

Environmental pollution has many facets, and the resultant health risks include diseases in almost all organ systems. Many infections are acquired by inhalation and ingestion of pathogens. Airborne diseases are spread when droplets of pathogens are expelled into the air due to coughing, sneezing or talking. Water-borne diseases are infectious diseases spread primarily through contaminated water.

Air & Water Borne Diseases-open gives barrier-free access to the literature for research. It increases convenience, reach, and retrieval power. It increases convenience, reach, and retrieval power. Free online literature is available for software that facilitates full-text searching, indexing, mining, summarizing, translating, querying, linking, recommending, alerting, "mash-ups" and other forms of processing and analysis.



Air & Water Borne Diseases

Open Access

Editors & Editorial Board

<http://omicsgroup.org/journals/awbdhome.php>



M. J. Lannoo
Indiana University
USA



Alfésio Braga
The Catholic
University of Santos
USA



James L. Sublett
University of Louisville
USA



Jacek Dutkiewicz
University Fribourg
Germany



Sameeh Mansour
Suez Canal
University, Egypt



Ki-Hyun Kim
Sejong University
Korea



Itzhak Brook
Georgetown Univer-
sity, USA



Anita C. Wright
University of Florida
USA



E. W. Stommel
McGill University
USA



Joseph Larkin
University of Florida
USA



Walid Alali
University of Georgia
USA



Sung Kyun Park
University of
Michigan, USA



Weidong Wu
University of North
Carolina, USA



H Jian-Min Hou
Alabama State
University, USA



G. A. Preidis
University of Texas,
USA



Rajeev Gupta
North Shore
University, USA



Rajat Sethi
Kingsville, Texas
USA



Kyoko Fukuda
University of
Canterbury
New Zealand



Ken-ichiro Inoue
Oita University
Japan



R Harikrishnan
Jeju National
University
South Korea



M Zaki Zaghloul
Ain Shams University
Egypt



L Thore Fadnes
University of Bergen
Norway



Iván Bravo
University of Castilla-
La Mancha, Spain



P Eberechi Akpaka
The University of the
West Indies



Ding Xue-zhi
Lanzhou University
China



Shlomit Paz
University of Haifa
Israel



Zhang Yan
University of São
China



William Cho
University of Hong
Kong, China



Arnaud Le Menach
Health Protection
Agency, UK

Journal of Air & Water Borne Diseases -Open Access using online manuscript submission, review and tracking systems of Editorial tracking system for quality and quick review processing. Submit your manuscript at <http://www.omicsonline.org/submission/>

OMICS Publishing Group

5716 Corsa Ave., Suite 110, Westlake, Los Angeles, CA 91362-7354, USA, Phone: +1- 650-268-9744, Fax: +1-650-618-1414, Toll free: +1-800-216-6499

Case Report

Open Access

Occupational Exposure to Asbestos: Mortality and Liability Issues Arising in Hong Kong's Shipping Industry

Rohan Price¹ and Jack Burke²

¹Research Fellow, Faculty of Law, University of Tasmania and Visiting Professor, School of Law, Dalian Maritime University, China

²Senior Teaching Fellow, School of Law, City University of Hong Kong, China

Abstract

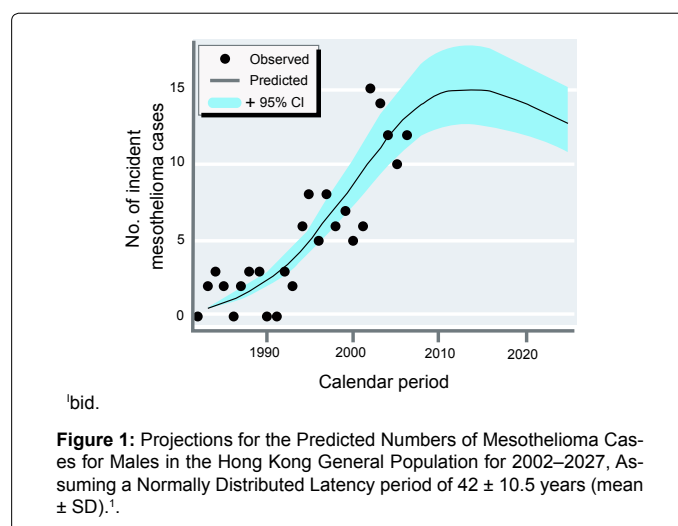
This article evaluates a range of legal responses to issues of causation and compensation arising out of occupational malignant mesothelioma claims. A survey of the common law in the United Kingdom leads to an assessment of the law and policy settings which Hong Kong should adopt in relation to these issues. It is argued that Hong Kong is underprepared for the steep rise of asbestos-related litigation on the way to its shores and that the absence in Hong Kong of local common law on mesothelioma liability means that it will draw on English approaches which are, themselves, unsatisfactory and unsuitable to local conditions. In particular, it is argued that (1) the high sympathy culture toward patients in Hong Kong's healthcare system and (2) the high level of personal and corporate bankruptcy mean that stringent English compensation approaches to mesothelioma in cases of pre-cursor conditions and multiple employer apportionment of liability (respectively) are not a good fit for Hong Kong.

Introduction

This article addresses asbestos-related mesothelioma in Hong Kong from both general occupational and more particularly the maritime exposure perspectives. A conference on asbestos in Asia was hosted by Hong Kong in 2009 and the Hong Kong Confederation of Trade Unions, the Association for the Rights of Industrial Accident Victims and the relative of a marine mechanic who was an asbestosis sufferer all combined to express concern at the increasing mesothelioma mortality in the Region [1]. There is a great similarity between the course of the disease in Hong Kong mesothelioma patents and the epidemiology described in the international medical literature: mean age of 63 years upon diagnosis, mean latency of 46 years, median survival of 9.5 months, patients are predominantly male and there is a high prevalence among workers in ships and dockyards [2]. Thus, the legal questions raised in Hong Kong's shipping industry by mesothelioma about causation, latency and measure of damages will be very similar to those in the England. But it is questionable whether Hong Kong should follow the English in finding pleural plaques to be a non-compensable condition (*Rothwell*) and that in multi-employer cases damages should be carried by solvent employers to the extent only of the liability of each remaining one (*Barker*). On loss of earnings issues arising in mesothelioma claims there is, however, a clear and well-developed set of precedents from which Hong Kong can fine-tune its approach to such problems.

