出國報告（出國類別：會議）

參加亞太經濟合作組織罕見疾病政策對話報告

服務機關：衛生福利部 國民健康署
姓名職稱：藍佳斐技正
派赴國家：大陸北京
出國期間：民國 **107** 年 **6** 月 **5** 日至 **6** 月 **8** 日
報告日期：**107** 年 **7** 月 **6** 日

本項經費由「菸品健康福利捐」支應

摘　要

亞太經濟合作組織（APEC）生命科學創新論壇（LSIF）罕見疾病網絡（Rare Disease Network, RDN）為辦理「Ensuring an Inclusive “Healthy Asia Pacific 2020” by Addressing Barriers to Healthcare Services for Population Affected by Rare Diseases」計畫，召開為期 2 天之罕見疾病政策對話，參加經濟體除我方，另有:澳洲、中國大陸、加拿大、智利、印尼、義大利、印度、香港、韓國、馬來西亞、墨西哥、菲律賓、新加坡、泰國、越南等。共辦理 9 場政策對話專題座談，討論議題，包括：罕見疾病定義之決定與實施、符合罕見疾病病人之醫療照護系統設計、早期正確及系統性診斷體系之建置、研究診斷及治療之創新融資、罕見疾病藥物加速審查機制、罕見疾病藥物價值評估與補助、罕見疾病登錄系統之建置、經費規劃及策略等，及 2 場專題講座。臺灣大學醫學院附設醫院基因醫學部簡穎秀醫師受邀擔任「罕見疾病之早期、正確及系統性診斷」專題座談之與談人，本署人員陪同前往，並瞭解 APEC 其他經濟體罕病政策措施與規劃及於 APEC 框架下對於罕見疾病計畫之規畫方向及進展，所收集之國際資訊與經驗將作為未來相關政策研議之參考。建議未來應隨醫療與科技之進步，以病人為中心，強化罕見疾病及治療藥物之相關政策措施，並持續強化罕見疾病與遺傳性疾病防治網絡，與病友團體、醫療人員維持良好夥伴關係及加強宣導。後續，將持續關注 APEC 本計畫下產出之相關報告與文件，適時參採，以更強化罕病政策措施，並落實執行，期能符合本次會議提出行動勝於空談之呼籲，及達到罕見疾病防治及藥物法加強照顧罕病病人之目的。

關鍵字：罕見疾病、罕見疾病照護、罕見疾病藥物、APEC、亞太經濟合作組織、生命科學創新論壇

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亞太經濟合作組織（APEC）生命科學創新論壇（LSIF）罕見疾病網絡（Rare Disease Network, RDN）為辦理「Ensuring an Inclusive "Healthy Asia Pacific 2020" by Addressing Barriers to Healthcare Services for Population Affected by Rare Diseases」計畫，召開為期 2 天之「亞太經濟合作組織罕見疾病政策對話」，臺灣大學醫學院附設醫院基因醫學部簡穎秀醫師受邀擔任「罕見疾病之早期、正確及系統性診斷」專題座談之與談人，本署人員陪同前往，並瞭解 APEC 經濟體罕病之政策措施與規劃，及於 APEC 框架下對於罕病相關計畫之規畫方向及進展。收集國際資訊與經驗作為未來相關政策研議之參考。

貳、過程

一、與會行程

日期	行程
6 月 5 日(二)	台北-北京
6 月 6 日(三)	參加亞太經濟合作組織罕見疾病政策對話第 1 天會議
6 月 7 日(四)	參加亞太經濟合作組織罕見疾病政策對話第 2 天會議
6 月 8 日(五)	北京-台北

二、會議議程 (詳如附件 1)

日期	內容
6 月 6 日(三) 上午	● **報到** ● **致詞** ● **專題座談 1 : Setting the scene for Rare Disease issue in APEC Economies** (為亞太經濟體之罕病作好準備) ● **專題座談 2：Determining and implementing a Rare Disease definition**（罕病定義之決定及實施）
6 月 6 日(三) 下午	● **專題演講第 1 場：Construction of the Clinical and Research System for rare Diseases in China: Experience from Peking Union Medical College Hospital and National Rare Disease Registry System** (建置罕病臨床及研究系統：北京協和醫院及國家罕病登錄系統之經驗) ● **專題座談 3：Health system design to address the needs of the Rare community** (為罕病病人需求設計之醫療照護系統) ● **專題座談 4：Diagnosing Rare Disease early, accurately, and systemically** （罕見疾病之早期、正確及系統性診斷）

日期	內容
6 月 7 日(四) 上午	● **專題演講-第 2 場：Rare Diseases in China: opportunities and challenges(**中國大陸罕病之機會與挑戰**)** ● **專題討論 5：Innovation financing for Rare Disease research, diagnosis, and treatment**（為罕病研究，診斷和治療提供創新融資） ● **專題座談 6：Accelerated regulatory pathways and pre-regulatory early access for Orphan Medicinal Products (OMPS)**（罕藥之加速審核途徑及於審核前之早期取得）
6 月 7 日(四) 下午	● **專題座談 7：Value assessment process and funding for Orphan Medicinal Products (OMPS)**（罕藥之價格評估程序和資助） ● **專題座談 8：Leveraging public-private partnerships for Rare Disease patient registries**（利用公私合作夥伴進行罕病患者登錄） ● **專題座談 9：APEC economy plans and strategies for Rare Diseases (**APEC 對於罕病之經濟計劃及策略**)**

三、**會議重點**（大會資料、講者介紹如附件 2、3）

（一） 專題座談 1：Setting the scene for Rare Disease issues in APEC Economies (為亞太經濟體之罕病作好準備)

第 1 位與談人 Dr. Jakris Eu-AHSUNTHORNWATTANA (泰國 Mahidol 大學 Ramathibodi 醫師)談到泰國罕病面臨之重要議題：在人力部分，泰國罕病相關人力（包括遺傳諮詢人員、病理學家、技術員及生物資訊人員等）與醫療資源有限，且大部分集中在曼谷，其他專科之臨床人員也缺少對罕病之認識；診斷設施部分，僅曼谷之醫院設置診斷設備，可提供確診服務；罕病藥物部分，取得較不易，未列於國家基本藥品名單內之藥物，無法獲得補助，也無法透過一般公共衛生體系取得；罕病相關資訊部分，資訊較有限，尚未設置國家登錄系統，因此罕病之疾病負擔尚無法估算，且境內罕病個案之基因資訊與疾病資訊有限。後續造成之問題為延遲診斷、誤診或漏診，造成疾病治療之延誤，因未能全面性診斷也造成因低估罕病人數而低估所需資源之惡性循環。對此，提出因應解決方法包括：制定相關政策，如全國精準醫療策略，及積極倡議罕病與成立病友團體等；資金方面，提供罕病檢驗及醫療補助，這需要政府單位之參與；培育遺傳學專家、諮詢人員、檢驗人力等相關人力、與其他科別合作、製訂臨床指南及組成工作網絡；分享診斷設施，建置轉介機制；建置快速核可及早期取得藥物機制，及藥物分布與緊急需用儲備機制；建置

全國登錄系統及基因與疾病資料庫，獲取相關資訊。泰國近期已發展之工作，包括：響應罕病日聚集各界能量、新成立基因藥物委員會、國家精準醫學計畫納入罕病等。未來將不斷倡議期能改善現狀。

第 2 位與談人 Mr. Cameron Milliner (APEC 罕病網絡共同主持人，夏爾公司公共事務及患者倡議部門負責人)表示全球約有 7 千多種罕病，80%為遺傳性，依 WHO 估算全球約有 4 億罕病患者，其中 2 億病人在亞太地區，另罕病病人中 50%是兒童。另指出，罕病即使在先進國家平均也需 5-7 年才可被診斷出來，其過程中包含至少 3 次誤診，對病人本身及其親人影響甚大，若能透過相關體系支持，即早診斷治療，也許有機會讓他們過一個有意義的人生。在政府層面也需嚴肅面對瞭解罕病對社會及整個經濟體影響極大，部分罕病為高殘障性需要仰賴社會照護，並需要持續投入龐大預算應對疾病。在醫藥界雖不斷致力創新，希望將新療法引入市場，但也面臨挑戰，包括：臨床試驗之證據程度，實驗證據之轉譯，產品之查驗登記，如何確保病人取得管道，及補助與病人自費負擔費用等議題。沒有一個經濟體可以單獨面對這些艱難任務，需要所有利益相關方（含：病人、衛生部門、財政部門、臨床醫師、照護人員、研究人員、產業界、學術界等）一起參與，而 APEC 經濟體也可以結合起來一起應對挑戰，有一個嚴重的錯誤迷思是認為一個國家需要達到經濟繁榮，才能聚焦於罕病問題，然其邏輯應改為若不治療罕病，國家的經濟繁榮是不可能達成的。罕病解決方案需要長期規劃，相信但隨著時間推進，我們可以逐步找到解決方案。

第 3 位與談人 Prof. Xinming SONG （北京大學 APEC 健康科學院資深顧問）說明，中國大陸尚無官方罕病定義，但已有學術或民間組織提出可供參考標準，2011 年中華醫學會將罕病定義為患病率低於 10 萬分之 5，據以估算病人數約有 1,680 萬人，但可能低估，正確統計數據待未來進一步研究。中國大陸對於罕病仍處初步階段，但進展很快。目前面對之議題，在診斷部分，有誤診、未能早期診斷、病例少治療方式難以開發而無法有效治療病人、藥價昂貴、缺少訊息交流平台、及公眾對於罕病缺乏認識和幫助等；此外病人有社會融入困難，病人遭受社會不平等待遇，如受教育水平較低，研究顯示大專以上學歷僅約 14%，39%患者輟學，使患者成年後缺乏謀生就業能力，約 60%病人認為缺乏社會參與機會與支持，需自己面對疾病帶來的心理壓力。中國大陸多年來陸續制定罕病相關政策，如：2015 年國務院提出改革罕病藥物及醫材藥品醫療評估與審查系統意見，2017 年提出改革罕病藥物及醫材之評估與審核系統創新及鼓勵藥物醫材創新意見，2018 年提出優化罕病藥物審查、審視及許可公告。其他方面工作，如 2016 年成立國家衛生和計畫生育委員會設置罕見病診療與保障專家委員會。在積極預防方面，已辦理產前篩檢，新生兒篩檢等措施，實施幾年來不斷進步，但還存在地區間之差異；另關於罕病病人之登錄制度，2010 年起已建立全國血友病登記系統，計畫 2020 年前，逐步完成國家罕病註冊登

記系統，將包含 50 餘種罕病。有關於罕病籌資及社會支持部分，病人可以透過包括保險、財政部等不同機構獲得部分醫療保險補助，但需視病人加保類型、家庭收入等決定補助金額，部分地區也自定有罕藥補助政策，如上海等。期待未來能更加保障罕病病人權益，加強相關領域之合作共同應對罕病。

在回饋與討論中，與會者提出討論意見包括：需要放大罕病聲音，提高對話層級如世界衛生組織等，或邀請世衛人員參與會議，並讓更多利益相關方參與進來；有些癌症疾病和罕病一樣病例數很少，但卻能因強調疾病嚴重度及致死性，引起重視爭取到許多資源，建議可借鏡癌症策略，並應有展示相關數據之技巧；多年來罕病一直在討論層面，建議能提出具體可行方案，才有可能得到政府重視並納入國家層面之健康體系內。討論總結：行動勝於空談，這次對話會議為各經濟體提供採取行動平台，希望今年底前，在 APEC 框架下，能產出一個關於亞太地區的具體確實建議，提供政府和各經濟體參考並加以執行，然而這過程非一蹴可幾，需要各經濟體、產業、利益相關方參與建立基礎，共同解決亞太地區罕病問題。

