會議中心，發表張貼論文「半導體產業低頻噪音評估與控制一以封測試製程爲例（Subjective annoyance from exposure to low frequency noise of semiconductor manufacturing in the packaging and testing processes）」。本論文主要研究職場（台灣電子業 IC 產業）低頻噪音的暴露狀況；本次行程除論文發表外，也與各國專家學者交流相關環境及職場衛生、暴露評估、流行病學研究等訊息，蒐集各國目前已發展及未來趨勢研究重點與方向資訊將可提供我國政府機關、事業單位與學術研究機構在職業安全衛生政策、實務與研究參考。

貳、參與 21 屆「國際環境流行病學研討會」過程

一、出國會議行程簡介

日期	天數	到達地點	工作內容
99.08.28	1	高雄→首爾 (Seoul)	去程 （屏東大仁科大→高雄(小港國際機場)→韓國(仁川機場)→首爾(機場捷運)→NAMSANPARK HOTEL）
99.08.29	1	首爾 (Seoul)	1. 由首爾 NAMSANPARK HOTEL 搭車至首爾 COEX Convention Center 國際會議中心 2. 大會接待中心（研討會）報到，領取會議資料、手冊、光碟、識別證等 3. 3 樓海報區（PP-29-180）張貼論文海報 4. 返回大會中心出席開幕式 5. 專題演講 題目：永續環境衛生（Environmental Sustainability Health），講者：John D .Spengler 6. 午餐時段專題演講 題目：Exposure to and Health Effects of Traffic Pollution: HEIReview of the Literature 並與各國學者教授交流指教 7. 專題演講 題目：交通噪音與中風（Road Traffic Noise and Stroke: A Prospective Cohort Study）
99.08.30	1	首爾→高雄 (Kaohsiung)	1. 07：00 由 NAMSANPARK HOTEL 搭車前往首爾 COEX Convention Center 國際會議中心聽專題演講 題目：個人暴露頻估技術—感應器（Sensor Technologies for Personal Exposure Assessment） 2. 午餐時段專題演講 題目：如何讓我們地球更健康（How Healthy is our Earth? A Case Study of the Gulf of Mexico Oil Spill） 3. 下午續聽演講與海報觀賞，於 17：00 返回飯店 返程 （首爾→仁川機場→高雄小港國際機場→屏東）