To this point in time, malignant mesothelioma has been quite rare in Hong Kong. A study based on medical records from 12 of the 20 hospitals in Hong Kong discovered that there were 67 cases of the disease over the period from 1988 to 2000 [3]. Considering that this survey covered more than three quarters of the patient hospitalizations in the territory, 67 cases over a 12 year span, while tragic on an individual level, is not a high number relative to the total population. In another study by the Hong Kong Cancer Registry, it was found that during the period 1976–2006, a total of 199 new cases of mesothelioma were diagnosed (137 males and 62 females) in the general population of the Region [4]. (Figure 1)

The disproportionate number of males contracting the disease is due in large part to the occupational nature of exposure to crocidolite, amosite and chrysotile asbestos – exposure to which is strongly associated with mesothelioma and lung cancer [6]. Moreover, there are



six indicators of cancer causation which are all met by asbestos: causal likelihood, statistically significant positive association, qualities of association, animal experimentation, structural cell changes and biological mechanisms [7]. Another statistical method of assessing causation is the magnitude of the Relative Risk (RR) and this predicts the likelihood of developing a particular kind of cancer on the basis of whether one is or is not exposed to a particular carcinogen. The RR of asbestos expo-

***Corresponding author:** Rohan Price, Research Fellow, Faculty of Law, University of Tasmania, Private Bag 89, Hobart, TAS, Australia, Tel: 613 6226 2064; E-mail: rohan.price@utas.edu.au

Received December 15, 2011; **Accepted** February 08, 2012; **Published** February 10, 2012

Citation: Price R, Burke J (2012) Occupational Exposure to Asbestos: Mortality and Liability Issues Arising in Hong Kong's Shipping Industry. Air Water Borne Diseases 1:101. doi:10.4172/awbd.1000101

Copyright: © 2012 Price R, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

sure leading to mesothelioma is between 50 and 80; the RR of cigarette smoking leading to lung cancer is 10 and agent orange exposure leading to soft tissue sarcoma has an RR of between 0.53 to 8.64 [8]. It has been observed by Christie that, 'where the Relative Risk is equal to or greater than 10, it could be concluded, with reasonable certainty, that a causal relationship exists' [9].

Three quarters of the recorded cases in the Hong Kong 1988 to 2000 study related to occupational exposure to asbestos [10] and on this basis Hong Kong will see a rash of male workers' claims in the near future because of the use of asbestos in the construction and shipping industries in the late seventies, with further peaks in the early eighties and late nineties [11]. The study, by taking into account the 25 to 50 year latency period of mesothelioma, concluded that, "Hong Kong may encounter an epidemic of mesothelioma in the 2010s if effective occupational asbestos control measures are not in place [12]." Considering that latency periods are long for mesothelioma, the implementation of control measures would appear to be a case of shutting the gate after the horse has bolted, but it is not entirely too late for Hong Kong. A recent media report has featured expert opinion that from 2010 onwards Hong Kong can expect a significant increase in mesothelioma claims, not only from dockworkers and construction workers of previous decades, but also from workers who are employed in more recent times by ignorant or cost-cutting contractors to renovate buildings [13]. Hong Kong is part of a larger and international trend in mesothelioma mortality which will only get worse as the decade from 2010 progresses [14]. In terms of the ratio of mortality to incidence, mesothelioma is only slightly less likely to finally end the life of its sufferer than diseases with extremely high mortality rates such as cancer of the esophagus, liver or pancreas [15]. Moreover, malignant mesothelioma, once a rare disease late in the UK in the 20th century is now to cause an estimated 1950 to 2450 deaths per year between 2011 and 2015 [16].

In global terms, malignant mesothelioma practically unheard of in the early 1950s but since the 1970s its occurrence has increased markedly [17]. The greatest risk factor for malignant mesothelioma is regarded as occupational exposure to asbestos: responsible for 70–83% of the risk of contraction for males and 38% for females [18]. Other implicated causes of mesothelioma are radiotherapy and exposure to erionite fibres (volcanic ash), as well as chronic inflammation of the lung [19]. The average latent period between first exposure to asbestos fibres and the development of mesothelioma is approximately 40 years but it may be as long as 60 years depending on how much exposure occurred throughout a lifetime [20]. Different countries used asbestos for different reasons and this makes country-to-country comparisons difficult, however, the lengthy latency is universal and this means that incidence and mortality rates of malignant mesothelioma will continue in the decades ahead [21]. Although mesothelioma in the shipping industry is a global concern, the main focus here will be on Hong Kong and although malignant mesothelioma of an occupational origin is rare in Singapore (16 diagnoses of the disease between 1996 and 2001) [22], the sheer quantity of Singapore registered ships and seafarers based in Singapore on pre 1970s ships suggests that it, like Hong Kong, will not be immune from the expected spike in cases.

In Hong Kong from 2010 onwards, there will be those who present with malignant mesothelioma, but doubtless also those who 'merely' have pleural plaques [23]. In the medical literature, there is an association between asbestos exposure and pleural plaques – a localized fibrosis on the diaphragm and inner rib cage [24]. About a third to one half of those occupationally exposed to asbestos will have calcified pleural plaques thirty years after first exposure; after twenty years, 5 to 15 %

will have uncalcified pleural plaques [25]. There is, however, a less credible connection between pleural plaques and mesothelioma. Thus, a key legal issue to be discussed later in this article is whether or not pleural plaques constitute a compensable disease and whether their presence should be regarded as a reliable indicator of the likelihood of the development of mesothelioma.

Dimensions of Hong Kong's Shipping Industry

It is trite to observe that shipping is big business in Hong Kong. In 2009 the Port of Hong Kong had 21, 000, 000 Twenty Foot (Container) Equivalent Units (TEUs) and ranks only a little behind Singapore (1) and Shanghai (2) in terms of container throughput [26]. In terms of gross tonnage of shipping owned, Hong Kong ranks seventh in the world [27]. Although the average age of ships in the Hong Kong is twelve its fleet is not so young as to generally postdate the 2002 global ban on the use of asbestos in vessels. Hong Kong saw the widespread use of asbestos in thousands of vessels between the Second World War and the mid-1970s when they plied East Asian and global waters. Added to the 'pipeline effect' of cases from the earlier era, disturbing reports have emerged that Turkish and Chinese shipyards continue to use the mineral as insulation in vessel newbuildings and refits and flout the 2002 global ban [28]. Furthermore, there is evidence from a technical manager of a Dutch engineering company (which removes asbestos) who believes that the purchase of spare second hand engine components (gaskets and the like) is the main way that contamination can happen even in recently constructed ships that were built or serviced outside of Turkey or China; a survey conducted recently by his company of 300 ships in a range of ages found asbestos in around 95% of the ships [29]. This modern contamination will doubtless lengthen the latency pipeline even further, in Hong Kong as elsewhere.