（二） 專題座談 2：Determining and implementing a Rare Disease definition（罕病定義之決定及實施）

第 1 位與談人 Dr. Durhane Wong-Rieger （加拿大罕病組織 CORD 主席及執行長）認為理想的罕病政策有 4 項原則，包含：平等原則：罕病雖人數少，但面對疾病與死亡威脅，需被平等對待；普遍性原則：不論罕病患者之年齡、經濟狀況，都都應要有獲取醫療及其他服務之管道；全面性原則：提供診斷、治療、照護及社區支持等之整合性服務；參與原則：病人及家屬在各層次之決策都須能夠參與。其說明在加拿大，未訂定罕病藥物專屬法案，但於 2016 年衛生部已將罕病藥物政策視為優先項目，將朝更一致之藥物評估及合理藥價策略努力，並承諾以 CORD 作為政策平台，及成立病人與醫療人員組成之工作小組。未來地區性或國際性之合作非常重要，如歐盟、拉丁美洲、亞太地區都有病友聯盟，國家間藥品和醫療服務有很好的跨境合作機制，病人可至鄰國接受治療，由自己國家補助，因此需要發展出國家層級政策，才可能建立此種跨國機制及進行各種罕病相關政策決策。結語時指出，罕病政策各國依不同國情來訂定，但有關鍵性之共同點包括診斷、專家中心、治療管道、社會支持及研究，沒有一個國家可以單獨解決這些層面之問題，需要透過國際性組織共同合作。

第 2 位與談人 Mr. Andrew Martin（輝瑞公司拉丁美洲、亞太平洋、非洲及中東區行銷副總裁）自藥物產業之角度提出看法，認為罕病需要訂定明確定義，如此可受到政府重視，進而制訂相關法規，相關政策也才能具體執行。並提出罕病定義及法規之訂定需包含 5 項要素：第 1 點是有清晰可量化之罕病標準；第 2 點為不能具

限制性；第 3 點為要有相對應可落實實施且明確的管理政策；第 4 點為相關規定標準能與國際一致，且是與罕病藥物之可取得性相連結的，如藥物審查標準。

在回饋與討論中，與會者對於是否需要定一個共同性之罕病定義或一致之罕藥審查標準進行許多討論，包括：對於還未訂定罕病定義之國家，其訂定可能影響政府之預算分配、特定藥物之研發等層面，涉及不同利益相關方，因此訂定不易；如果一直拘泥統一罕病定義，將無法有定論，且會阻礙許多事務之推動；目標應不是訂定一個完美罕病定義，但若至少有一個罕病範圍之架構，會是一個起點，啟動一些政策方案，如藥物補助、預防措施等，並有助於收集病例數等統計資料；從產業角度來說，疾病標準不一致，包括藥物審核標準不一致，可能無法加速新療法或新藥之審查與使用。另提到總體目標是希望可以預防個案之發生，因為許多地區沒有足夠醫療資源提供罕病病人治療，藥價也多昂貴不夠親民，因此預防還是最根本方法。主席結論時說明罕病是否需要全球性或區域性統一定義，並無標準答案，大家也須自多角度思考。

（三） 專題演講 1：Construction of the Clinical and Research System for rare Diseases in China: Experience from Peking Union Medical College Hospital and National Rare Disease Registry System (建置罕病臨床及研究系統：北京協和醫院及全國罕病登錄系統之經驗)

演講人 Dr. Mengchun Gong（北京協和醫院醫師及國家罕病登錄中心執行負責人)分享中國大陸罕病登錄計畫之建置經驗，該計畫在政府支持下由北京協和醫院執行，旨在建立各醫院之協作平台，收集不同機構有關罕病之臨床與基因等資訊，提供臨床醫療、研究、產業等之用，系統架構包含基礎設施層、數據資源層、應用層、業務應用層、使用者服務層等，並設有資料保護機制，也訂定許多流程標準規範，於 2016 年 12 月啟動計畫，2017 年 7 月上線使用，至 2018 年 5 月登記有 82 種罕病，包括：心肺腎罕見病、內分泌代謝與血液系統罕見病、神經骨骼與皮膚罕見病和兒童罕見病，共 1 萬 5 千多名個案資料，預計至 2020 年 6 月將超過 5 萬名個案資料登錄。參與本登陸平台之醫院，需分享臨床病例資料，提供資金支持及人力登錄資料。此外，因各醫院罕病醫學詞彙用語不一，及部分疾病無適當之 ICD 編碼，造成登錄困難，目前也在同步進行罕病詞彙及疾病編碼標準化工作，並培訓相關人才。本登陸計畫產出之相關研究成果，也與雜誌期刊共同出版罕病及孤兒藥專刊，並於國際會議及國際雜誌發表研究成果文獻。未來希望創建罕病大數據資料庫，並與國際交流，將可大幅改善罕病醫療服務。

（四） 專題座談 3：Health system design to address the needs of the Rare community (為罕病病人需求設計之醫療照護系統)

第 1 位與談人 Mr. Luke Elias（澳洲芒特德魯特醫院業務分析與執行部門負責人）說明罕病醫療照護系統面對之挑戰與機會，認為罕病其實與一般疾病有許多相同之問題，如：健康識能、延遲診斷治療與照護、臨床試驗等議題，因此需要去檢視罕病所進行之一些臨床或研究是否有與一般疾病有相重疊之部分，應該予以避免，以減少資源浪費，相對的也可以檢視所發現之罕病議題是否也為一般疾病所面對，而將其擴大為一般疾病問題，引起重視；要完成這些需要有良好的管理機制。另，提出以病人為中心之照護，加上臨床專業可以創造出好的臨床證據之理念。

第 2 位與談人 Mr.Hyun Min SHIN（韓國罕病組主席）主要介紹韓國之罕病醫療與補助系統。在韓國將罕病定義為國內罹病人數少於 2 萬人，且無適當療法及替代療法之疾病，推估約 30 餘萬名病患，全國健康保險方案，涵蓋約 96%以上之人口，另有提供低收入戶之醫療補助方案，由中央及地方政府共同提供預算。另在 2001 年實施針對罕病病人之醫療費用補助方案，財源由中央政府與地方政府各半，補助醫療費用個人負擔部分、輔具、呼吸器、咳痰機、特殊營養食品等。韓國醫療保險已將罕病藥物納入，但並未包含所有罕病藥物，並依病人家庭經濟狀況分等級、就醫之醫院等級給予不同比例之補助給付。未來希望韓國在罕病部分也能如殘障一樣，可作等級判定。

第 3 位與談人 Mr. Kevin Huang（中國罕病組織創辦人及主席）分享中國大陸罕病發展經驗，統計數據部分，目前有約 1,600 萬餘罕病病人，核准之罕藥 280 餘種，少於 40%病人被診斷出來，診斷時間約需 5-8 年，全國有 80 多個病友組織。近 10 年中國大陸之罕病發展快速期間，於上海等地已成立 6 個罕病醫學會、13 家罕病診斷治療醫院，及 600 多家次世代基因定序公司提供快速診斷，並持續成長中。政策部分也發展十分快速，2015 年至今已推出多項新政策，尤其加速了罕病藥物及臨床試驗審查速度，另於 2018 年 5 月公布第 1 批罕病目錄共計 121 項病，提供執行罕病相關政策之重要依據。未來建議發展重點包括：於各地區設置罕病診療中心，有利於罕病診斷及轉診；發展 NGS 技術，大幅縮短罕病檢驗時間；運用行動互聯網技術於罕病之臨床服務管理，照護偏遠地區病人。

在回饋與討論中，與會者提出討論意見包括：不管任何地區罕病誤診或漏診是常見現象，應於國家層級推動在不同地區設置診療中心，接受轉診提供治療，並提高醫療人員罕病意識；在 APEC 框架下，運用健康亞太 2020 平台，形成參考方案提供政策決定者參考。

（五） 專題座談 4：Diagnosing Rare Disease early, accurately, and systemically （罕見疾病之早期、正確及系統性診斷）

主持人 Dr. Joan Keutzer（賽諾菲 Genzyme 公司副總裁，兼罕病整合方案部門負責人），說明多數罕病診斷缺乏標準，且同一疾病可能有不同症狀，因此，因誤診而

延誤治療是常見之問題，故亟需聚焦罕病診斷問題，建立系統性早期篩檢診斷體系，並提高醫療人員罕病意識及發展診斷技術。

第 1 位與談人 Dr. Duangrurdee Wattnasirichaigoon（泰國 Mahidol 大學 Ramathibodi 醫院小兒科及基因醫學教授及醫學遺傳部門主任）分享泰國經驗，表示要改善罕病患者狀況，需要及早診斷從新生兒做起，在泰國 92%兒童享有醫療保險，提供全國新生兒先天性代謝異常疾病篩檢，並已有成立罕病病友團體，與政府也有溝通管道。總的來講泰國政策之制定主要為由下而上，但這麼多年來已有很好之進展，患者可得到更好照護，但仍有部分問題，包括：罕病診療醫院主要集中在曼谷，偏遠地區個案就醫不易；很多基因測試商業或社會保險都未給付，需要自費；藥物治療方面，政府已成立罕藥專門委員會，使罕藥更容易取得，但這些藥品並未能全部列入國家給付，因此後續會有藥費補助問題。對應這些問題，建議未來努力方向，包括：建置更好的罕病管理系統與網絡，將資源整合彼此分享，在各省份設罕病中心提供罕藥，避免病人因轉診時間過長造成病情惡化；罕藥之審查在泰國約需 2 年時間，相當於一般藥品時程，因此需要一些政策及指導原則加快罕藥查登時程；需要加強新生兒及高危險群之早期診斷與治療，及預防疾病之發生；加強臨床基因醫學檢驗、遺傳諮詢人員、生物資訊人員訓練，特別是人員對檢測結果解讀能力之培訓；建立臨床診斷與治療之指南，及培訓材料；研究方面，希望可以針對各地區不同的疾病問題、遺傳疾病之公共衛生政策、治療罕病病人之社會成本等醫療經濟及流行病學等進行更深入研究，將有助於引入新的檢驗方法與罕病藥物。

第 2 位與談人為 Dr. Eva Maria C. Cutiongco-De La PAZ（菲律賓大學國家衛生研究院負責人）說明，菲律賓在 2004 年發布新生兒篩檢政策法案，建立國家新生兒篩檢系統，法案重點包括：醫療人員必須告知父母或監護人有新生兒篩檢之服務、衛生部須要求醫療機構提供新生兒篩檢服務、衛生部為主責單位、須設置諮詢委員會、須設置新生兒篩檢參考中心（reference center）及須將新生兒篩檢列入健保福利措施等。菲律賓設有國家性的新生兒篩檢整合性協作平台，讓全國新生兒都可獲篩檢，菲律賓這方面管理工作相當妥善，並獲地方政府支持提供協助；目前共提供 6 項篩檢項目，設有 6,500 多家採檢機構、6 家篩檢檢驗機構，但只有 14 個地區設有提供持續性診療機構；因為菲律賓有許多島嶼人口也密集，所以也試圖努力建立更多診療中心，目前也會透過遠距醫療提供診斷與醫療服務。在確診部分，菲律賓已建有基因檢驗機構，並也會進行國際間之交流，如已與台大醫院建立管道將檢體送至該院進行檢測與學術交流。未來，希望將原有篩檢項目 6 項增加至 28 項；另菲律賓目前新生兒篩檢率約為 70%，尚有 30%未接受篩檢，也會繼續努力接觸到這些新生兒，尤其是在在家生產者。