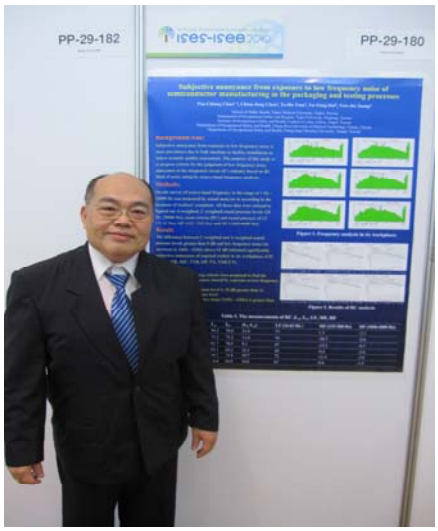
二、照片欣賞

照片 1：研討會開幕式

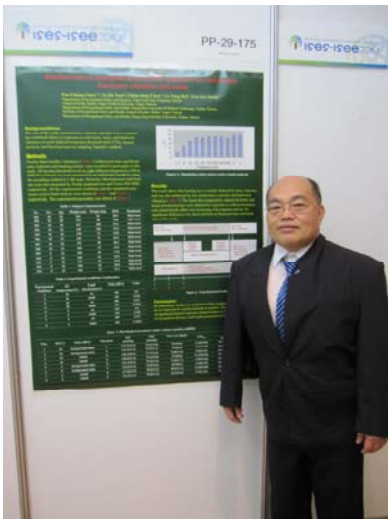
照片 2：研討會大會實況

照片 3：Morning Training Sessions

照片 4：研討會專題講座 Q&A



照片 5：趙講師寶強與發表 Poster 合影



照片 6：趙講師寶強與發表 Poster 合影

三、研討會發表情形

參加研討會過程如下：8 月 28 日由高雄小港機場直飛韓國仁川國際機場，仁川機場是亞洲第六繁忙的國際機場（設備包括各式餐廳、飯店、醫院等設施，並設立獨創文化體驗空間，甚至有高爾夫球場），根據調查，仁川國際機場連續五年（2005-2009）獲得「全球服務最佳機場」第一名，出入境服務及速度皆相當不錯（入境約 21 分鐘；出境約 29 分鐘）。接著於 1 樓入境大廳轉搭高速巴士前往首爾參加為期 5 天的第 21 屆 2010 年「國際環境流行病學研討會 ISES-ISEE 2010(2010 Joint Conference of International Society of Exposure Science & International Society for Environmental Epidemiology)」會議。會議假韓國首爾 COEX Convention Center 舉行，約有全世界 60 多個國家的環境衛生與流行病學專家學者共襄盛舉，場面十分浩大。

8 月 29 日早上 7 點由南山公園旅館出發，出門天空下著大雨，故搭乘計程車到首爾國際會議廳，8 點在 COEX Convention Center 1 樓報到，由於已預先註冊，告知服務人員自己的姓名，經多半為研究生的會務人員登入電腦查詢，於確認已註冊後，領取大會註冊收據、個人識別證及環保背包，背包內含會議資料，包括：摘要集、摘要 CD 等相關會議資料及首爾 COEX Convention Center 完整的導覽圖。

完成報到手續，先行認識研討會整體環境，至三樓 E 1 海報張貼廳找到 PT Code(0845)：PP-29-180 位置張貼 Poster「半導體產業低頻噪音評估與控制—以封測試製程為例（Subjective annoyance from exposure to low frequency noise of semiconductor manufacturing in the packaging and testing processes）」。完成海報張貼後，參加 8 點半的開幕儀式，由 ISES President Tina Bahadori 及 ISEE President Dean Baker 等貴賓致詞，接下來由 Prefessor John Spengle 演講 How Healthy Is Our Earth ? A Case Study of the Gulf of Mexico Oil Spill，大會並於 9 月 28 日已安排一系列不同 Works shop 學習工作坊供與會者參加，詳細項目如下：

- W1：Bayesian methods for spatial epidemiology.
- W2：Writing and Publishing Environmental Epidemiology Papers.

- W3：A Library for Environmental Time Series Analysis in R (ares).
- W4：Black Carbon, Ultrafine and Fine PM Monitoring In Exposure and Epidemiology Studies.
- W5：Statistical methods for evaluating air pollution and temperature effects on human health.
- W6：Public health and Air Pollution in Asia (PAPA) – A forum for further development with new scopes and participants.
- W7：Children's Environmental Health.
- W8：Risk assessment for chemical exposure : Methods and Application.
- W9：Disease Mapping using Generalized Additive Models.

此次大會還精心安排（從 8 月 29 日到 9 月 1 日）每日早上 7 點 30 分到 8 點 20 分安排 2 個部分的 Morning Training Sessions（以下簡稱 MTS）讓與會的各國學者專家自由選擇參加，且完全免費。本人 8 月 30 日特別早在 6 點 20 分出發參加 MTS（Writing and Publishing Environmental Epidemiology Papers），由大師及主編級教授講解如何寫作研究發表論文，並讓與會的博士生發問交流研究時遇到之問題，資深教授說：「除非你深愛研究，並將整個生命投入其中，否則學術研究是條相當辛苦之路！」，讓全場與會者感動。另一博士後研究（獲得博士學位之後專門從事某領域研究的研究人員）表示：「由於要幫老闆作許多研究，加上工作不是很穩定、薪水也不高（有計畫時就有薪水），且需要長時間在實驗室忍受獨孤寂寞挫折，Postdoctoral 相當辛苦！」，資深教授回答：「在研究領域，博士後研究就是如此，當你累積到一定能量時即可『出頭』！」，此言一出，讓全場與會學者莞爾。

研討會也於會議期間，安排每日社交節目，包括 8 月 29 日的首爾市政府「綠建築」參觀，韓國人於節能減碳上非常認真用心，程度應以已超越我國，值得我國深思。30 日的韓國晚宴及漢江旅遊等，讓各國學者專家在學術研討交流之餘，也可紓緩緊張疲憊之身心。並巧妙運用中午用餐時間，安排學者專家在會場學術演講，如 29 日演講題目爲「交通污染德健康效應（Exposure to and Health Effects of