Hong Kong has over 5, 000 seafarers registered in the region and there are nearly 60, 000 seafarers employed on Hong Kong registered ships [30]. The owners of the maritime industry of Hong Kong will be seriously affected by the projected surge in claims related to maritime asbestos. Vessel construction and maintenance during the first two thirds of the twentieth century involved extensive use of asbestos containing products, particularly as heat insulation in wall lining in engine rooms [31]. Other properties of asbestos that made it indispensable to international shippers are that it is lightweight, increasing ship speed and fireproof [32]. Mariners, construction workers, maintenance technicians and others are likely to bring claims against their employers seeking to recover damages suffered as a result of lung conditions including asbestosis and mesothelioma [33]. Maritime claimants typically allege they inhaled asbestos particles which became airborne during operations and maintenance, resulting in lung conditions in their later lives. There were 350, 000 premature deaths from asbestos related cancers arising from exposure between 1940 and 1980 and of this number 74, 000 occurred to employees in the shipbuilding industry. It was said in evidence that "ironically, most of these individuals jobs did not directly involve the use of asbestos, they were simply working nearby when application of insulation or removal work was underway [34]." Moreover, a study by Harries of Royal Navy ship workers found that pleural mesothelioma patients were not drawn predominantly among "asbestos workers" but from boilermakers, shipwrights, labourers, welders and fitters [35]. These tendencies in exposure mean that leaders of the shipping industry in Hong Kong need to recognize that liability issues arising from asbestos are far wider than those relating to installers and removers of maritime insulation.

Until the early 1990s reliable information on pleural fibrosis consistent with prior exposure to asbestos among merchant marine sea-

men was difficult to find even though asbestos was commonly used in ship construction until the late 1970s [36]. However, a medical study published in 1990 revealed that, of a total of 3324 chest radiographs (1985-7) of long term United States seamen, one third (34.8%) had parenchymal or pleural abnormalities, or both and pleural changes were prevalent [37]. It also found that abnormalities increased with longer duration from onset of shipboard exposure (as defined by first year at sea) [38]. The occurrence of asbestotic changes was more frequent among seamen who had served in the engine department (391/420; 42.5%) compared with seamen in other departments, including deck (301/820; 36.6%), steward (278/981; 28.4%), or with service in multiple departments (167/541; 30.9%). [39]

Current Legal Settings in Hong Kong and the Common Law of England

In Hong Kong statutory compensation is payable under the Pneumoconiosis and Mesothelioma (Compensation) Ordinance (PMCO) if the claimant is actually suffering from either disease and is diagnosed, or has died from the disease, after the commencement date which was set in an amending Ordinance at or after 18 April 2008 [40]. Thus, under the typology supplied by *Society of Lloyds* the statutory system follows the manifestation theory as the vehicle for compensation and does not need to deal with the question of latency. The PMCO places no limit, however, on common law damages [41] and although the low level of common law claims has undoubtedly been influenced by the generosity of the statutory system, this cannot last forever. Moreover, the PMCO provides a large measure of employer indemnity by providing that "where any person has paid damages for death or disability resulting from pneumoconiosis or mesothelioma (or both) pursuant to a judgment of any court in Hong Kong, he shall be entitled to recover from the Fund the amount of such damages and interest thereon together with the amount of any costs ordered by the court to be paid by that person [42]."

As with most health-related occupation claims in Hong Kong, the PMCO establishes a manifestly generous position. However, notwithstanding the indemnity in determining local asbestos claims Hong Kong courtswill likelyconsider the common law of England which, it is clear, is not well disposed to applicants with latent disease claims associated with mesothelioma [43]. To date there is no documented Hong Kong law case which deals either explicitly or incidentally with causation issues arising out mesothelioma. The UK Court Service updated the forty-two Civil Procedure Rules (CPR) in 2008 and one of them concerned management of mesothelioma [44]. As Hong Kong grapples with Civil Justice Reform (CJR) there is a reasonable chance that the UK's procedural approach will be adopted in Hong Kong. In the UK 'Practice Direction 3D - Meothelioma Claims' uses a show cause case management procedure against defendants [45] and allows plaintiffs to expedite proceedings. The show cause procedure requires the defendant to demonstrate what if any aspect of the claim can be realistically defended and, as we shall see, the common law of England gives employer defendants ample opportunity to show cause i. e. raise defences to liability for mesothelioma exposure. The cases on mesothelioma liability fall into three primary categories:

- (1) the question of quantifying loss of earnings;
- (2) pleural plaques and latency (*Rothwell*); and
- (3) liability among multiple employers (*Fairchild* and *Barker*).

In the first category, mesothelioma occasioned a ruling on general principles and the outcome has created little controversy and an

overview of approaches to lost income in the UK is instructive to Hong Kong. In *Fairchild v Glenhaven Funeral Services Ltd* [46] the plaintiff had worked for many years for multiple employers as a subcontractor for the Leeds City Council. As one single asbestos fibre, when inhaled, can ultimately cause mesothelioma it is nearly impossible to know when the causative exposure occurred and using the balance of probabilities as a standard it is unlikely that a plaintiff in the place of *Fairchild* would recover. The House of Lords ruled that the test to be applied to this situation turned on whether the defendant had materially increased the risk of harm toward the plaintiff. The employers held to be joint and severally liable for the exposures *Fairchild* experienced.

The principle in *Fairchild* was to make standard of proof more amenable to mesothelioma claims and less compensatory approach to claimants displayed in *Barker v Corus* needs to be seen in the light of *Fairchild*. *Barker* concerned the liability of solvent employers for the share of the loss occasioned by negligent exposure of asbestos dust by insolvent employers and found that solvent employers should only shoulder their proportion of losses arising from their exposures and that the proportion of the loss of insolvent tortfeasors was irrecoverable. This poses particular problems in Hong Kong because of its unique bankruptcy culture and we will return to this argument later in the article. The immediate task is to considers what Hong Kong can learn for the English approach to lost earnings, then why the *Rothwell* approach to pleural plaques should not (and in all likelihood will not apply) in Hong Kong. Lastly, reasons why *Barker* ought not be followed in Hong Kong are given. In category (3) *Barker* held that, in a case of multiple employers those that were solvent could only be held liable for their own contribution to risk of exposure and that it was inappropriate for any such employer to accept a share of the liability of employers no longer in business. It is argued that *Rothwell*, given Hong Kong's special approach to medical and occupational death compensation, should not be accepted uncritically, and that because of the high level of use of bankruptcy as a tool of business in Hong Kong neither should *Barker*. There is much, however, to recommend the UK's approach to lost earnings.