第 3 位與談人為台大醫院基因醫學部簡穎秀醫師，簡醫師受主辦單位邀請為與談人，分享國內新生兒篩檢情形。簡醫師強調建立系統性早期篩檢診斷體系對罕病

防治之重要性，並說明我方新生兒篩檢施行，可追溯至 1984 年，當時發布優生保健法，此後便開始逐步建立新生兒篩檢體系，建置集中式的篩檢及治療中心，及後續更重要的異常個案追蹤機制。在當時實施新生兒篩檢政策是非常具智慧性的，也獲得政府、公共衛生護士、遺傳諮詢等相關資源之支持與協助直至現在。篩檢計畫實施至今 30 餘年已具相當之成效，努力實踐不讓任何一個人被遺漏之基本目標。此外一個好的新生兒篩檢方案，包含很多不同層面，包括需要一個良好的篩檢實驗室，如臺大醫院的篩檢中心就已接受並通過認證機構之認證，確保檢測品質與正確性。目前新生兒篩檢率已接近 100%，而受檢新生兒中，99%在出生 6-8 天即能得到檢驗報告。歸納能順利推動新生兒篩檢有 3 項主要優勢：第 1 項優勢是關於檢測費用，目前政府提供 11 項篩檢項目之補助約 7 美元，新生兒家庭自付額約 12 美元，大多數父母都能負擔得起，若為低收入戶家庭，政府則會全額補助，此外民間團體也會針對政府未能補助之費用提供補助，因此，新生兒篩檢實施 8 年後，至 1992 年當時篩檢率已達 95%。第 2 項優勢是關於治療的費用，我們在 2000 年發布罕見疾病防治及藥物法，依根據這項法律我們為確診罹病之新生兒提供罕病藥物、基因診斷、呼吸器等維生所需居家醫療器材、維生所需特殊營養食品、營養諮詢等服務，希望為罕病患者提供最佳的照護，另也有全民健康保險給付部分罕病藥物之藥費，目前約共有 1 萬 5,000 名罕病患者，均能得到幫助。第 3 項優勢是篩檢方案之主持人，臺大醫院新生兒篩檢中心當時由胡務亮醫師帶領，逐年發展並增加新的篩檢疾病項目。透過新生兒篩檢可以達成早期系統性的正確診斷，達成最佳的治療效果。(簡報如附件 4)

第 4 位與談人 Mr. Andrew Martin（輝瑞公司拉丁美洲、亞太平洋、非洲及中東區行銷副總裁）表示，有幾項重要因素可以幫助縮短罕病診斷時間及誤診，第 1 點是政府需要建置新生兒篩檢機制，早期發現與治療，可以使癒後效果更好；第 2 點是罕病相關團體互相交流機制，包含醫療及諮詢各方面之交流，例如本次對話會議也是很好的交流；第 3 點是針對罕病制定指南準則，幫助專業人士更好的去面對罕病，當前作法很多是單打獨鬥，因此我們需要跨領域跨學科之專業人士合作，更精確的診斷罕病；第 3 點，建立罕病診療中心有效及持續性的應對疾病，自早期之診斷、預防，到持續關懷和治療，目前很多罕病中心被動的應對疾病，未來應積極轉向預防性方式；此外，政府也應更多投入，來激勵醫藥公司進行研究，自這些方面進行創新和進展，應可對罕病問題帶來解決之道。

在回饋與討論中，與會者提出討論意見包括：罕病病類眾多應加強提升臨床醫療人員罕病意識，以加速疾病診斷避免誤診，以能及早接受適當之治療；良好的檢驗實驗室品質對新生兒篩檢之執行非常重要，應可進行檢驗結果正確性之品管；建立亞太地區罕病基因測試平台與資訊交換平台，可以避免重複作其他經濟體已做過之研究或工作，但資訊納入交換平台前，宜經過專家會議審議，確保資訊正確性；

以次世代基因檢測方法已可快速正確檢驗疾病，但非所有罕病可作基因診斷，且每一種疾病可能還有不同分類與變異，也造成檢測上之困難。總結希望大家一起努力在 APEC 個經濟體框架下，共同促進及實踐更好的新生兒篩檢及罕病早期診斷完整系統，大家仍有許多可合作空間。

（六） 專題演講-第 2 場：Rare Diseases in China: opportunities and challenges(中國大陸罕病之機會與挑戰)

主講人 Dr. Jie Ding（北京醫學學會罕病部門主席，北京大學第一醫院小兒科教授）分享北京醫學罕見病分會之辦理情形與成果，希望透過此瞭解中國大陸罕病發展全貌。其說明罕病不僅是醫學範疇問題，還具社會屬性，國際上也開始有具體行動，自政府層面(立法)、專家層面(專家委員會、患者註冊、轉診網、診斷實驗室、研究等)、患者層及社會層面等都應有所行動，以體現社會公平、社會進步、人人平等之理念，中國大陸起步雖相對較晚，但近年發展趨勢良好。於 2013 年成立第 1 個罕病聯合性組織：中國罕見病發展中心，2010-2016 年間也於山東、北京等地成立 5 個罕病學術團體，其中北京醫學會罕見病分會 2012 年成立，對罕病具強有力之推近作用，其下設立之專科學科共 20 多個，希望引入更多專家進到罕病領域。該學會另也創建宣導網站並獲獎，並與各政府部門溝通推動罕病醫療保障工作，及訂定罕病診斷規範，藉由召開專家會議，以共識方式建置診治規範，重點討論疾病項目有 Alport 綜合症、粒線體 MELAS、希佩爾林道病、節結性硬化症、甲基丙二酸等 5 項。在流行病學部分，學會自 2013 年 6 月起受北京市衛生和計畫生育委員會委託，進行北京地區基於住院患者資料之罕病研究調查，對 32 家診療罕病之醫院，進行資料調閱，參考歐盟罕病名單，5 年累積收集 3,560 種病類，35.9 萬住院個案資料進行流行病學調查，以獲得基礎數據。研究過程發現，罕病其實並不罕見，需要調整改變研究調查方式，需要更廣、更高品質之全國性數據來源，也需要更多科學合作（醫學專家、數據資訊專家、數學家）及精簡首批研究病類。之後，參考歐盟清單，及中國大陸可診治性之罕病調查研究清單，經過會議討論共篩選出 281 種罕病，至國家醫療服務數據中心查調資料，初步結果發現罕病住院患者 2014 年為 5.06 萬人次佔總住院人次之 0.68%，2015 年為 5.62 萬人次佔總住院人次之 0.70%，就罕病病類分析，單一疾病住院總人次分布 2014 年為 0-6782 人次、2015 年為 0-8073 人次，此為初步數據可做相關推算之基礎數據，住院地區北京、上海、廣東佔約 45%佔多數間接反映各地區罕病診治能力，近期將做正式文獻發表。

另指出各層面之挑戰與機會，在科技部分，因科學技術，如：次世代基因檢測、模式生物等技術之進步，可推動疾病之精準診斷，培育更多基因檢驗報告專業解讀人才；罕病管理部分，許多罕病尚無治療藥物，因此罕病管理之目標不在於治癒，而是需要讓病人知道如何與罕病共存，最大程度提高生活品質，延緩疾病進展及延長生存期；在倫理學部分，遺傳諮詢、遺傳基因篩檢、產前及胚胎植入前診斷都涉

及醫學倫理議題；社會學部分有醫療平等性、衛生保健分配等問題。在醫療挑戰部分，包括產學之有效合作，探索新治療靶點、模式生物以促進推動發病機制之研究、如何做好罕病臨床註冊研究、如何設計發展新藥之臨床試驗、如何估算適宜之罕病試驗之樣本量、什麼情況下罕病藥物可以豁免臨床藥物試驗，以增進罕病藥物之可及性等等。

總結，罕病夢希望實現 4 個目標，促進醫療人員罕病醫療技術之提高、促進社會對罕病防治之了解進而提供患者關心幫助、促進相關醫藥產品之研發及市場之開發、促進相關政策對罕病與罕藥之重視。建議先從少數罕病開始著手，不要糾纏於罕病定義，學會、協會、政府部門共同合作，創造一種可持續運作之模式或機制，對罕病逐步一一解決，從 0 的突破到系統運作。

（七） 專題討論 5：Innovation financing for Rare Disease research, diagnosis, and treatment（為罕見疾病研究，診斷和治療提供創新融資）

第 1 位與談人 Mr. Prassanna Shirol（印度罕病組織共同創辦人及執行長）說明印度於 2013 年成立第 1 個罕病組織推動罕病之發展，2017 年發布國家罕病政策，將罕病定義為 1/2,000，估計約有 7 千萬罕病病人，另設立罕病照護協作中心（Rare Disease Care Co-ordination Center）作為結合病人、醫院、醫師專家、資金、臨床試驗、治療選擇、診斷、照護者、教育、遺傳諮詢之平台，協助罕病個案之轉介治療、診斷及管理，2016 年和當地醫院合作設置罕病診療中心，設有全職協調人員、護士、醫學基因學家、小兒科醫師。病人登錄系統則已自 2017 年啟動，目前含括 6 項疾病。

在醫療保險部分，在政府層面，2016 年起員工國家保險（ESI）印度員工部分自費的社會保險和醫療保險計劃提供罕病員工家庭診斷治療費用補助，另 2015 年發布將遺傳疾病納入醫療保險，惟細節仍尚待推動；企業部分，設置企業社會責任（Coporate Socail Responsibility, CSR）制度，企業符合營收標準就需將利潤固定比例用在社會責任活動上，及為雇員提供醫療補助；此外有群眾募資（Crowd Funding）之傳統作法，目前已設有 IT 平台，可針對病人骨髓移植、幹細胞治療、支持性照護等單一醫療事件進行募資。

印度國家罕病治療政策部門(National Policy for Treatment of Rare Diseases, NPTRD)由健康與家庭福利部主責，設有 3 個委員會提供政府罕病政策架構之建議，另設罕病治療基金，其基金比例 60%來自州政府，40%來自聯邦政府，罕病政策涉及單位包括：健康及家庭福利部、化學製藥部、財政部、企業業務部、勞工部等，目前之措施包括：設置跨部會之諮詢委員會、在中央及州層級設置技術性委員會管理及提供補助，建置線上申請機制。現行在州衛生部下任命 CTC 機構負責與中央衛生部門協調，提供資金給醫院進行罕病治療，申請案件於州技術委員會審查通過後通知中央衛生部及醫院開始治療。

未來長期規劃為建置病人登錄系統，通報及資料蒐集，進行流行病學調查推估罕病盛行率，建立以流行病學調查結果為基礎的罕病定義，促進治療、診斷、照護及藥物之研發，透過立法鼓勵國內罕病研發以控制藥價於可支付範圍，鼓勵資金支持，確保保險包含罕病及遺傳性疾病，以提供病人可持續之資金支持。

第 2 位與談人 Dr. Dino SEPULVEDA （智利衛生部健康企劃組健康科技與健康實証部門負責人）說明智利並沒有特別針對罕病之政策與官方專屬機構，罕病相關事務由衛生部下一個健康計畫部門負責，目前無官方罕病定義，因智利人口不多因此罕病相關研究也較少。在醫療保險部分，智利設有基金補助罕病醫療費用，並有一個註冊系統，病人可透過該系統申請成為罕病病人，由一個專門委員會審查通過後，可進行治療。智利在罕病藥品市場上已進行一些規範，也努力於業界與政府間建立更透明之互信關係，給予罕病更多資金與政策之支持，及將藥品納入國家藥品名錄，進行藥價之調控。經過這樣系列的努力，相信可以更好的去提升智利罕病之診治，已先選擇一些疾病先著手建立透明機制，是好的開端。