Traffic Pollution: HEI Review of the Literature）（HEI 組織已發表之文獻探討）」，講者爲 Rashid Shaikh Director Science Health Effects Institute, USA，內容講述 HEI 過去對交通造成空氣污染其排放與暴露標準建立回顧，讓各國與會專家學者在用餐之餘並可聽取國際權威專業大師及教授的精闢演講，此巧思令本人印象深刻。

下午 3 點，所有 Poster 作者到 Poster 前接受各國學者教授指教與交換意見，本人除解釋自己低頻噪音之文章之餘，同時也與別國學者專家交流意見、探討研究趨勢等，並學到其後可將論文摘要印成 A4 大小供與會專家教授取閱及方便攜帶，如來不及詢問討論時，可用數位相機將海報拍照，以便回去再詳細研究。中場休息時間大家皆把握時間相互溝通討論，直至最後會議結束時，各國學者、教授及專家在依依不捨的心情下互道珍重，並留下名片與電子信箱等聯繫方式後踏上歸途。

參、綜合心得與建議事項

本次參與 2010 年「國際環境流行病學研討會 ISES-ISEE 2010」收穫相當豐碩。心得如下：ISES 主辦大會籌備上非常用心，大會選在韓國首爾的國際展覽中心（COEX Convention Center），其交通、購物、食宿皆非常便利，尤其首爾有近千萬的人口，但完善的地鐵與乾淨整齊的街道卻令人讚歎。

本次研討會展出之 Poster 文章，共有四百多篇論文，其內容包括：環境暴露與健康、生物偵測、空氣污染與健康效應、流行病學…等範圍，可說是非常豐富。詳細項目如下所示：

Session & Topic

Plenary 1: environmental sustainability and health

Plenary 2: Emerging technology and environmental health

Plenary 3: Environmental Justice

Lunch Session

1. (O) Climate change and environmental health I
2. (O) Work Environment and Respiratory Effects
3. (O) Air pollution - Long-term health effects
4. (S) Enhancing Exposure Assessment for Air Pollution Health Studies: EPA/NERL Cooperative Agreement Program
5. (O) Biomarkers and Biomonitoring I
6. (O) Indoor and built environment I
7. (S) Arsenic crisis in the Ganges Delta: What have we learned? (Part I)
8. (S) What do we know about modes of influenza transmission?
9. (O) Noise, emerging environmental problems and health

本人特別留意噪音專題（Noise, emerging environmental problems and health），其中有兩篇台灣論文：1) Road traffic noise and stroke: a prospective cohort study 及

2) Road traffic noise exposure and risk of hypertension in Taiwan。分別探討交通噪音與中風、高血壓間的關係，十分有趣。此外在研討會現場與各國學者專家溝通交流之中，發現德國（西德）一學者的研究特別有興趣，其研究探討交通噪音與冠狀動脈鈣化之關係（Does Traffic Noise Explain the Association of Residential Proximity to Traffic With coronary Artery Calcification ?）（附件 3），與作者熱烈討論下，進一步瞭解此研究之精隨，此文探討冠狀動脈鈣化（Coronary Artery Calcification，簡稱 CAC）是血管上斑塊或動脈粥樣硬化的標記與交通噪音之關連性，作者使用電子束電腦斷層攝影（electron -beam computed tomography）之技術來偵測冠狀動脈上鈣化量的多寡，顯示動脈粥樣硬化斑塊的存在與量的大小，但人體暴露交通噪音與冠狀動脈鈣化仍需進一步研究與釐清。另一有趣研究爲韓國教授探討維他命 C 能幫助防制聽力損失，也值得後續追蹤。下屆（23 屆）ISEE 2011 將在 Barcelona (2011 年 9 月 13-16 日)舉行，許多學者在閉幕前相約明年再見。

此次參加 2010 年「國際環境流行病學研討會 ISES-ISEE 2010」，深感韓國之進步，與會後個人建議如下：

1、 期待政府有關單位可多列經費舉辦此類國際性之研討會，不但可提升國內研究風氣與研究學者知名度，並提升台灣學術競爭力。

2、 增列預算鼓勵國內學者專家教授出國發表學術研究文章以提昇國內研究論文質與量。

3、 韓國學術領域進步迅速，期待國內學術團體可仿效韓國人認真與效率之態度。

4、 此研討會午餐時段仍舉辦演講，全體與會學者專家邊用餐邊聽演講，充分把握時間。

5、 國科會可增列經費，鼓勵國內私立技專博士班學生出國發表，增進學術風氣。

6、 整合國內知名大學（如臺灣大學、交通大學等）共同舉辦國際性公共衛生領域之研討會，強化我國學術界研究動機與熱忱。

7、 首爾捷運（地鐵）可飲食，卻能保持車廂整潔，可供相關單位參考。

附件一：發表論文摘要

Subjective annoyance from exposure to low frequency noise of semiconductor manufacturing in the packaging and testing processes