Why *Rothwell* is inappropriate to Hong Kong

In category (2) is the case of *Rothwell v Chemical and Insulating Co Ltd* [47] which established that pleural plaques did not, by themselves, reduce expectancy or lung function and that it was inappropriate to properly consider them as constituting a compensable disease at common law. Thus, negligent exposure to asbestos was not actionable on the basis of pleural plaques, despite the fact of their association with mesothelioma and the shortness of life expectancy once the cancer is diagnosed. The issue of propensity and pleural plaques has been covered in depth elsewhere [48]. Needless to say it is the subject of a major legal controversy in England and Scotland [49] and it is likely to fall for decision in Hong Kong before very long. In particular, the House of Lords decision in *Rothwell* ruled that pleural plaques did not affect life expectancy or lung function and so could not be properly regarded as a compensable disease at common law. Thus, negligent exposure to asbestos was not actionable on the basis of pleural plaques. This effectively means that a mesothelioma patient needs to wait through their period of latency until malignant mesothelioma presents itself, and this often means that their last 9.5 months of life (on average) [50] after diagnosis is spent fighting in court for damages for their surviving family. In Scotland, the *Rothwell* ruling was met with disbelief and has been reversed by legislation in the Scottish parliament to make, in effect, mesothelioma an exception to the requirement of causation by establishing that latency, as indicated by the existence of pleural plaques, is sufficient

for the purposes of common law claims against former employers, and others too [51].

As it stands, Hong Kong has an advanced approach to damages for future illness which can be invoked in cases of mesothelioma. The District Court Ordinance (Cap 336) provides that in an action for a claim for personal injuries in circumstances where it is admitted there is a chance that in the future the claimant will develop a serious disease or deterioration in physical or mental condition as a result of the act or omission which gave rise to the cause of action, rules can be made by the Rules Committee to enable an award of further damages at a future date if the disease does develop [52]. Although this is not as adventurous as the Scottish position (which effectively allows pleural plaques to be considered a disease for compensation purposes) the Hong Kong position, that a future damages award will be triggered by subsequent diagnosis of mesothelioma, is clearly a step in the right direction.

It is fair to say that the common law of England has not been a great source of comfort for mesothelioma sufferers. Hong Kong has no common law decisions on mesothelioma liability and will draw extensively from the English approach. The extent to which it is desirable for Hong Kong to do this is questionable. The emphasis in Hong Kong employment law on death and illness compensation and rehabilitation ensures it is more generous than many other jurisdictions in its treatment of people who are ill. Hong Kong is renowned internationally for a health system which is dominated by public health provisions, high performance standards and low out of pocket expenses for patients [53]. Hong Kong can afford to take a more generous approach to pleural plaques because of local commitment to health funding which is shown by a number of indicators. Over 5% of Hong Kong's GDP is used to support the provision of public and private healthcare [54]. Although this is low in world terms (a third of the percentage of GDP spent in the US and about half of that spent by the UK) [55] it is because patients' needs come before other considerations and there is a strong public expectation of cost-effective treatment delivery. Yuen notes that the measures taken under the Hong Kong model to keep costs down include putting public inpatient care under a spending cap, retaining public hospital staff on fixed salary, maintaining low administrative expenses, and having a competitive private outpatient market financed privately and mostly through out-of-pocket payments [56].

Although the current level of Hong Kong healthcare is projected to be unsustainable from public funds by 2016, Hong Kong can fund a comprehensive response to an impending mesothelioma epidemic by marginal increases to the rate of cost recovery from patients and increasing personal and corporate tax rates (15% to 16.5% currently). [57] As immigration from mainland children with one Hong Kong parent increases, Hong Kong, unlike other countries with aging populations, will not face a shrinking income tax base in the medium term future [58]. Thus, on the basis of small reforms and existing trends Hong Kong can afford a compensatory approach to people with pleural plaques, similar to that taken in Scotland.

The problem of multiple employers: *Barker v Corus*

Before an argument is made as to why the *Barker* approach is particularly inappropriate to Hong Kong it is useful to give the decision analysis from top to bottom. The argument raised in the next section is that Hong Kong's level of bankruptcy is so much higher than that of England and Wales that to apply *Barker* will mean that there is only one remaining solvent employer in Hong Kong required to cover a mere third or quarter or fifth of the exposure risk of an employee with multiple employers over a working life. The claim in *Barker* was brought

by the wife of the deceased who died from mesothelioma as a result of occupational exposure to asbestos [59]. The deceased was negligently exposed to asbestos during three periods. The exposure during the first two of these periods was from two employers (Employer 1) and (Employer 2). The exposure from Employer 1 and Employer 2 occurred in the late 1950s and throughout much of the 1960s respectively. In addition, the deceased was also exposed to asbestos while self-employed during a period encompassing the late 1960s to mid-1970s. He later contracted mesothelioma and died from that disease. Employer Number 1 was insolvent. The court held that Employer 2, from the standpoint of causation, was responsible for the disease on the *Fairchild* principle as it had materially contributed to the risk of injury. Although the deceased had negligently allowed himself to be exposed to asbestos during his period of self-employment, this did not in the view of Moses J take him outside the *Fairchild* principle. It was additionally held that Employer 2 was jointly and severally liable for all the damages because the claim concerned an indivisible injury where it was not possible to identify the extent to which the various tortfeasors had contributed to it, based on the authority of *Rahman v Arearose Limited*. [60] The trial judge further stated that even if this were not the case, the defendant would have been liable as a matter of justice and fairness because the defendant had increased the risk of the claimant getting the disease. However, the trial judge held the damages awarded against Employer 2 should be reduced because of the deceased's contributory negligence.

The defendant appealed to the Court of Appeal [61]. Kay L. J., taking as his text the judgment of Lord Bingham in *Fairchild* who recognized that in cases where a defendant had not actually caused an indivisible injury, then this would lead to injustice if judgment was entered against the defendant purely because it had exposed the claimant to a material risk [62]. Conversely, if the defendant was in breach of their duty to the claimant, who suffered an injury which could not be proved under the usual rules of causation, then this would also lead to injustice. Kay L. J. observed that if the deceased was only partially to blame this should not absolve the defendant of all liability [63]. Any fault of the deceased in materially contributing to the risk of injury could be cured by reducing the damages for contributory negligence. Moreover, on balance, where an employer was in breach of the employer's duty of care, by contributing to the risk, it was less of an injustice to find for the claimant [64]. Kay L. J. confirmed that the ruling of Moses J, that the usual principles of non-apportionment in the case of indivisible injuries applied to this situation, should not be upset irrespective of the fact that the claimant may be blamed for what occurred [65]. While Kay L. J. acknowledged the outcome was not completely satisfactory from the defendant's perspective, the fundamental goal to be achieved here was to protect the victim of the wrong.

Keene L. J. concurred with Kay L. J. and in particular stressed that to absolve the defendant from liability because it could not be proved that the claimant was not wholly responsible for the damage was inconsistent with social policy considerations and analogous to the early law of contributory negligence which completely precluded a claimant from recovery [66]. All that was required under the reasoning in *Fairchild* was that a defendant exposed a claimant to risk. Keene L. J. was also of the view at that it would be unfair to deviate from the usual principles of apportionment where there had been an indivisible injury as this would lead to an injustice if one defendant had become insolvent [67]. Accordingly, if there had been fault by the claimant, this could be addressed via the current law of contributory negligence. Wall L. J. agreed with both the judgments of Kay L. J. and Keene L. J.