主持人及講者 Dr. Vinciane Pirard（歐洲製藥工業協會聯合會 EFPIA 罕病藥品部門副主席）介紹歐洲 Innovative medicines Initiative (IMI)組織，該組織是由歐盟及歐洲製藥工業協會聯合會公會，各自出資 25 億歐元組成之公、私合作單位，預計 2008-2020 年之 10 年間完成 100 個項目，歐盟出資之經費為使用於大學、中型企業及病友組織，至歐洲製藥工業協會聯合會內之各藥品公司無經費可拿取，且必須捐助慈善計畫。於該組織下，有超過 1 萬多位研究人員參與公開合作、改善研發及創新研發，IMI 是一個跨國界之中立平台，參與者學習互相協調，找到可以共同研究之議題，且不能只偏向或有利於某家公司或企業方，運作方式是先確定研究議題，然後協調可能有興趣之相關方報名，之後進行篩選組成團隊，團隊成員可能包含公私部門，須制定工作時程規劃，IMI 提供之資金支持約為 3-5 年，若後續仍需資金支持，則 IMI 會協助尋求其他歐盟之外之合適資金支持。這樣的平台建立多方合作關係一定會面臨議題包括：知識產權、技術專利、法律等。歐洲有很多小國家，很多疾病只有 1-2 個病例，因此非常需要在歐盟層面上去進行這樣的協調與合作，避免做重複的工作，讓資源互補而非競爭。

在回饋與討論中，與會者共同討論建議罕病病人第一線經費協助，通常是由公、私單位及不同保險機制來共同互補經費減少罕病家庭之支出，然而病人仍須自費部分費用及負擔非治療性之支出，造成壓力，對於如何創新罕病資金來源，由醫療存款、保險、稅收、產業等等，都須視各國國情去評估訂定。

（八） 專題座談 6：Accelerated regulatory pathways and pre-regulatory early access for Orphan Medicinal Products (OMPS) （罕病藥物的加速審核途徑及於審核前之早期取得）

第 1 位與談人 Prof. John CW LIM(APEC 生命科學論壇委員、Duke-NUS 醫學院法規科學卓越中心執行長)說明該機構承辦 APEC 多項計畫法規科學訓練卓越中心，說明該機構之工作，包括教育訓練提升法規專業人員之能力、提供諮詢利用專業育工作網絡支持利益相關方，扮演智庫角色建立夥伴關係及促進政策創新，進而能強化亞太區醫療相關產品管理系統，促進區域健康醫療系統與政策。其指出，良好的管理，基礎層需建立核心能力，做好知識管理與教育訓練；其次需加強管理能力及科學的優化，進行政策創新、協調、建立藥物早期取得方案與加速審查路徑；最上層則為醫療系統之整合，包括對政策、健康政策、醫藥科技評估、補助、臨床照護及研發等之整合。另提到藥物法規規範之合作，因各國管理體系很難自己從頭建立，且都有其相似性，因此如個經濟體能共同界定管理原則與框架，彼此協調出一致性意見，互相信賴，分享資訊與工作，應能達到規範管理上之合作。另一概念是以危機為基礎之管理，建立上市前與上市後之風險管理，不能將藥品上市卻不考慮其影響。此外，因目前罕病資料有多元來源 (臨床試驗、上市後之監測系統、登錄系統及健康紀錄電子化、安全性與有效性之實際世界證據等)、產品創新(3D 列印、個人化藥物、細胞及組織治療、可穿戴技術及遠端監測等)、管理途徑改變(適應性的授權、產品壽命管理、法規之參照與合作等)，故新的藥物管理模式有其必要性，建議相關規範也須隨之不斷與調整進步。

第 2 位與談人 Dr. Lahouari Belgharbi（墨西哥聯邦保護衛生風險委員會科學規範及良好規範實踐卓越中心負責人）說明在墨西哥法律定義罕病為罹病率少於 5/10,000，推估至 2017 年約有 800 萬罕病個案，已有 14 項疾病公告為罕病，但尚未進行官方之病人登錄機制，在國家健康委員會下設有罕病分析、評估、登錄及監測委員會(Commission for the Analysis, Evaluation, Registration and Monitoring of Rare Diseases, CAESER)負責罕病政策制定，及評估新增公告罕病名單等。在墨西哥約 95%人口，已包含於公共建康保險機構之下，該些機構包含:政府雇員保險機構 Civil Service Social Security and Service Institute、私人機構及非正式單位之雇員保險機構 Mexican Social Security Institute、一般人民保險之 Health Popular Insurance，另有軍人保險單位，其中一般人民保險數最多佔 49%。罕病藥物管理部分，由聯邦保護衛生風險委員會(Commission for the Protection against Sanitary Risk, COFEPRIS)主責，已設有針對罕藥之快速審查流程，及專門之評估審查群，結至目前申請 98 件罕藥案件中已通過 79 件，申請手續費用為免費。面臨挑戰包括：需提升罕病於政策上之優先序位及提升大眾對罕病之認知與支持；改善診斷準確性；提供藥物管道及改善藥價可支付性；推動罕病早期診斷及篩檢之預防防治方案等。對於建議因應方案包括：建置分享最佳實踐網絡，以對醫療專業人員、民眾及政策制訂者進行倡議；蒐集更多對於罕藥需求之資訊提供政策制訂者、公眾及產業參考，提升醫療含蓋層面；調查病人及醫療專業人員對醫療架構、罕藥可及性及個案管理之需求與意見；更新法

規；建立早期及大範圍之篩檢診斷網絡。

第 3 位與談人 Ms. Kyu-Bee Sohn（輝瑞公司亞洲區法規管理策略師）自藥物產業角度提出說明，認為對於可能危及生命但還無治療方法之疾病，我們歸類為有醫療需求之疾病，為讓病人有藥可用，面臨如何加快研發之挑戰，要達此目的，需要有臨床研發技術之創新，及規範之創新，罕病因人數少，臨床試驗數據有限，如何在臨床或法規可接受之有限數據情況下，做出之臨床試驗數據，將可加速研發過程；此外，需要促進醫療科技評估(HTA)與政府管理單位要求一致性，若業界可與相關管理方，經常之溝通，應可加速推進研發過程。

在回饋與討論中，與會者討論建議可在 APEC 框架下，進行各方資訊融合，避免各經濟體做重複性之工作，及相一致之審查標準，但這牽涉到各利益相關方之互相信任度。各經濟體也要隨著科技進步及對於疾病與藥物之新發現，調整修正藥物審查標準。

（九） 專題座談 7：Value assessment process and funding for Orphan Medicinal Products (OMPs) （罕病藥物的價值評估程序和資助）

第 1 位與談人 Dr. Elena Nicod（倫敦多隆公司資深顧問，義大利博科尼大學健康與社會照護管理研究中心研究員）說明罕病因人數少且分散，且許多醫療需求未被滿足，因此其價值評估需要有其特殊之考量，且要瞭解到一般非罕藥之醫藥科技評估(Health Technology Assessment, HTA)與價值評估估流程可能只有部分適用於罕藥，罕藥需要在證據有限及不確定性高的情況下去做評估，因此對其標準之設定不易有共識。建議應從病人、醫療系統及廣泛的社會角度，納入多層面因素後去評估，而各國因國情不同也會有不同的決策，建議考量疾病嚴重度、醫療需求、國內罹病率等因素；另所作之決策也建議可隨著時間累積更多藥物或財務相關資訊後，進行調整，讓此評估機制有彈性。

第 2 位與談人 Dr. Camila Quirland Lazo（智利聖地牙哥 Aruro Lopez Perez 基金會腫瘤機構健康科技評估部門負責人）認為不適當的罕藥價值評估流程，將使病人無法得到所需要的治療，這方面各國都因國情不同而有不同挑戰與策略，其團隊因此針對如何改善罕藥之取得，進行各國策略之文獻回顧，共回顧了 85 篇文獻，歸納出 8 大類國際間採行之不同行動方案，包括：訂定專屬法規、設置專門補助基金、特別之給付機制、對醫療產業之獎勵及規範（含：市場專利、早期管道方案、審查費用減免、免稅等）、補助制度之決策過程改善、健康照護提供者之獎勵與規範（含：病人登錄、建立指南與手冊、定義卓越中心、免稅等）。另提到在經濟評估遇到限制，包括: 生活品質調整生命年數(cost per QUALY) 未包含所有應評估元素，而評估方法需要與國家政策一致；另有許多罕藥之激勵措施，但卻因考量成本效益比，未分

配罕藥經費資源。此外從國際經驗得知：醫療科技評估考量因素不應只是增加成本效益(incremental cost-effective)、藥物安全性及有效性，也可考慮對經濟、社會、法律及政治之影響。各經濟體價值評估流程不同的，但建議可以共識出一個最基本價值評估項目，共同針對這些元素建立證據資料，避免經濟體作重複之工作，且資訊品質會更好。

第 3 位與談人 Ms. Julie Kim（夏爾公司血液學全球業務負責人）自藥物產業角度提出說明，指出一般標準的藥物價值評估流程標準並非針對罕病所設計，較無法全部適用，罕病因人數少臨床試驗數據不足，造成療效評估不易、進行雙盲試驗不易及對疾病瞭解不足等困難，故藥物價值評估是極大挑戰，有些國家已採取不同方法解決這些議題，如英國將分層之成本效益閾值(tiered cost-effectiveness threshold)應用於罕病治療評估，主要是依據罕病臨床影響程度，另法國對於有蒐集臨床資料需求之創新產品，透過暫時性使用之授權方式，讓藥物於通過審前可先使用藥物，此外，德國於價值評估時將疾病負擔及稀有性考慮進去，在韓國為建立不考慮成本效益之評估機制。其所建議價值評估之考慮原則如下：病人即時性取得性，儘量減少過程中不必要之延遲；廣泛包容性之證據基礎；多元性之考量觀點，如治療影響、疾病負擔(包括對醫療體系及患者家庭負擔)；有彈性之方案，如在初期證據資料有些不確定性是可接受的。希望罕病病人和一般疾病病人有一樣的機會接受到治療。

在回饋與討論中，與會者提出討論意見包括：應該以病人需求為中心討論罕藥之價值評估與補助機制，而不是以成本效益為中心去討論此議題；鼓勵製造商進行負責任的藥價訂價政策，若訂價太高，不利病人取得；藥物價值訂定涉及很多層面之考量因素，在部分經濟體中已有較彈性之機制，但自管理單位角度，仍需要有參考標準，因此基於醫療科技評估的有效補助機制仍是有幫助的。

（十） 專題座談 8：Leveraging public-private partnerships for Rare Disease patient registries（利用公私合作夥伴進行罕見疾病患者登記）

第 1 位與談人 Prof. Mathew Bellgard（APEC 罕病網絡主持人，昆士蘭科技大學電子研究和商業化部門負責人）說明罕病病人登錄系統需要患者、醫療人員、研究人員、產業及官方之參與，建置之目的，包括:給予罕病病人及團體更多賦權、可聚焦於個別化及治療性之介入、可支持罕藥之研發、支持公共衛生與臨床研究之發展、透過分析相關數據可加速相關服務規劃、可推廣臨床最佳實踐與照護、招募更多志願者加入臨床試驗及與臨床試驗登錄無縫接軌等等。有關登錄系統之資料收集與應用，包括:臨床上治療情形之追蹤、以病人為中心之資料如生活品質與家庭及照顧者之影響、對政府來說，可以作醫療經濟之分析，包括藥物補助、成本有效性，對產

業來說，可隨著治療結果之進展做成本效益分析，在學術界，則可更了解疾病、及有助於創新及臨床試驗。登錄系統需要考慮因素包括:那些資料需被收集、那些人可以獲取資料，用於那些目的及是否會改變用途、需要具備哪些功能，是否需要新功能等。此外，登錄系統是一個動態變化的平台，不應該只是儲存資料的地方，否則無助於政策決定及新知發展，需要以病人為中心，系統性蒐集數據資料，所得到的資料才有實用。