Pao-Chiang Chao[1, 2], Chiou-Jong Chen[3], Ta-Ho Tsao[4], Yu-Tung Dai[5], Yow-Jer Juang[4]

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2. Department of Occupational Safety and Hygiene, Tajen University, Pingtung, Taiwan
3. Institute of Occupational Safety and Health, Council of Labor Affairs, Taipei, Taiwan
4. Department of Occupational Safety and Health, Chung Hwa University of Medical Technology, Tainan, Taiwan
5. Department of Occupational Safety and Health, Chang Jung Christian University, Tainan, Taiwan

Background/Aims: Subjective annoyance from exposure to low frequency noise is more prevalence due to bulk machine or facility installation in indoor acoustic quality assessment. The purpose of this study is to propose criteria for the judgment of low frequency noise annoyance in the integrated circuit (IC) industry based on RC Mark II noise rating by octave-band frequency analysis.

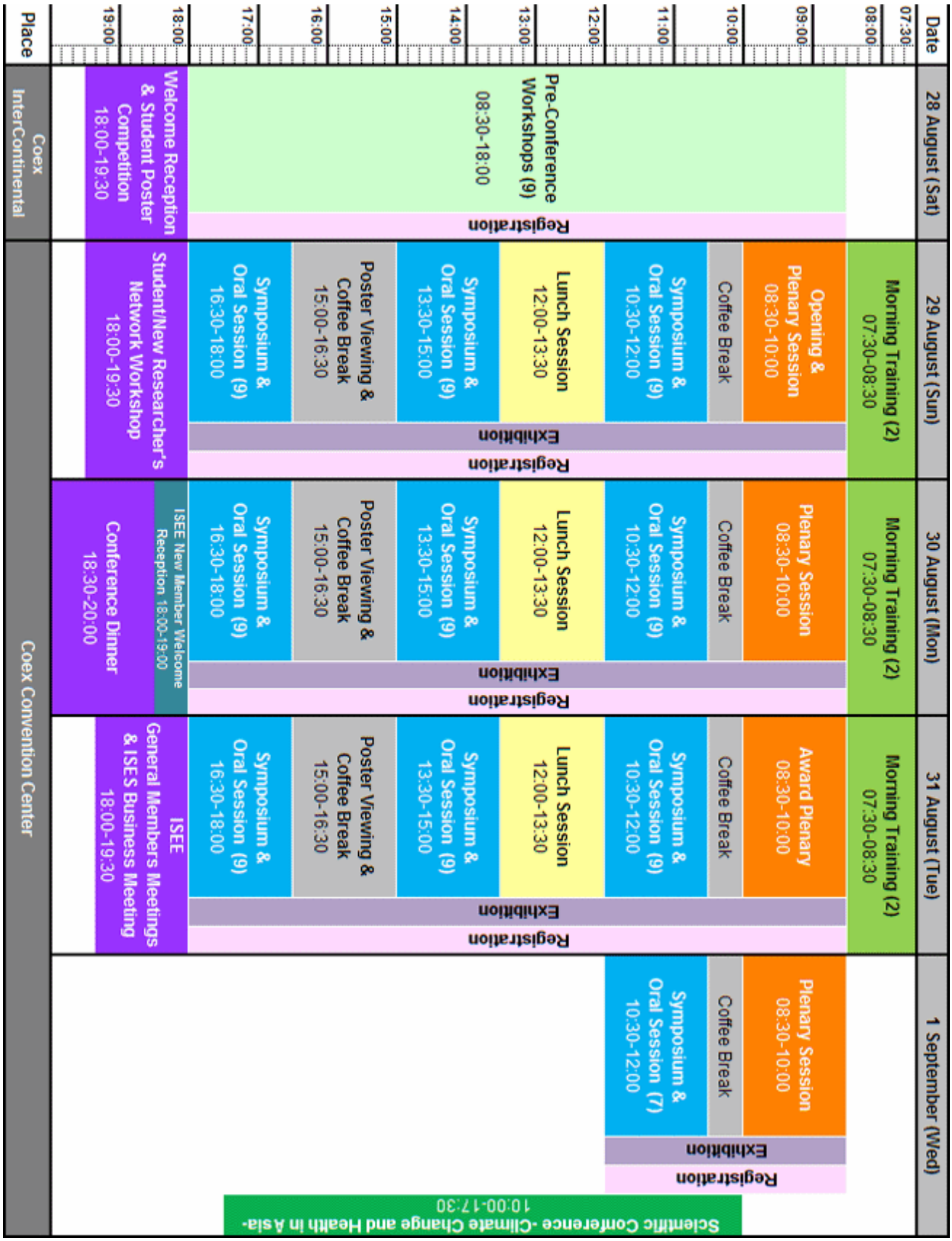
Methods: On-site survey of octave-band frequency in the range of 1 Hz - 16000 Hz was measured by sound analyzer in according to the locations of workers' complaint. All these data were utilized to figured out A-weighted, C-weighted sound pressure levels (20 Hz - 20000 Hz), room criteria (RC) and sound pressure of LF (16-63 Hz), MF (125-500 Hz), and HF (1000-4000 Hz).