The insurer appealed from the decision of the Court of Appeal to

the House of Lords [68]. Lord Hoffman considered that there were two main issues to be determined. Firstly, whether or not the exceptional category to the general tortious requirement of causation should apply in circumstances outside the facts in *Fairchild v Glenhaven Funeral Services Ltd* (2003) 1 AC 32? The second issue was whether all the defendants should be jointly and severally liable or responsible for their share of the creation of the risk in this case? In relation to the first issue, in *Fairchild*, the House of Lords delivered a quite "radical" decision [69] on the law on causation, although it was at pains to stress that the ratio was limited to the special fact of the cases before the House [70]. In this case, the claimants, who subsequently developed mesothelioma, had been exposed to asbestos while working for a variety of different employers. It was held that it was not possible to identify at which place of employment the claimants ingested the asbestos fibres which caused their illnesses. Therefore, the claimants were not in a position, according to the traditional principles of tort law, to satisfy a court on the balance of probabilities that a particular employer had through its negligence, caused or contributed to the claimants' condition. In order to ensure that the claimants were not left without a remedy in respect of the defendants' wrongful actions the House of Lords calibrated the law of causation in these circumstances to substitute the evidence which existed here that the defendants had increased the claimants' risk of contracting the disease as sufficient for this aspect of liability in place of the usual need for proof that a defendant had caused the relevant damage.

In *Barker*, although the exposure by the claimant to asbestos occurred during a period of self-employment that it would not be fair in the view of Lord Hoffman to leave the claimant without any remedy [71]. However, it would be rough justice if a defendant, who is liable because of the mere possibility of causing harm, was required to contribute on a joint and several bases [72]. Therefore, the damages should be apportioned between the defendants based on the degree to which they contributed to the risk [73]. This decision seemed to be at odds with the decision of the House in *Fairchild* per Lord Hutton [74] and Lord Rodger of Earlsferry [75].

Lord Scott of Foscote agreed with the reasoning and decision of Lord Hoffman. However, noteworthy about his Lordships additional commentary was his reasoning that a deviation from the usual principles of joint and several liability in a case involving indivisible damage was appropriate in a case where specific causation had not been proved, as such a case is more appropriately compared to that of independent tortfeasors [76]. Lord Walker of Gestingthorpe, in a rather novel approach, dealt with the question of apportionment before that of liability, arguing it was vital in determining how far the doctrine in *Fairchild* should be developed. In this respect, His Lordship stated that the House had not provided any guidance on this issue, [77] although this does not appear to accord with a literal reading of that part of Lord Hutton's ruling. Lord Walker stressed that the heavy burden that would fall on remaining defendants in these kinds of cases where other culpable defendants are no longer solvent or cannot be found [78]. His Lordship further averred that continued exposure to asbestos only increases the risk statistically rather than cumulatively [79]. His Lordship opined that the injustice of not providing a remedy for this type of indivisible injury was lessened where the claimant might have been responsible for it, although on balance maintenance of the principle laid down in *Fairchild* was the fairest result here [80].

In a dissenting judgment on the issue of apportionment, Lord Rodger of Earlsferry, averred that the defendants were liable for causing mesothelioma, not for contributing to the risk of acquiring it [81]. His Lordship further asserted that the majority of the court's opinion

was not purely attributable to one based on the creation of risk [82] although this is apparently at odds with the unambiguous rulings of Lord Bingham, Lord Nicholls of Birkenhead and Lord Hoffman [83]. Lord Rodger relies at on his interpretation of Lord Bingham's judgment in *Fairchild* for this conclusion [84]. Quoting His Lordship,

And Lord Bingham is indeed saying that in *these circumstances someone who exposes the victim to a risk to which he should not have been exposed is to be treated as making a material contribution to the victim's contraction of the condition against which it was his duty to protect him*. It was on this basis that Lord Bingham concluded that the appeals should be allowed because the claimants had proved that the defendants had caused the men's death or injury. This is scarcely surprising since the claimant's appeals were argued on exactly that basis [85].

Lord Rodger's view, as italicized, erroneously asserts that Lord Bingham had held that there was proof that a particular defendant in *Fairchild* had caused the disease disease. Lord Rodger's judgment on the apportionment issue also warrants further attention:

Of course, it may seem hard if a defendant is held liable in solidum even though all that can be shown is that he made a material contribution to the risk that the victim would develop mesothelioma. But it is also hard and settled law that a defendant is held liable in solidum even though all that can be shown is that he made a material, say 5%, contribution to the claimant's invisible injury. That is a form of rough justice which the law has not hitherto sought to smooth, preferring instead, as a matter of policy, to place the risk of insolvency of a wrongdoer or his insurer on the other wrongdoers and their insurers. Now the House is deciding that, in this particular enclave of the law, the risk of insolvency of a wrongdoer or his insurer is to bypass the other wrongdoers and their insurers and to be shouldered entirely by the innocent claimant. As a result, claimants will often end up with only a small proportion of their damages which would normally be payable for their loss. The desirability of the courts, rather than Parliament, throwing this lifeline to wrongdoers at the expense of claimants is not obvious to me [86].

His Lordship's analysis of the consequences issue is clearly compelling. He asserts that an "enclave" will be formed as a result of the (new?) rules concerning causation in *Barker* for those suffering from mesothelioma from which other litigants will be excluded [87]. An added inconsistency identified by Lord Rodger is that while those inside the enclave may receive favouritism in relation to liability on the basis of *Barker*, their situation in relation to apportionment is worse than claimants outside the enclave who can recover fully against any tortfeasor found liable for an indivisible injury [88].

The decision of the House was to allow the appeals and to remit the cases back (presumably to the trial judge) for redetermination of damages. It is hard to regard any judgment in the entire litigation as entirely satisfactory as many are delivered with an admission, express or implied, that rough justice is being done. The final judgment, that of Baroness Hale of Richmond, tries to ascertain a more acceptable solution which yields justice for litigants in a way that does not bend the law of causation completely out of shape: "For as long as we have rules of causation, some negligent (or otherwise duty-breaking) defendants will escape liability. The law of tort is not (generally) there to punish people for their behavior. It is there to make them pay them pay for the damage they have done." [89] While Her Ladyship decided that a ruling that the defendants would pay only according to their share would cure much of any resulting unfairness, such a decision is inconsistent with the (general) principle which she has described [90]. The position in *Barker v Corus* has now been reversed by the the Compensation Act

2006, s 3(2) of which makes clear that an employer ('the responsible person') is to be liable in respect of the whole of the damage caused to the victim by the disease (irrespective of whether the victim was also exposed to asbestos – other than by the responsible person, whether or not in circumstances in which another person has liability in tort, or by the responsible person in circumstances in which he has no liability in tort), and jointly and severally with any other responsible person.