建立全球登錄系統需要基於所在地區瀏覽器語言，這種國際化是很重要的，可以幫助解決統一性協調的問題，目前已建立之系統如 Angelman Syndrome 全球登錄系統，各相關單位行業、政府等，都可以運用這些數據去實現改善該疾病之目標。

第 2 為與談人 Dr. Mengchun Gong（北京協和醫院醫師及國家罕並登錄中心執行負責人)分享中國大陸之罕病登錄系統經驗，該系統為公有、非營利之系統，但也陸續獲得到私部門之捐贈，及提供軟體與人力支持研發。該系統自各醫院之資料庫收集資料，採用集中化方式，分享各醫院資料之平台，這需要用高度之資訊科技技術來完成。另使用此種集中化資料時，會遭遇標準化系統語言之問題，因此正在開發中國大陸之罕病編碼。另一挑戰是資料品質控制，需要找出重複個案，及將個案影像檢查、基因報告、病理報告等進行轉換上傳資料庫。此外，還須考量個人資料保護、技術開發，管理權與所有權等議題。儘管如此，公私合作關係未來在數據資料庫是有發展空間，可以大幅加速推動罕病相關工作。

第 3 位與談人 Dr. Joan Keutzer（賽諾菲 Genzyme 公司副總裁，兼罕病整合方案部門負責人）分享賽諾菲公司罕病註冊系統經驗，該公司建置登錄系統目的在於加強病人管理、瞭解疾病自然史、增加病人對治療反應之瞭解、提供專家間之溝通加速罕病領域之進步等，該公司資料收集方式為觀察式非干預式，同時有前瞻法及回溯法，且為自願性參加，所有參加之病人需簽屬知情同意書，但未參加者並不會影響其藥物之取得,收集之資料包括性別與年齡等人口學資料、疾病病徵與進展、臨床評估及病人自述治療情形、使用之藥物、劑量、頻次等，該系統設有國際區域性之諮詢委員會，負責原始之資料收集檢核，另設有一核心之國際委員會，進行資料管理、統計、監測、醫學交流、資料品質等，目前登錄 4 個疾病(Gaucher disease, Fabry disease, MPSI，Pompe disease)資料，約 1 萬 5,000 位個案，收集長達 25 年來自 60 個國家之病人資料，已發表多達 75 篇文獻，也定期依國家別或不同期間產出報告，提供參考。

在回饋與討論中，與會者建議登錄系統需要有患者、醫療及公部門之參與，另於專業團隊中要有臨床醫學、倫理、統計、資訊等之專家，以能良好的定義那些關鍵資料需要被收集，及良好之管理結構。若要作跨經濟體不同罕病資料庫之整合是很大挑戰，需要跨越語言障礙，及如何確保所收集資料之品質。設置登錄系統需要先設定想要解決病人什甚麼問題，是否能產出解決方案，並需要產業、病人醫療

人員及政府間之互相交流，公、私方共同參與。與會者並也同意資訊科技只是收集更多資料之方法，資料安全、個人資料保護是最基本的要求。

（十一） 專題座談 9：APEC economy plans and strategies for Rare Diseases (APEC 對於罕病之經濟規劃及策略)

第 1 位與談人 Dr. Eva Maria C. Cutiongco-De La PAZ（菲律賓大學國家衛生研究院負責人）分享在菲律賓罕病立法、法律方面經驗，2016 年 3 月 6 日菲律賓通過了罕病法，規範包括提供完整的照護、建立全國註冊系統、治療、衛教、宣導、健康促進，建立各利益相關者之角色與責任，提供法規、經濟上之誘因，支持罕病之研究與發展，及促進可負擔之藥物與產品之製造與進口等項目。衛生部為主責單位，辦理之工作包括：成立罕病技術工作小組(Rare Disease Technical Working Group)、結合國家衛生研究院(National Institutes of Health)提供技術協助、結合政府及非政府單位之共同參與、認定罕病轉介中心、組成診斷與治療之次專家群。其他相關部門有：食品藥物管理部，確保藥用食物、罕藥及醫材之安全性與許可；教育部及社會福利與發展部，確保罕病病人在社會上有同等的機會成為有生產力的人，並與其他殘疾人士享有同等的權利與福利；科技部：建置更佳的罕病之研究機制，及研發低成本的藥物及醫療食品。上述衛生部罕病技術工作小組之任務，包括：提出建議納入罕病清單、訂定罕病藥物與醫材名單、檢視罕藥法規之不足處並提出政策建議、建置系統確保提供最新之診斷、治療及疾病資訊。在實際運作上，若病人高度疑似罕病將轉介至新生兒篩檢治療診所，全國共 14 家接受治療，也可透過該些診所進行遠距醫療。所有的醫療人員均須將通報罕病病人至登錄系統，並上傳病人病情資訊。衛生部也與衛生研究院合作，不斷在進行罕病人力培訓。另也成立監督委員會，結合衛生部下不同單位，依據病人需求，提出依病人生命週期、以病人為中心及結合醫療體系之解決方案。

第 2 為與談人 Mr. Luke Elias（澳洲芒特德魯特醫院業務分析與執行部門）認為成功之策略訂定需要瞭解問題對象、可用資源為何，且參與其中之人員應各自盡己責。在向決策者爭取資源時，先釐清利益相關者，並進行工作項目優先序位之排序，以前幾名項目優先先去爭取資源，對於欲爭取資源項目，逐一羅列所需資源、經費等，並提出具體措施及執行時程與里程碑，有助於成功獲取支持。罕病領域仍有許多問題待解決，但非均需投入大筆預算才能解決，如改善溝通機制、人員增能等都是可以無需大成本投入，但成果明顯之項目。

在回饋與討論中，與會者共同討論建議：訂定罕病專屬法規，對於罕病經費資源之改善有實質幫助，清楚定義罕病及罕藥與醫材後才能作適當資源分配；各經濟體罕病政策發展各處於不同階段，但重要的是在 APEC 框架下已開始了這個工作，其

問題複雜涉及政府不同部門、患者組織、臨床機構、產業等，無法一次解決，但可將問題分為小項目處理，一個一個解決，持續向前進步。

參、遭遇之問題

無。

肆、我方因應方法及效果

本次會議各經濟體積極分享經驗，參與各議題討論，希望能經由充分溝通，共同合作提出解決方案，討論者對於不同經濟體之意見與作法，均能予以尊重，並體認跨經濟體合作之重要性。

伍、心得與建議

一、**持續強化罕病及遺傳性疾病防治網絡，並分享經驗。**本次罕見疾病政策對話會議，針對罕病定義、個案登錄系統、藥物管理法規及補助機制等，進行各經濟體之經驗分享及所遭遇挑戰之議題討論，簡穎秀醫師並受邀分享新生兒篩檢服務體系經驗。相較於其他經濟體，我方對於罕病通報、藥物、照護、補助等法規政策較屬完整落實，已有國家層級之整體政策與施行體系，所建置之罕病及遺傳性疾病防治網絡，包括新生兒篩檢中心、基因檢驗機構、遺傳諮詢中心、罕病診療機構等，運行多年並有成效，於此會議中也經出席經濟體多次例舉為良好實踐範例。未來需隨醫療與科技之進步，持續強化相關法規與罕病防治網絡，提升罕病防治與照護成效。另有關罕病之執行成果均為民間與政府共同努力之結果，擬鼓勵參與之專家或機構團體於國際上分享經驗。

二、**持續與罕病病友團體、罕病診療機構保持良好夥伴關係，民間與政府共同促進罕病防治與照護工作之進步。**在本次政策對話會議中，各經濟體不斷強調與病友團體及醫療專家/單位溝通與合作之重要性，及 2 者於制定與推動罕病政策過程中，扮演的重要角色。本署向來與罕病診療院所保持良好業務聯繫管道，並對於罕病病友團體之活動與宣導積極參與並提供補助，亦透過平時聯繫，瞭解病友、醫療人員有關罕病之需求，進行評估研議，期能與病友團體與醫療機構共同推動以病人為中心之罕病政策措施。

三、**加強醫療人員、社會大眾等之罕病宣導。**各經濟體多認為罕病之誤診、漏診導致延遲治療，及社會未能重視關懷罕病，後續引發之問題嚴重影響罕病病人及其家庭生活品質，因此加強宣導提高醫療人員對於罕病之認知與敏感度，以早期發現診斷罕病病人，及早接受治療改善癒後情況，可減少罕病家庭之醫療支出提高生活品質；另透過宣導增加社會大眾對罕病之認識，有助於罕病病人社會融入，及社會對罕病相關政策之支持與推動。本署每年於國際罕病日發布新聞稿呼籲各界重視罕病，另也製作微電影、醫事人員教案短片、廣編稿等透過網路媒體及相關團體推播宣導，並每年補助民間團體辦理宣導活動。將持續結合相關單位進行宣導。

四、**檢討強化「罕見疾病整合式資訊管理系統」，及加強系統資料之分析與運用，作為制定相關措施之參考。**本次會議中對於罕病登錄系統之重要性及經濟體間資訊交流平台之建置進行許多討論，目前各經濟體建置罕病登錄系統進度處於不相同階段，部分尚未設置。本署為依「罕見疾病防治及藥物法」有關醫事人員發現罕病個案需進行通報之規定，已建置「罕見疾病整合式資訊管理系統」，提供線上通報及上傳診斷資料功能，個案經委員審查通過後納入罕病資料庫，本署亦已分析彙整相關資料放置署網站供查詢參考。至本次會議討論有關登錄系統收集個案後續治療與用藥紀錄資料部分，因非本署系統建置目的，故未予蒐集，後續擬視實際需要及本 APEC 罕病計畫後續產出之建議意見，進行資料庫登錄內容之檢討評估，於符合資料保護規範下，提昇系統功能，協助罕病工作之推動。

五、**本計畫後續產出之報告與文件，未來於研議相關政策措施時，適時參採，落實執行。**鑑於部分罕病議題已在國際上之不同會議，重複討論多年，惟至今仍尚待改善，因此，主席及不同經濟體於會議中都不約而同呼籲行動勝於空談之重要性，希望本次會議之討論，能產出具體方案，轉化成實際行動，落實改善罕病問題。故本次會議所收集資訊將作為未來政策研議之重要參考，並將持續關注 APEC 該計畫下產出之相關報告與文件，適時參採運用於制定罕見疾病相關政策措施，實際採取行動，期符合本次會議強調行動勝於空談之呼籲，及達到罕見疾病防治及藥物法加強照顧罕病病人之目的。

陸、附錄

一、 議程

FINAL

Asia-Pacific
Economic Cooperation

APEC Policy Dialogue on Rare Diseases

6-7 June 2018 | Beijing, China

Da Xue Tang Conference Center, The Lakeview Hotel, Peking University

Day 1 | Wednesday, 6 June	
07:30-08:30	Registration
08:30-09:00	**Welcome and Opening Remarks** • **Prof. Zhouyi WANG,** Deputy Director, Office of Humanities and Social Sciences, Peking University, China • **Prof. Matthew BELLGARD**, Chair, APEC Life Sciences Innovation Forum - Rare Disease Network and Director of eResearch and Commercialisation, Queensland University of Technology, Australia • **Dr. Li HE**, Vice President, Chinese Pharmaceutical Association, China • **Prof. Xiaoying ZHENG**, Director, APEC Health Science Academy, Peking University, China
09:00-10:30	**Panel I: Setting the scene for Rare Disease issues in APEC Economies** *How can economies adopt an inclusive approach to "Healthy Asia Pacific 2020" implementation by addressing barriers to healthcare services for populations with rare diseases? How can APEC help facilitate greater alignment of domestic policies, implementation of best practices, and multi-sectoral collaborations?* • **Dr. Jakris EU-AHSUNTHORNWATTANA, MD, PhD**, Lecturer, Department of Community Medicine, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Thailand • **Mr. Cameron MILLINER**, Industry Co-Chair, APEC Rare Disease Network and Head Public Affairs and Patient Advocacy – Asia Pacific, Shire • **Prof. Xinming SONG**, Senior Advisor, APEC Health Science Academy, Peking University, China • Moderator: **Jean-Luc LOWINSKI, PhD, MBA**, Head of Emerging Markets, Sanofi Genzyme
10:30-10:45	Break
10:45-12:15	**Panel II: Determining and implementing a Rare Disease definition** *How can economies implement a definition with a clear objective criteria and quantifiable prevalence for what constitutes a rare disease, is not too restrictive on small populations, and remains in line with international standards?* • **Dr. Durhane WONG-RIEGER**, Chair, Rare Diseases International and President & CEO,