Results: The difference between C-weighted and A-weighted sound pressure levels greater than 8 dB and low frequency noise (its spectrum in 16Hz - 63Hz) above 65 dB indicated significantly subjective annoyance of exposed worker.

Conclusion: In this study, the following criteria were proposed to find the source of workers' annoyance caused by exposure to low-frequency noise. 1. C-weighted sound pressure level is 10 dB greater than A-weighted sound pressure level. 2. Noise in the low frequency range (16Hz - 63Hz) is greater than 65 dB. 3. LF ≥MF ≥HF.

Keywords: room criteria curve, integrated circuit industry, low-frequency noise

附件二：大會議程


Date
28 August (Sat)
29 August (Sun)
30 August (Mon)
31 August (Tue)
1 September (Wed)
07:30
08:00
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11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
Pre-Conference Workshops (9) 08:30-18:00
Welcome Reception & Student Poster Competition 18:00-19:30
Registration
Morning Training (2) 07:30-08:30
Opening & Plenary Session 08:30-10:00
Coffee Break
Symposium & Oral Session (9) 10:30-12:00
Lunch Session 12:00-13:30
Symposium & Oral Session (9) 13:30-15:00
Poster Viewing & Coffee Break 15:00-16:30
Symposium & Oral Session (9) 16:30-18:00
Exhibition
Student/New Researcher's Network Workshop 18:00-19:30
Morning Training (2) 07:30-08:30
Plenary Session 08:30-10:00
Coffee Break
Symposium & Oral Session (9) 10:30-12:00
Lunch Session 12:00-13:30
Symposium & Oral Session (9) 13:30-15:00
Poster Viewing & Coffee Break 15:00-16:30
Symposium & Oral Session (9) 16:30-18:00
ISEE New Member Welcome Reception 18:00-19:00
Conference Dinner 18:30-20:00
Morning Training (2) 07:30-08:30
Award Plenary 08:30-10:00
Coffee Break
Symposium & Oral Session (9) 10:30-12:00
Lunch Session 12:00-13:30
Symposium & Oral Session (9) 13:30-15:00
Poster Viewing & Coffee Break 15:00-16:30
Symposium & Oral Session (9) 16:30-18:00
ISEE General Members Meetings & ISES Business Meeting 18:00-19:30
Plenary Session 08:30-10:00
Coffee Break
Symposium & Oral Session (7) 10:30-12:00
Scientific Conference -Climate Change and Health in Asia- 10:00-17:30
Place
Coex InterContinental
Coex Convention Center

附件三：交通噪音與心臟關係 POSTER

Does Traffic Noise Explain the Association of Residential Proximity to Traffic With coronary Artery Calcification?

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Background/Aims: Residential proximity to high traffic, a major source of noise and fine particle exposure, has been linked to atherosclerosis. We investigate, whether the association of traffic proximity and coronary atherosclerosis can be explained by chronic traffic noise exposure.