Why *barker* does not belong in Hong Kong

In 2008 there were 67,428 court ordered bankruptcies in England and Wales for a combined population of around 63,000,000 people or 1.07 people having such bankruptcies ordered per 1000 of population [91]. In Hong Kong in 2008 there were 10,779 bankruptcy orders for a population of around 7,000,000 or 1.57 people per 1000 receiving a court ordered bankruptcy [92]. In Hong Kong a person is 50% more likely than one in England and Wales to be declared a bankrupt. Perusal of the daily public notices in the back pages of *The Standard* (Hong Kong) newspaper will reveal that bankruptcy and winding ups of companies is a way of life there. This is the reality into which *Barker* would be received in Hong Kong. The likelihood of a majority of employers having gone out of business after 10 or 15 years is high in Hong Kong. Yet *Barker* applied to England the position where it is more commonly the case that only one out of four former employers is out of business. The view was taken by the House of Lords was that it was unfair for, in effect, the other three to have to bear the defunct tortfeasor's share of the loss. This might be defensible in England but in Hong Kong in all likelihood the remaining solvent employer out of four employers would pay for only one quarter of the exposure liability if the *Barker* approach was taken to its logical conclusion.

Conclusion

The UK experience to date indicates that it can be preferable for the legislature to step in to take action rather than leave it to the common law to find a solution that remains compartmentalized from the rest of the law of tort or which steadily erodes the law of causation. The shortcomings of *Barker* are further illustrated by the statements by several of their Lordships that their findings of culpability would have been altered had another agent been a contributor to the risk [93].

The statutory indemnity for Hong Kong employers from common law damages under the PMCO is due, it is suspected, to the unlikelihood of a successful common law claim arising given the position under the prevailing UK case law. A simple method to assist claimants and avoid the outcome of lumping all of the financial burden onto surviving defendants, would be to take claims out of the remit of the courts and to create a common fund to which potential defendants could contribute to and from which claimants could receive compensation which is reflective of the risks causation poses to litigants. This approach is warranted in Hong Kong as a conclusive answer to the problems of causation for ship-owners, maritime employers and ship component manufacturers, as well as a host of employers and principals in the construction industry. It could achieve a just and defensible damages outcome for claimants when claims begin to spike without exposing the potentially liable to hefty class actions and decades of litigation draining investment from their respective industries.

It is likely that ship owners and employers in Hong Kong will look to "pass the buck" in regards to asbestos claims just like those in the British cases. However, the US trend in maritime-related claims is for a wider range of defendants to attend court than was the case twenty years ago. Shipyards and carrier lines were the primary accused in salty asbes-

tos claims but now service and product providers are being sued too. The manufacturers of the maritime employer's air conditioning units, hoisting equipment, and metal piping are now defending mesothelioma claims and the manufacturers of respiratory masks and protective gloves used to prevent exposure, currently are named as defendants (based on alleged product failure) [94]. Sufferers of mesothelioma in the UK and Hong Kong can make much better use of misleading conduct concepts and product manufacturer's liability than is currently the case and this trend is now clearly evident in Australia as well as the US.

The reason why Hong Kong's bankruptcy rate is so high can be explained by a number of factors, but is it clearly a matter of concern if *Barker* is to be received into the common law of Hong Kong. Biddle, Ma and Song have shown that unconditional and conditional conservatism in the accountancy practices of a firm to be negatively associated with bankruptcy risk [95]. There is less bankruptcy where there are auditor, creditor and regulator incentives to act and where there are no managerial incentives to withhold bad news [96]. The manifest liberality of Hong Kong's accountancy and disclosure settings promote risk taking behaviours which result in a culture of winding ups and bankruptcy which is totally different to that of many common law jurisdictions.

The compensatory principle in Hong Kong healthcare provision is at odds with the non-recognition of pleural plaques as a compensable disease in *Rothwell* and some caution need be shown toward the English approach to pleural plaques when the Scottish model makes possible their treatment and compensation as a disease.

To end on a brighter note, there has been some good news about the way maritime asbestos is treated, at least at the end of a ship's working life. The *Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships 2009* was adopted by representatives of 63 nations at a conference in May 2009 [97]. The purpose of the Convention is to: "effectively address, in a legally-binding instrument, the environmental, occupational health and safety risks related to ship recycling, taking into account the particular characteristics of maritime transport and the need to secure the smooth withdrawal of ships that have reached the end of their operating lives [98]." The Convention provides that for each ship to be recycled an individual inventory of its hazardous materials is to be prepared including where relevant materials including asbestos, heavy metals, hydrocarbons and ozone-depleting substances [99]. It further provides for a range of protocols for the handling and disposal of these materials. Litigation in the shipping context in the US has revealed that key issues in many asbestos cases are the topics of product or employer identification i. e. defendants argue that their particular asbestos-containing product was not to blame or that their ship was not the site where the lung condition was contracted [100].

References

1. International Ban Asbestos Secretariat website. Avail: http://ibasecretariat.org/hk_report_web_fin.pdf (accessed 5 Feb 2012).
2. Chang KC, Kwok C, Leung CC, Tam CM, Wai C, Hui DS and Lam WK. (2006) Malignant mesothelioma in Hong Kong. *Respiratory Medicine* 100 (1): 75-82.
3. Chang et al, *ibid*, 77.
4. Tse AT, Yu I, Goggins W, Clements M, Xiao RW, Au JS and Kai SY. (2010) Are current or future mesothelioma epidemics in Hong Kong the tragic legacy of uncontrolled use of asbestos in the past? *Environmental Health Perspectives* 118(3): 382-386, 384.
5. *Ibid*.
6. Lemen R. (2010) Chrysotile asbestos and mesothelioma. *Environmental Health Perspectives* 118(7): a282-a282.