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	Canadian Organization for Rare Disorders • **Mr. Andrew MARTIN**, Vice President, Marketing - Rare Disease: Latin America, Asia-Pacific, Africa/Middle East, Pfizer • Moderator: **Prof. Matthew BELLGARD**, Chair, APEC Life Sciences Innovation Forum - Rare Disease Network and Director of eResearch and Commercialisation, Queensland University of Technology, Australia
12:15-13:40	Lunch
13:40-14:00	**Day 1 Keynote Presentation** – "Construction of the Clinical and Research System for Rare Diseases in China: Experience from Peking Union Medical College Hospital and National Rare Disease Registry System" • **Dr. Shuyang Zhang**, Vice President and Director of Clinical Pharmacology Research Center, Peking Union Medical College Hospital, China
14:00-15:30	**Panel III: Health system design to address the needs of the Rare Disease Community** *How can economies integrate rare disease management into existing healthcare systems to ensure access to diagnosis and treatment for patients living with a rare disease. How should healthcare systems provide services and how should they be structured? How can economies establish centers of excellence that provide specialized care for rare diseases?* • **Mr. Luke Elias**, Director, Business Analytics & Performance, Blacktown and Mount Druitt Hospitals, Western Sydney Local Health District, Australia • **Mr. Hyun Min SHIN**, Chairman, Korean Organisation for Rare Diseases, Korea • **Mr. Kevin Huang**, President, Founder & President, Chinese Organization for Rare Disorders, China • Moderator: **Mr. Peter Fang**, Head of Asia Pacific, Shire
15:30-15:45	Break
15:45-17:15	**Panel IV: Diagnosing Rare Diseases early, accurately, and systematically** *What are APEC economies doing to improve diagnosis of rare diseases? What infrastructure needs to be in place to allow for genetic testing and diagnosis? What about newborn screening programs?* • **Dr. Duangrurdee WATTANASIRICHAIGOON**, Professor of Pediatrics and Medical Genetics and the Chief of Division of Medical Genetics, Department of Pediatrics, Faculty of Medicine of the Ramathibodi Hospital, Mahidol University, Thailand • **Dr. Eva Maria C. CUTIONGCO-DELA PAZ**, Vice Chancellor for Research and Executive

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	Director, National Institutes of Health (NIH), University of the Philippines - Manila, Philippines • **Dr. Yin-Hsiu CHIEN,** Department of Pediatrics and Medical Genetics, Taiwan University Hospital, Chinese Taipei • **Mr. Andrew MARTIN,** Vice President, Marketing - Rare Disease: Latin America, Asia-Pacific, Africa/Middle East, Pfizer • Moderator: **Dr. Joan KEUTZER,** Vice President and Head, Integrated Solutions, Rare Diseases Franchise, Sanofi Genzyme, Sanofi
17:15-17:30	**Wrap-Up of Day 1**
17:45-18:45	**Reception**

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Day 2 | Thursday, 7 June	
08:30-08:40	**Recap of Day 1 and setting the scene for Day 2** **Prof. Matthew BELLGARD**, Chair, APEC Life Sciences Innovation Forum - Rare Disease Network and Director of eResearch and Commercialisation, Queensland University of Technology, Australia • **Prof. Lihua PANG**,APEC Health Sciences Academy, Peking University, China
08:40-09:00	**Day 2 Keynote Presentation** • **Dr. Jie Ding**, Chairman of the Rare Disease Branch of the Beijing Medical Association, Member of the National Committee of the Chinese People's Political Consultative Conference, and Professor in the Department of Paediatrics, Peking University First Hospital, China
9:00-10:15	**Panel V: Innovative financing for Rare Disease research, diagnosis, and treatment** • **Mr. Prasanna SHIROL**, Co- Founder and Executive Director, Organization for Rare Disease India, India • **Dr. Dino SEPÚLVEDA**, Head of the Department of Evaluation of Health Technologies and Health Based on Evidence Division of Health Planning, Ministry of Health, Chile • Speaker and Moderator: **Dr. Vinciane PIRARD**, Co-Chair, Joint Task Force on Rare Diseases and Orphan Medicinal Products, European Federation of Pharmaceutical Industries and Associations (EFPIA)
10:15-10:30	Break
10:30-12:00	**Panel VI: Accelerated regulatory pathways and pre-regulatory early access for Orphan Medicinal Products (OMPs)** *How can economies implement pre-regulatory early access programs and/or accelerated regulatory processes with clear eligibility requirements, applicability to all OMPs, and assurance of coverage support to fund medicines for patients?* • **Prof. John CW LIM**, APEC LSIF Board Member, Executive Director, Duke-NUS Centre of Regulatory Excellence & Chairman, Singapore Clinical Research Institute, Singapore • Dr. **Lahouari BELGHARBI**, Director General, Centre of Excellence on Regulatory Sciences and Good Regulatory Practices, Federal Commission for the Protection against Sanitary Risk (COFEPRIS), Mexico • **Kyu-Been SOHN**, Asia Regional Regulatory Strategist, Pfizer

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	• Moderator: **Ms. Eileen ANG**, Head of Regulatory Affairs – APAC, Shire
12:00-13:15	Lunch
13:15-14:30	**Panel VII: Value assessment process and funding for Orphan Medicinal Products (OMPs)** *How can economies develop a flexible value assessment process to exempt OMPs from strict cost effectiveness analysis within certain thresholds, and ensure adequate funding for OMPs through clear and transparent reimbursement criteria?* • **Dr. Elena NICOD, PhD,** Senior Consultant, Dolon Ltd; Co-Leader of IMPACT-HTA Work Package 10 on Appraisal of Orphan Medical Products, Bocconi University, Italy • **Dr. Camila QUIRLAND LAZO, PharmD, MSc,** Health Technology Assessment Unit Chief, Oncology Institute, Arturo López Perez Foundation Santiago, Chile • **Ms. Julie KIM**, Global Franchise Head, Hematology, Shire • Moderator: **Prof. John CW LIM**, APEC LSIF Board Member, Executive Director, Duke-NUS Centre of Regulatory Excellence & Chairman, Singapore Clinical Research Institute, Singapore
14:30-14:45	Break
14:45-16:00	**Panel VIII: Leveraging public-private partnerships for Rare Disease patient registries** *How can economies implement centralized, digital disease registries that allow for better management of rare diseases in a larger population by gathering as much patient info as possible and linking together different regional or local databases?* • **Prof. Matthew BELLGARD**, Chair, APEC Life Sciences Innovation Forum - Rare Disease Network and Director of eResearch and Commercialisation, Queensland University of Technology, Australia • **Dr. Mengchun GONG**, Executive Director, National Rare Disease Registry System of China, China • **Dr. Joan KEUTZER,** Vice President and Head, Integrated Solutions, Rare Diseases Franchise, Sanofi Genzyme, Sanofi • Moderator: **Dr. Durhane WONG-RIEGER**, Chair, Rare Diseases International and President & CEO, Canadian Organization for Rare Disorders
16:00-17:15	**Panel IX: APEC economy plans and strategies for Rare Diseases** *How can economies develop comprehensive domestic plans on rare diseases that incorporate actionable strategies for policy development, prioritize key geographies and populations, and support implementation with financing provisions?*

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	• **Dr. Eva Maria C. CUTIONGCO-DELA PAZ,** Vice Chancellor for Research and Executive Director, National Institutes of Health (NIH), University of the Philippines - Manila, Philippines • **Mr. Luke ELIAS,** Director, Business Analytics & Performance, Blacktown and Mount Druitt Hospitals, Western Sydney Local Health District, Australia • **Moderator: Mr. Cameron MILLINER,** Industry Co-Chair, APEC Rare Disease Network and Head Public Affairs and Patient Advocacy – Asia Pacific, Shire
17:15-17:30	**Closing Remarks** • **Prof. Xiaoying ZHENG**, APEC Health Sciences Academy, Peking University, China • **Prof. Matthew BELLGARD**, Chair, APEC Life Sciences Innovation Forum - Rare Disease Network and Director of eResearch and Commercialisation, Queensland University of Technology, Australia

二、 Key Issues to Addressing Rare Diseases in APEC Economies （大會提供資料）

Asia-Pacific
Economic Cooperation

Key Issues to Addressing Rare Diseases in APEC Economies

APEC LSIF Rare Disease Network

Final Draft - 5 June 2018

Background

From fragile X syndrome to cystic fibrosis to hemophilia, rare disease is one of the most difficult health challenges of our time. Between 5,000 and 8,000 rare diseases have been identified and more types, sub-types, and clinical presentations are discovered every year (Rath & Janmaat, 2018). These diseases are uncommon individually, hence their name; but as a group they affect 6 to 8% of the global population (Barakat et al., 2014). This "paradox of rarity" presents unique problems for not only the individuals living with rare diseases but for caregivers, researchers, policymakers, and industries as well (Schulenburg & Frank, 2015).

More than 90% of rare diseases are caused by genetic or congenital aberrations, and 75% present with a wide range of neurological symptoms and intellectual disabilities (McClellan & King, 2010). Many are fatal with no known cure—almost one-third of those born with a rare disease die before the age of five (Institute of Medicine, 2010). However, with opportune medical intervention, many rare diseases can be controlled, and the lifespan of individuals can be extended into adulthood (Valdez et al., 2016).

To achieve opportune medical intervention though, economies and their health systems must address barriers that prevent individuals with rare diseases from accessing high-quality healthcare services. This means designing a health system that facilitates the right diagnosis early and delivers the right care at the right time in the most effective, efficient, and equitable way possible (Valdez, 2016; Ferrelli, 2017).

This paper summarizes eight key issues that many Asia-Pacific Economic Cooperation (APEC) member economies face in addressing barriers to healthcare services for individuals with rare diseases. The issues were identified by literature review initially, then confirmed and expanded in discussions with X stakeholders in Australia; Beijing, China; Shanghai, China; Taipei, Chinese Taipei; Seoul, Korea; Bangkok, Thailand; and Ha Noi, Viet Nam.

1. Defining rare diseases and orphan medicinal products
2. Prioritizing domestic rare disease policy
3. Promoting innovative research
4. Developing human resource capacity across sectors
5. Facilitating early, accurate, and systematic diagnosis
6. Delivering new and accessible treatments
7. Coordinating care across specialty, life course, and location
8. Supporting financial and social needs of patients

Defining rare diseases and orphan medicinal products

Government administrations rely on clear and consistent definitions for health policymaking and planning. Most health authorities use prevalence as the metric to determine whether a condition is considered a rare disease. As such, the definition varies around the world from 1 in 500,000 individuals in some jurisdictions to 1 in 2,000 individuals in others (Dawkins et al., 2018). Put another way, a condition considered a rare disease in one population is not necessarily considered one in a different population. The question for many emerging economies is how to formalize a seemingly static parameter like prevalence when populations are still growing rapidly (Dong & Wang, 2016). For example, a condition considered a rare disease in 2018 may not be in 2028.