Methods: We used baseline data (2000-2003) from the Heinz Nixdorf Recall-Study, a population-based cohort of 4814 participants living in three cities in Germany. We calculated the distances between participants´ home address and federal and state highways. For long-term traffic noise exposure we used categorical noise map values (according to the EU-directive; 2002/49/EC) and assigned these to the participants´ home addresses. Main outcome was coronary artery calcification (CAC) measured by electron-beam computed tomography. We used multiple linear regression to investigate the association of exposure to traffic noise with CAC, controlling for gender, age, education, occupation, smoking, waist-hip ratio, physical activity, LDL, statins, urban background PM2.5 and city.

Results: Distance to federal and state highways and exposure to traffic noise were only weakly correlated in this urban setting (r=0.3).No consistent association was observed for weighted daily mean (Lden) or night-time traffic noise exposure with

CAC (N=4249). We estimated CAC to be 3.2% higher (95%CI -26.0-43.9%) for the highest traffic noise category (Lden >70 dB; n=192) compared to the reference group (When noise was included in the model for distance to major roads, the estimate for distance and CAC did not change substantially [without noise: 12.3% increase (95%CI 2-21.5%) in CAC for a reduction of the distance by half; including noise in the model: 14.5% (95%CI 3.7-24.1%)].

Conclusion: With our current traffic noise exposure data we were unable to show the effect of traffic noise on the biological variability of CAC. Further analyses including residential characteristics and investigation of more refined noise exposure data are necessary.

Does traffic noise explain the association of residential proximity to traffic with coronary artery calcification?

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Background

- Residential proximity to high traffic has been linked to coronary and aortic atherosclerosis (Allen 2009, Hoffmann 2007)
- Residential proximity to high traffic is a major source of noise and fine and ultrafine particle exposure, which are both related to cardiovascular disease:
  - Chronic noise exposure from road traffic is weakly associated with blood pressure and hypertension, one of the most important risk factors of atherosclerosis. (Babisch 2008)
  - Chronic fine particulate matter exposure is associated with atherosclerosis. (Bauer 2010, Künzli 2010)
- It is unclear, which pathogenic factor is responsible for the observed association of road proximity with atherosclerosis

Objective

To investigate, whether the association of traffic proximity and coronary atherosclerosis can be explained by chronic traffic noise exposure.

Methods

Heinz Nixdorf Recall Study:

- Population-based prospective cohort study
- Random sample from 3 large adjacent German cities (highly urbanized region, 'Ruhrgebiet')
- 4.814 participants aged 45-75 years
- Use of cross-sectional baseline data (2000-2003)

Risk Factors, Evaluation of Coronary Calcification, and Lifestyle

Outcome:

- Coronary calcification score (CAC), measured non-invasively with electron-beam computed tomography (EBCT)
- EBCT is a highly reproducible and accurate measure of coronary atherosclerosis that correlates well with cardiovascular risk factors and predicts clinical events
- Modeled as natural logarithm of CAC score +1, accounting for the skewness of the distribution

Exposure:

Residential proximity to high traffic:

- Proximity of participants´ home address to federal and state highways
- Modeled continuously as natural logarithm of distance, distances > 400 m set to 400 m

Long-term road traffic noise:

- Noise map values were provided by the three cities of the study area
- Modeled according to the EU-directive; 2002/49/EC
- Yearly mean of 24h mean daily road traffic noise (L_{den})
- Categorical noise map values with lowest as reference [≤55;56-60;61-70,>70 db (A)]
- Noise model based on the following noise-relevant determinants:
  - -Small-scale topography of the area
  - -Dimensions of buildings
  - -Noise barriers
  - -Street axis
  - -Vehicle-type specific traffic density
  - -Speed limit
  - -Street surface

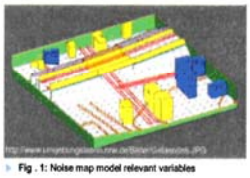

Fig . 1: Noise map model relevant variables

Statistical Analysis:

- Analysis of 4.249 participants with valid data on road proximity, noise exposure, outcome and covariates
- Correlation of exposures (check for co-linearity)
- Multiple linear regression
  - -Road traffic noise (L_{den}) as main exposure for crude and fully adjusted model (gender, age, education, economic activity, smoking, diabetes mellitus, waist-hip ratio, physical activity, LDL, statins, region, city; blood pressure, and antihypertensive medication were included in a separate step)
  - -Inclusion of road proximity and road traffic noise in one model
  - -Additional inclusion of urban background fine PM in above specified model
- Sensitivity analysis: excluding participants with coronary heart disease (CHD)
- All results are given as %-change in CAC-Score
- Results that are related to models including proximity to major roads are presented as %-change in CAC-Score per reduction in the distance between the residence and a major road by half