7. Kune R and Kune G. (2003) Proof of cancer causation and expert evidence: bringing the science to law and law to science. *Journal of Law and Medicine* 11: 112-121, 115.
8. Christie E. (1992) Toxic tort disputes: proof of causation and the courts. *Environmental and Planning Law Journal* 9: 302-318, 311.
9. Christie, *ibid*.
10. Chang et al, *supra* n1, 77.
11. Chang et al, *ibid*.
12. Chang et al, *ibid*, 81.
13. Pearl Report, "Deadly Dust" aired on Pearl TV, Hong Kong 15/11/2009. Avail at: <http://evideo.lib.hku.hk> (Accessed on 3 June 2010).
14. Pelucchi C, Malvezzi M, La Vecchia C, Levi F, Decarli A and Negri E. (2004) The mesothelioma epidemic in Western Europe: an update. *British Journal of Cancer* 90: 1022-1024; Hodgson JT, McElvenny DM, Darnton AJ, Price MJ and Peto J. (2005) The expected burden of mesothelioma mortality in Great Britain from 2002 to 2050. *British Journal of Cancer* 92: 587-593; and Peto J. (1995) Continuing increase in mesothelioma mortality in Britain. *Lancet* 345: 535-539.
15. Hong Kong Cancer Registry, Hong Kong Cancer Statistics 2007 (Version II, 2009) Table 17, 19. Avail at: http://www3.ha.org.hk/cancereg/e_canstat2007.pdf (accessed 4 September 2010).
16. Chalmers J. (2007) The Rights of Relatives to Damages (Mesothelioma) (Scotland) Act 2007. *University of Edinburgh Law Review* 11: 407-411.
17. Tse et al, *supra* n4, 382.
18. Chang et al *supra* n1.
19. Tse et al, *supra* n4.
20. Chang et al *supra* n1.
21. Tse et al, *supra* n4.
22. Chan K, Tan KL, Lee HS and Eng P. (2003) Malignant mesothelioma: experience at the Singapore General Hospital. *Annual Academy of Medicine* 32: 388-91.
23. For discussion of compensability of pleural plaques see Price R. (2010) Judicial review of the Damages (Asbestos-related Conditions) (Scotland) Act" *Edinburgh Law Review* 14: 145-150; Price R. (2011) The need for a regulatory response to diagnosis fraud in mesothelioma cases. *Journal of Law and Medicine* 19: 196-200.
24. For instance, Bianchi C et al (1997) Latency periods in asbestos-related mesothelioma of the pleura. *European Journal of Cancer Prevention* 6: 162-166; and Lin RT et al (2007) Ecological association between asbestos-related diseases and historical asbestos consumption: an international analysis. *Lancet* 369: 844-849.
25. Parkes RW, *Occupational Lung Disorders*. Butterworths: London, 1982, 121 (2nd ed).
26. MARDEP, 'Port of Hong Kong in Figures 2010', 6. Avail at: http://www.mardep.gov.hk/en/publication/pdf/portstat_pamphlet10.pdf (accessed 3 September 2010).
27. ITF Seafarers Website, Avail at: <http://www.itfseafarers.org/resources.cfm> (accessed 3 September 2010).
28. Ostler D, 'DNV find more asbestos on newbuildings' *Lloyd's List Website*, Avail at: <http://www.lloydslist.com/ll/sector/ship-operations/article173416.ece> (accessed on 4 September 2010).
29. Ostler, *ibid*.
30. MARDEP, *ibid*, 7.
31. Block S. (2004) The new wave of maritime asbestos litigation. *Marine Digest and Transportation News Aug*: 1.
32. US Congress, Failure to Regulate: Asbestos – A Lethal Legacy: A Hearing Before a Subcommittee of the Committee of Government Operations, House of Representatives, 98th Congress, 1st Session, 28 June 1983, 192.
33. Block, *supra* n29.
34. Failure to Regulate, *supra* n32, 10.
35. Harries PG (1968) Asbestos hazards in naval shipyards. *Annual Occupational Hygiene* 11: 136-155, 142.
36. Selikoff IJ, Lillis R and Levin G. (1990) Asbestotic radiological abnormalities among United States merchant marine seamen' *British Journal of Industrial Medicine* 47: 292-297.
37. Selikoff et al, *ibid*, 292.
38. Selikoff et al, *ibid*.
39. Selikoff et al, *ibid*, 294.
40. PMCO, s 13.
41. PMCO, *ibid*.
42. PMCO, *ibid*
43. See Price R (2010) *supra* n23.
44. Meggitt G, (2008) Civil justice reform in Hong Kong – Its progress and its future *Hong Kong Law Journal* 89-128, 95.
45. See especially PD 6.1 & 6.2 on Ministry of Justice website, "Practice Direction 3D - Mesothelioma Claims". Avail at: http://www.justice.gov.uk/civil/procrules_fin/contents/practice_directions/pd_part03d.htm (accessed September 2010)
46. [2002] 1 WLR 1052.
47. [2008] 1 AC 281.
48. Price R, (2010) *supra* n23.
49. *Ibid*.
50. Chang et al, *supra* n1, 76.
51. Price R, *supra* n23, 148-149.
52. District Court Ordinance, s 72E.
53. Chan B (2009), Pharmaceutical policy in Hong Kong: Defining an evolving area of study. Avail on SSRN: <http://ssrn.com/abstract=1487662> (accessed 2 December).
54. Chan, *ibid*, 2.
55. Organisation for Economic Cooperation and Development, *OECD Health Data 2008* (Paris, OECD, 2008).
56. Hong Kong Policy Research Institute Limited Website. Yuen P. (2008) The sustainability of Hong Kong's health care financing system: A population based projection. Avail at : <http://www.hkpri.org.hk/bulletin/11/peteryuen.html> (accessed 2 December 2010).
57. Yuen, *ibid*.
58. Yuen, *ibid*.
59. Decision of Moses J in the Manchester High Court 23 May 2003. The report is avail: at www.johnpickering.co.uk/news/barker.doc.
60. [2001] QB 351.
61. *Barker v Corus UK Ltd* [2004] P.I.Q.R. P34
62. *Ibid*, at 590.
63. *Ibid*, at 591.
64. *Ibid*, at 592.
65. *Ibid*.
66. *Ibid*, 593.
67. *Ibid*, 594.
68. *Barker v Corus* [2006] UKHL 20; [2006] 2 AC 572.
69. As described by Lord Walker of Gestingthorpe at 113 in the House of Lords decision in *Corus*.
70. See especially Lord Bingham at [2] and [9].
71. *Barker, ibid*, at [40].
72. *Ibid.*, 43.
73. *Ibid*, 48.