This problem is mitigated to some degree in the economies that maintain a list of officially recognized rare diseases that incorporates more than just prevalence in the definition. In some of these economies, a panel of interdisciplinary experts uses prevalence data combined with other information to make a determination on considering a condition a rare disease. Whether based on strictly prevalence or on a variety of metrics, definitions of rare disease should be reviewed and revised regularly. That said, however, this additional process requires political and financial resources; and still, many economies either do not have a definition or have one that is unofficial or informal.

Among APEC Economies that do have an official or formal definition, these definitions are embedded in national legislation while others are codified by health ministries or drug administrations. Some are determined with broad input from researchers, clinicians, industry, policymakers, and patient groups, while others are modeled after guidance from the World Health Organization (WHO). In several economies, a health ministry or regulatory authority has established a definition for orphan medicinal products but not for rare disease explicitly.

Whether the definition of rare disease is an official one or just commonly accepted, the resulting list should be transparent and easily accessible. There are challenges maintaining such a record however. Many relevant authorities in APEC Economies face difficulties managing the high number of distinct types, sub-types, and clinical presentations of rare diseases, and the frequency with which more are discovered.

Remaining questions: Which jurisdictions currently recognize a common definition for rare disease? What should be defined as a rare disease and why?

Prioritizing domestic rare disease policy

Without clear and consistent definitions, it is difficult for health policymakers to allocate resources to rare diseases. This is especially true when size of the affected population and size of the potential benefits are factors for consideration in the political calculus. That is, where few people are affected and few treatments exist rare diseases are already at risk of insufficient political attention and limited public health resource allocation (Norheim, 2016). The voices of individuals living with rare diseases and their caregivers often fill this vacuum. In many economies, patient groups become central to building political capital to prioritize rare disease policy.

In contrast to the patient group experience at the height of the HIV/AIDS epidemic, rare disease patient groups face unique difficulties. With so few individuals living with a single rare disease, organizations that have gained momentum are ones capable of building coalitions, expanding their scope, or otherwise including *all* rare disease patients in a collective movement (Mikami & Sturdy, 2017). Without a cohesive patient voice, rare disease will be at risk of decreasing in priority. It takes the entire community of stakeholders to build and sustain political capital, and channel it into comprehensive rare disease policy often in the form of a national plan.

However, for many economies enacting comprehensive rare disease policy in a single bill is neither feasible nor effective. Instead, one proven best practice is incorporating small provisions for rare disease into larger and broader legislation with political support. After all, the challenge of rare disease is interdisciplinary and thus must be addressed from all angles—the rare disease community can find support in legislation as far ranging as tax to transportation. In practice though, the difficulties are in the details of the inter-ministerial communication; but they can be addressed by convening support from non-governmental actors. All stakeholders can be advocates for prioritizing rare disease policy and improving coordination of policymaking.

Remaining questions: Which jurisdictions have a rare disease strategy or defined policies to address the needs of the rare disease community? What strategies should be adopted to ensure adequate focus is provided to the rare disease community? How would this be implemented practically? Thinking about the current health policy goals in a jurisdiction, does action to address the needs of the rare disease community align with these goals or will it require a broader policy shift to accomplish? Why?

Promoting innovative research

Though much progress has been made in rare disease research over the last decade, especially with help from the digital and genomic revolutions, the source and benefit of this knowledge tend to be unevenly distributed within and between APEC economies. Furthermore, in comparison to other regions of the world, Asia Pacific has a particularly lacking evidence base on rare disease. A Google Scholar search in January 2018 for ["rare disease*" and "Europe*"] returned more than 50,000 results, while ["rare disease*" and "Asia*"] returned less than 15,000. Research is also unevenly distributed by discipline. For example, while the genetic mechanisms underlying hemophilia are understood in depth, the economic burden of this rare disease and others is still an emerging area of research, with only 77 studies identified as of 2015 worldwide (Angelis, Tordrup, and Kanavos, 2015).

One hurdle to promoting innovative research is cost. Research related to rare disease is relatively expensive due to the use of sophisticated equipment and the costs of organizing qualified study participants (Angelis et al., 2015). Funding for rare disease research is limited and covered somewhat by a patchwork of private initiatives, public research grants, and support from patient organizations. In addition to cost challenges, the high fatality rates and low prevalence of rare diseases means longitudinal studies are especially scarce and difficult to organize (Valdez, 2016). In fact, nearly all traditional clinical trial and academic study designs are insufficient for addressing the unique quantitative challenges of rare diseases, so new thinking is needed for alternatives like n=1 trials and real-world evidence systems that are rigorous and replicable (Knowles et al., 2017).

Collaborative platforms like the International Rare Diseases Research Consortium and RD-Connect (http://www.rd-connect.eu/) are essential for connecting not only researchers but also individuals living with rare diseases. Similarly, patient registries can also help collect data on demographics, diseases, and treatments. However, numerous challenges remain to privately and securely capturing, standardizing, and sharing health information between patient registries and with researchers.

Remaining questions: How does the lack of understanding of rare disease affect the delivery of healthcare services in jurisdictions? How can these gaps be overcome to ensure adequate planning in a jurisdiction to accommodate the needs of the rare disease community? What mechanisms might be adopted to address these issues? How can different stakeholders collaborate to foster research and development in rare diseases? Any positive trends? Are these enough? Any negative trends? What else is critical?

Developing human resource capacity across sectors

Across economies and affecting a variety of disciplines, there is a "scarcity of expertise" in rare diseases (Holmes, 2012). Significant progress has been made over the past 5 years, especially within universities and teaching hospitals, but several barriers remain to attracting new professionals to become researchers and clinicians in the rare disease field, and to formalizing and scaling new professions such as genetic counseling (citation). For researchers, the limited public funding and grants available means the field is highly competitive and lacks strong financial incentive (citation). For clinicians, rare disease practices especially in rural and underserved hospitals remain small, nascent, or nonexistent, meaning employment opportunities are sparse and salaries are limited (citation).

A unique adaptation emerging from and simultaneously addressing one human resource challenge is the hybrid professional—a growing number of individuals that may for instance practice clinical medicine part-time while also leading research investigations part-time into the rare diseases they treat (citation). As this is already a common structure in developed academic settings, universities with teaching hospitals can be effective platforms in APEC emerging economies for supporting hybrid professionals working on rare diseases (citation). Similarly, many families of individuals living with rare diseases also require professional support as they maintain their jobs while taking on responsibilities of a caregiver. Especially in low-resource settings, patient groups also sometimes function in much broader capacities than usual, often shepherding patients and their families through their journeys to secure diagnosis, access treatment, coordinate care, and pay for it (citation).

In addition to recruiting new clinicians and researchers and supporting professionals that perform both these functions, the rare disease community could also be more inclusive and supportive of non-medical professionals like lawyers. The issues of rare diseases are interdisciplinary; as such, they require a team of professionals from a variety of disciplines, both medical and non-medical, to address them effectively and efficiently. That said, beyond growing the number of human resources for rare disease, APEC economies must also navigate ways to improve the capacity of existing human resources. It is up to public and private medical education institutions to ensure rare disease is included in the curriculum early and with sufficient depth, so more healthcare practitioners are better prepared to diagnose and treat these conditions. Where this is absent, patient groups again have filled the vacuum, but need partners to support effective professional education activities.

Remaining questions: What are the barriers to recruiting and training capable human resources to research and treat rare diseases in a jurisdiction? What impacts do human resource limitations have on quality of care and clinical outcomes? What programs or policies are in place or could be explored to recruit and/or train new professionals in rare diseases? How are or might these integrate into the larger medical education system?

Facilitating early and accurate diagnosis

In seeking a diagnosis, its cause if discernable, and available treatment options, individuals living with a rare disease face unique journeys often so complex they are likened to "medical pilgrimages" (Dharssi et al., 2017). A 2012 study of 12,000 individuals found that 25% had to navigate this "patient odyssey" for between 5 and as many as 30 years before obtaining a diagnosis, 25% had to travel to a different region in the process, and almost half of these patients received at least one misdiagnosis prior to the accurate one (EURORDIS Survey, 2012). Patients also face the risk of incorrect treatment with potentially complicating or fatal results, as well as the emotional and psychological toll of living without a name for their sickness (Schulenburg & Frank, 2015).

For over 40% of rare disease patients, misdiagnoses precede treatment delays (EURORDIS Survey, 2012). Even when diagnosed accurately or quickly, underlying molecular or physiologic mechanisms often remain unknown (Valdez, 2016). Still, fewer than 10% of individuals living with rare diseases receive disease-specific treatment, meaning the vast majority never receive a diagnosis (Melnikova, 2012). In many places, the clinical community is unfamiliar with signs and symptoms of rare diseases; and with such heterogeneity among clinical presentations of even the same condition, case definitions for surveillance are usually lacking and confusion is common between similar conditions (Valdez, 2016).

Over the last decade, advancements in molecular genetics have certainly helped to characterize the causes of many rare diseases and provide unprecedented opportunities for diagnosing individuals and determining phenotypes (Austin et al., 2018). However, genome sequencing and lab capacity in general is still expensive for many, especially in rural areas of APEC economies, which has a significant impact on the speed and accuracy of diagnoses (Schulenburg and Frank, 2015).

If designed, implemented, and sustained effectively, neonatal screening is a proven best practice with the potential to contribute to early diagnosis and management of a significant portion of rare diseases. Where these programs are already in place in APEC economies, they can improve by updating procedures to account for new diagnostic technologies and techniques. For example, most programs are not mandatory or use an opt-in system of participation, which may be insufficient to cover a small number of patients. Where neonatal screening does not exist yet, core health infrastructure in hospitals and clinics is the first essential step.

Remaining questions: What are the barriers to diagnosis experience by patients in a jurisdiction? What impact do any barriers have on the quality of care provided, the outcome experienced by the patient and/or caregivers? Are there any programs in place to improve the diagnosis of rare diseases? How do these programs integrate into the broader healthcare system? What policy measures could be explored to improve diagnosis?

Delivering new and accessible treatments

Development, delivery, and financing of rare disease treatments are some of the more sensitive issues. For one, treatments are only available for roughly 200 rare diseases, so about 95% of patients have no treatment options available to them (Von der Lippe et al., 2017). If treatments are available, they often require highly specialized and coordinated medical care, which can be difficult to provide in economies with developing health infrastructure (Valdez, 2016). Patients also often require an assortment of long-term, non-therapeutic care: from special nutrient foods and other over-the-counter consumables to physical rehabilitation and home-based equipment (Simpson, 2016). That said, rare disease therapies nevertheless do extend the length and quality of life for patients, and recent genetic advancements suggest cures may be possible for many rare diseases in the near future (Austin et al., 2018).

Yet even if treatment is available alongside well-integrated, high-quality care, the cost is also a key barrier. For rare diseases, the per-patient cost of treatment tends to be higher in order to recoup the cost of development for and marketing to such a small number of patients (Meekings, Williams, and Arrowsmith, 2012). Ideally, an appropriate mix of regulations and incentives encourages researchers and industry to develop new orphan drugs, while patchwork of public, private, and charitable financing and insurance mechanisms help manage the costs (Committee, 2010). Such systems work particularly well for middle-class consumers in smaller, more developed economies (Schulenburg & Frank, 2015). Many patients and caregivers in poor and rural areas however pay relatively more out-of-pocket for care, leaving their financial security at further risk (Jütting).

Cultivating a domestic policy environment to help enable biopharmaceutical innovation and access takes time. In the interim, where economies import a significant amount of therapeutic products, sensible trade policy becomes ever more critical on top of other policies to facilitate orphan drug designation, authorization, and early access programs (Dharssi et al., 2017). Economies must also figure out how to help regulators and reviewers keep up with new technology, techniques, and diseases while managing lean expense budgets (Schuhmacher et al., 2016).