Results

Tab. 1: Characteristics of study population N=4249

Age mean (SD)	59.8 (7.8)
Male sex, n (%)	2089 (49.2)
CAC median (Q1; Q3)	
Men	79.9 (7.2; 58.7)
Women	2.3 (0.0; 45.3)
Smoking status, n (%)	
Never smoker	1.795 (42.3)
Ex-smoker	1.479 (34.8)
Smoker	975 (23)
Education n (%)	
≤10 years	478 (11.3)
11–13 years	2.372 (55.8)
14–17 years	952 (22.4)
≥18 years	446 (10.5)
Coronary heart disease, n (%)	287 (6.8)
Antihypertensive medic., n (%)	1.545 (36.7)

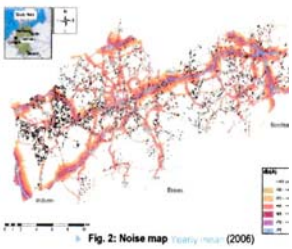

Fig. 2: Noise map (2006)

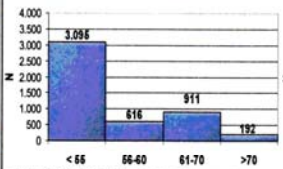

Fig. 3: Distribution of study population for road traffic noise categories dB (A) (L_{den}). Distance to federal and state highways and exposure to traffic noise were only weakly correlated in this urban setting (r=0.3).

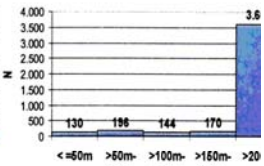

Fig. 4: Distribution of study population for proximity to federal and state highways

Effect of road traffic noise (L_{den}) on coronary calcification. Crude and fully adjusted models with gender, age, education, occupation, smoking, WHR, physical activity, LDL, statins, region, and city

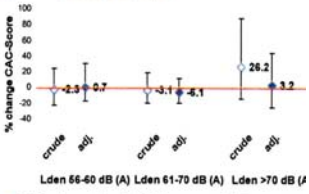

Fig. 5: Percent change in CAC-Score per road traffic noise catego (L_{den}) crude and adjusted with lowest category (<=55 dB (A)) as refere

Effect of road proximity on coronary calcification. Model 2 also includes road traffic noise, model 3 additionally includes long-term PM2.5 at the residence. All models adjusted for gender, age, education, occupation, smoking, WHR, physical activity, LDL, statins, region, and city.

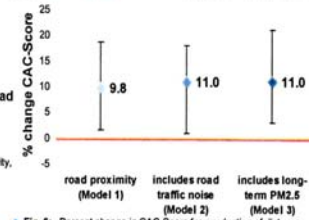

Fig. 6: Percent change in CAC-Score for a reduction of distance between the residence and a major road by half

Result of sensitivity analysis: For men the % change in CAC-Score was higher [14.0% (95% C 0.9%;28.0%)] than for women [10.3% (95% CI: -1.3%;23.0%)].The estimate is only significant for men. Excluding participants with CVD did not change the estimate: 12% (95% CI:-3.0;22.0).

Discussion

- We were not able to explain the previously observed association between residential proximity to a major road and arterial wall calcifications with chronic exposure to traffic noise, as modeled according to EU standards
- Possible explanations include imprecise personal noise estimation methods due to missing consideration of residential or personal characteristics, misclassification of the exposure status due to relocations, newly built noise barriers along federal highways which reduce modeled nois exposure, or absence of a measurable effect of moderate environmental traffic noise exposure c late stages of atherosclerosis as measured by coronary calcification
- Limitations include no information on residential characteristics (type of windows, location of living room / bedroom, ventilation habits), other noise sources related to this urban setting (shop „social noise"), and no consideration of hearing impairment. Furthermore, we did not take noise annoyance into account
- Strengths include a well examined study population, precise and reliable assessment of coronary calcification and the best available noise model

Conclusion

- With our current traffic noise exposure data we were unable to show the effect of traffic noise on the biological variability of CAC
- Further analyses including residential characteristics and investigation of more refined noise exposure data are needed

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