74. Ibid, at 117: "I observe no argument was addressed to the House that in the event of the claimants succeeding there should be an apportionment of damages because the breaches of duty of a number of employers had contributed to cause the disease and therefore the damages awarded against the defendant should be a proportion of the full sum of damages which the claimant would have recovered if he (or the claimant's husband) had been employed by only one employer for the whole of his working life. Therefore, each claimant is liable in full for a claimant's damages, although a defendant can seek contribution against another employer liable for causing the disease."
75. "No argument was advanced to the effect that, if they were held liable, the defendant's liability should be reduced or apportioned in some way to reflect an assessment of the chances that the particular defendants, rather than other employers, were actually responsible for the exposure that lead to the claimants' mesothelioma. Indeed it was said that no such assessment, even on a rough basis, was possible. Counsel accepted accordingly that, if liable at all, the defendants would be jointly and severally liable for the whole of the damages done to the claimants."
76. Ibid, 61.
77. Ibid, 106: "In *Fairchild* it was not argued by any of the respondents that the liability of a defendant employer should be limited to part only of the claimant's damage, in proportion to the duration and intensity of the claimant's exposure to asbestos during successive periods of employment. The House noted this and deliberately abstained from expressing any view on the point which could have been argued: see Lord Bingham, at p 68, para 34, Lord Hoffman, at p 78, para 74, Lord Hutton, at p 95, para 117, and Lord Rodger, at p 97, para 125."
78. Ibid, 108.
79. Ibid, 112.
80. Ibid, 117.
81. In *Fairchild* the majority of the House employed the test of risk per Lord Bingham at [34], Lord Nicholls of Birkenhead at [42], Lord Hoffman at [47], [61], [67], [73]. On the other hand, Lord Hutton appeared to employ a test operating on the principle that the added risk of getting the disease caused by exposure to asbestos amounted to an "inference of causation" at [111] or "a substantial contribution to the disease" at [116] and Lord Rodger of Earlsferry at [168] wrote "... by proving that the defendants individually materially increased the risk that the men would develop mesothelioma due to inhaling asbestos fibres, the claimants are taken in law to have proved that the defendants materially contributed to their illness." Lord Hoffman included a reminder in his judgment in *Corus* at [33] that he had described that line of reasoning in *McGhee v National Coal Board* 1973 SC (HL) 37, at [65] of his decision in *Fairchild* as resorting to "legal fictions".
82. Ibid, 83.
83. In *Fairchild* the majority of the House employed the test of risk per Lord Bingham at [34], Lord Nicholls of Birkenhead at [42], Lord Hoffman at [47], [61], [67], [73]. On the other hand, Lord Hutton appeared to employ a test operating on the principle that the added risk of getting the disease caused by exposure to asbestos amounted to an "inference of causation" at [111] or "a substantial contribution to the disease" at [116]
84. Ibid, 80.
85. Ibid.
86. Ibid, 90.
87. Ibid, at 85.
88. Ibid.
89. Ibid, 127.
90. Ibid.
91. UK Government Insolvency Website. Avail at: <http://www.insolvency.gov.uk/otherinformation/statistics/200908/table2.pdf> (accessed 2 December 2010).
92. Official Receivers Office (Hong Kong). Avail at http://www.oro.gov.hk/cgi-bin/oro/stat.cgi?stat_type=W&start_year=1989&end_year=2010&end_month=10&Search=Search (Accessed 2 December 2010).
93. Barker, per Lord Hoffman at [24] and Lord Scott of Foscote at [64]
94. Block, supra n31, 2.
95. Biddle G, Ma M and Song F (2011) Accounting conservatism and bankruptcy risk. Avail at SSRN: <http://ssrn.com/abstract=1621272> (accessed 14 September 2010).
96. Ibid, 2.
97. International Maritime Organisation (IMO) website. Accessed at: http://www.imo.org/environment/mainframe.asp?topic_id=818 (on 2 September 2010)
98. European Union website (2009), "Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships Text Adopted by the Conference Annex" Avail at: <http://ec.europa.eu/environment/waste/ships/pdf/Convention.pdf> (Accessed 3 September 2010).
99. IMO, supra n97.
100. Block, supra n31.
101. Bianchi C, Giarelli L, Grandi G, Brolo A, Ramani L, et al. (1997) Latency periods in asbestos-related mesothelioma of the pleura. *Eur J Cancer Prev* 6: 162-166.
102. Biddle GC, Ma ML, Song FM (2010) Accounting Conservatism and Bankruptcy Risk. SSRN.
103. Steven Block, 'The New Wave of Maritime Asbestos Litigation' (2004) *Marine Digest and Transportation News* 1-5(Aug).
104. Chan BT (2010) Pharmaceutical Policy in Hong Kong: Defining an Evolving Area of Study. SSRN.
105. Chan F, Chan WS (2000) Actuarial Assessment of Damages in Personal Injury Litigation: The Hong Kong Position. *HKLJ* 30: 272-292.
106. Chan K, Tan KL, Lee HS, Eng P (2003) Malignant mesothelioma: experience at the Singapore General Hospital. *Ann Acad Med Singapore* 32: 388-391.
107. Chang KC, Leung CC, Tam CM, Yu WC, Hui DS, et al. (2006) Malignant mesothelioma in Hong Kong. *Respir Med* 100: 75-82.
108. James Chalmers (2007) The Rights of Relatives to Damages (Mesothelioma) (Scotland) Act 2007. *Edinburgh L Rev* 11: 407-411.
109. Edward Christie, 'Toxic Tort Disputes: Proof of Causation and the Courts' (1992) 9 *EPLJ* 302- 321.
110. Harries PG (1968) Asbestos hazards in naval dockyards. *Ann Occup Hyg* 11: 135-145.
111. Hodgson JT, McElvenny DM, Darnton AJ, Price MJ, Peto J (2005) The Expected Burden of Mesothelioma Mortality in Great Britain from 2002 to 2050. *Br J Cancer* 92:587-593.
112. Kune R, Kune G (2003) Proof of cancer causation and expert evidence: bringing science to the law and the law to science. *J Law Med* 11: 112-121.
113. Lemen RA (2010) Chrysotile asbestos and mesothelioma. *Environ Health Perspect* 118: A282.
114. Lin RT, Takahashi K, Karjalainen A, Hoshuyama T, Wilson D, et al. (2007) Ecological association between asbestos-related diseases and historical asbestos consumption: an international analysis. *Lancet* 369: 844-849.
115. Gary Meggitt (2008) Civil Justice Reform in Hong Kong – Its Progress and Its Future. *Hong Kong Law J* 38: 89-128.
116. Pelucchi C, Malvezzi M, La Vecchia C, Levi F, Decarli A, et al. (2004) The Mesothelioma epidemic in Western Europe: an update. *Br J Cancer* 90: 1022-1024.
117. Peto J, Hodgson JT, Matthews FE, Jones JR (1995) Continuing increase in mesothelioma mortality in Britain. *Lancet* 345: 535-539.
118. Rohan Price (2010) Judicial Review of the Damages (Asbestos-related Conditions) (Scotland). *Edinburgh Law Review* 14: 146-150.
119. Selikoff IJ, Lilis R, Levin G (1990) Asbestotic Radiological Abnormalities Among United States Merchant Marine Seamen. *Br J Ind Med* 47: 292-297.
120. Tse AT, Tak-sun Yu I, Goggins W, Clements M, Xiao RW (2010) Are Current or Future Mesothelioma Epidemics in Hong Kong the Tragic Legacy of Uncontrolled Use of Asbestos in the Past? *Environ Health Perspect* 118: 382-386.
121. Peter Yuen (2010) The Sustainability of Hong Kong's Health Care Financing System: A Population Based Projection.