Remaining questions: What are the barriers to accessing available therapies to treat rare diseases within a jurisdiction? Is there funding available to provide therapy to patients in a jurisdiction? Are there clear criteria to decide which therapies should be funded, and which ones should not? Are there any rare disease / orphan drug specific evaluation criteria/funding routes? If yes, what are they and how effective are they? If not, should there be? If funding is available, are there other barriers preventing access to therapies? What options could be explored to ensure patients have access to the therapies they need to manage their condition?

Coordinating care across specialty, life course, and location

In addition to the journey to secure diagnosis, individuals living with rare diseases and their caregivers must also navigate an equally arduous process to secure treatment and rehabilitation from multiple providers within the healthcare system. Problems arise frequently from this fragmentation of care, which can have a significant impact on clinical outcomes. As such, it is critical that economies implement solutions to improve coordination of care across medical specialty, life course, and location. Defined referral networks for rare diseases and designated centers of excellence can be effective in helping coordinate these components, but they remain unofficial and underfunded in many economies. Where these mechanisms are weak, patient groups play an active role in coordinating care (Dharssi et al., 2017).

In many economies, improved coordination is needed especially between primary care providers and specialized medical services (Holmes, 2012; European Union, 2012). As trained specialists manage sophisticated treatments like enzyme replacement and proton beam therapy, general practitioners remain essential for their holistic approach, especially as many rare diseases create or complicate comorbidities. It can be challenging to coordinate treatment schedules, contraindications, and payments between the various providers. These issues weigh heavily on patients, who feel consistency of key contacts and good collaboration with the family doctor are some of the most important elements of their care (Schulenburg & Frank, 2015). Due to the chronic nature of rare diseases, coordination is also critical across the life course, specifically during the transition from pediatric to adult care (Holmes, 2012).

Geography adds an additional dimension to the challenge of coordinating care (Toumi et al.). Individuals living with rare diseases and their families may be forced to travel temporarily, or even move permanently, across provincial or international borders to access various components of their care, often at a lower price. However, patients face many barriers to coordinating care across borders. Starting at diagnosis, the codes of the WHO International Classification of Diseases (ICD) are often understood differently and applied inconsistently between jurisdictions (Yu et al., 2016). Moreover, transitioning medical records across different systems and borders has its own web of issues around data privacy and security. While costs and technical needs are still high, many national rare disease patient registries have design innovative solutions to these problems with digital (Gliklich et al., 2014).

Remaining questions: What are barriers to coordinating the various providers of treatment and continued care for rare diseases within a jurisdiction? Are there referral networks/pathways to help shepherd patients through the healthcare system? What options could be explored to help patients and caregivers can adequately coordinate the care they need to manage their condition?

Supporting financial and social needs of patients

The first tier of support for the financial needs of rare disease patients is the patchwork of public, private, and charitable financing and insurance mechanisms designed to minimize the amount they owe out-of-pocket. Yet many times the costs owed despite the support can be overwhelming, and some costs go uncovered. Additional yet vital non-therapeutic components of care add substantial costs for healthcare systems and out-of-pocket expenses for the patients with rare diseases (Solberg, 2011; Giunti, Greenfield, Stevenson, 2013).

The economic burden of rare disease extends far beyond just therapeutic and non-therapeutic costs to indirect costs, which actually account for a significant proportion of total costs (Angelis, Tordrup, and Kanavos, 2015). If not sufficiently covered by traditional payers, families of patients are often forced to bear a large part of the costs. According to one study, the medical expenses of patients with rare diseases exceeded three-times their individual income and twice their family income—indeed over 90% of patients surveyed were not able to make a living by themselves (Dong & Wang, 2016). Many other rare disease patients, however, are not able to work at all. Due to the actual or sometimes perceived limitations of their rare disease, these individuals are disqualified, discounted, or otherwise excluded from employment opportunities.

In addition to economic hardship, patients also face significant "loss of social support" (Von der Lippe et al., 2017). Given the number of children and young adults living with rare diseases, accessible education is of critical importance. Yet in many economies, this is a rarity itself—to fund specialized public education for children with rare diseases. Still, the consequences are sobering: for example, one study found children with congenital aniridia were not going to school at all because of the lack of trained staff and appropriate books accessible to individuals with blindness (Fioravanti, 2014). In addition to schooling, rare diseases can also force individuals, families, and caregivers into a mostly sedentary lifestyle, thus reducing social activity and interaction.

Remaining questions: To what extent do people living with a rare disease in a jurisdiction face these issues? What support can be provided to people living with a rare disease and/or their caregivers to address these issues? Should it be financed under the current healthcare financing framework in a country (tax-based, or social health insurance-premium based, pooled, medical savings accounts, etc.), or are alternate funding arrangements required? Who (government, hospitals, private insurance, patients, etc.) should be responsible for funding rare disease therapies? What kinds of payment models are most suitable for rare disease therapies?

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Asia-Pacific
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Speaker Biographies

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APEC 2018 PAPUA NEW GUINEA

APEC Policy Dialogue on Rare Diseases
Beijing, China
6-7 June 2018

By Order of Appearance in the Program

Prof. Matthew Bellgard
Chair, APEC LSIF Rare Disease Network; Director, eResearch, Queensland University of Technology, Australia

Professor Bellgard is the inaugural eResearch Director at Queensland University of Technology. Previously, Professor Bellgard was the Director of the Centre for Comparative Genomics, a Western Australian State Government Centre of Excellence for over 12 years. As CCG Director, he was responsible for the expansion of the Centre into the fields of rare disease and molecular therapy. Professor Bellgard also serves as the Chair of the APEC Rare Disease Network to address the barriers to Healthcare Services for populations affected by rare diseases. His scientific work has resulted in developments in both the areas of pairwise sequence alignment and artificial intelligence, human genomics, bacterial bioinformatics, whole genome analysis and annotation for a range of species, as well as eResearch across a range of disciplines. Professor Bellgard co-leads development of digital infrastructure for funded collaborative research in adaptive platform trials that are of particular relevance for rapidly evaluating new therapies, which critically relies on quality health data linkage, patient engagement and reliable secure digital platforms that can operate across jurisdictions and health stakeholder business units.

Dr. Jakris Eu-Ahsunthornwattana, MD, PhD
Lecturer, Department of Community Medicine, Faculty of Medicine, Ramathibodi Hospital, Mahidol University

Dr. Jakris Eu-Ahsunthornwattana is a medical researcher at Mahidol University, specializing in technology in translational medicine. He received his PhD in statistical genetics from Newcastle University's Institute of Genetic Medicine in 2015. He researched the use of empirical (genotype-based) and theoretical (pedigree-based) identity-by-descent (IBD) estimates in genetic data analysis of large pedigrees. Dr. Jakris also holds an M.D. from Faculty of medicine Ramathibodi Hospital of Mahidol University and an MSc in Epidemiology: Principles and Practices from the University of London's School of Hygiene and Tropical Medicine.

Mr. Cameron Milliner
Industry Co-Chair, APEC LSIF Rare Disease Network; Head, Public Affairs & Patient Advocacy – Asia Pacific, Shire

With more than 15 years of experience within government, consultancy and multinational corporations, Cameron has a deep understanding of the development and implementation of public policy, stakeholder management and advocacy.

He currently works as the Head Public Affairs and Patient Advocacy for Shire, a biopharmaceutical company specialising in rare and specialty conditions, with responsibility for the Asia Pacific Region. Prior to this, Cameron worked for a Pharmaceutical and Medical Device Company, as a Director of a Corporate Affairs consultancy and as a Senior Advisor to a Health Minister in an Australian State Government. Cameron holds a Bachelor of Commerce (Marketing and Industrial Relations) from Griffith University and has been appointed a Visiting/Honorary Fellow of the Murdoch University School of Research and Innovation and the Centre for Comparative Genomics. In addition to these roles he also holds an Honorary Fellowship of the McKell Institute, a public policy think tank specalising in social policy.

Dr. Jean-Luc Lowinski, PhD, MBA
Head of Emerging Markets, Sanofi Genzyme

Jean-Luc Lowinski became Senior Vice President, Sanofi Asia on May 1st, 2012. In this role, Dr. Lowinski is responsible for Sanofi's business and growth in Greater China, Southeast Asia (Philippines, Thailand, Indonesia, Singapore/Malaysia), and Indochina (Vietnam, Laos, Cambodia). In January 2017, Jean-Luc Lowinski took on the responsibility of Sanofi Genzyme Emerging Markets based out of Paris. Prior to joining Sanofi, Dr. Lowinski built a successful career in Pharmaceuticals, Consumer Healthcare and Animal Health. He began his career in the French Army as a technical volunteer before becoming a veterinary. He joined Bayer Germany in 1992 and held various positions including Head of Operations in Singapore, India, Thailand, China and Japan. In 2003, he became Head of Bayer Healthcare, China. He then became Head of Bayer Healthcare, Asia Pacific, at the end of 2004 before being appointed President, Bayer Yakuhin, Japan in 2007. In 2010, he became Global Head of the Animal Health Division at Bayer. Dr. Lowinski holds a Ph.D. in Veterinary Science from the University of Nantes, France and is a graduate from INSEAD. He is a French national, and he speaks French, English, German, Japanese and Chinese.

Dr. Durhane Wong-Rieger,
Chair, Rare Diseases International; President & CEO, Canadian Organization for Rare Disorders

Dr. Wong-Rieger is President & CEO of the Canadian Organization for Rare Disorders, the umbrella organization of patients and patient groups, and chair of the Consumer Advocare Network, a national network for patient engagement in healthcare policy and advocacy. She is also President & CEO of the Institute for Optimizing Health Outcomes, providing training and direct service on health coaching and patient self-management. Dr. Wong-Rieger has served on numerous health policy advisory committees and panels and is a member of the Advisory Board for the Canadian Institutes of Health Research Institute of Genetics and the Patient Liaison Forum for the Canadian Drugs and Technologies in Health. Internationally, Dr. Wong-Rieger is immediate Past-Chair of the International Alliance of Patient Organizations, Board Member representing patient interests

at DIA International Association, Steering Member of the Health Technology Assessment International Patient/Citizen Involvement Interest Group and Secretary of the Asia Pacific Alliance of Rare Disease Organizations. Dr. Wong-Rieger is a certified Health Coach and licensed T-Trainer with the Stanford-based Living A Healthy Life with Chronic Conditions. Dr. Wong-Rieger has a PhD in psychology from McGill University and was professor at the University of Windsor, Canada from 1984-1999.

Mr. Andrew Martin
Vice President, Marketing - Rare Disease: Latin America, Asia-Pacific, Africa/Middle East, Pfizer

Andrew Martin assumed the role of Pfizer's Vice President of Marketing for Rare Disease in Latin America, Asia-Pacific, Africa/Middle East in January 2018. He also serves as the Senior Director of Regional Therapeutic Area Lead in Lain America. In that role, he is accountable for the Therapeutic Area (Vaccines) in Latin America the team of country and regional marketers as well as cross-functional partners to achieve financial targets. He simultaneously serves as the Senior Director of US Vaccines Marketing. Before joining the Pfizer team in 2006, Martin worked for Janssen, Pharmaceutical Companies of Johnson and Johnson and Fiskars Brands. He graduated from the University of Pittsburgh with a BA in Political Science and Easy Asian Studies and from Cornell University's S.C. Johnson Graduate School of management with his MBA.

Dr. Shuyang Zhang
Vice President and Director of Clinical Pharmacology Research Center, Peking Union Medical College Hospital

Dr. Shuyang Zhang serves as the Vice President of Peking Union Medical College Hospital and Director of Clinical Pharmacological Research Center in PUMCH. Prior to this, professor Zhang was Deputy Director of Cardiology Department in PUMCH. Dr. Shuyang Zhang has authored and co-authored several national and international publications and works as a reviewer for reputed professional journals. She was a postdoctoral fellow in Ochsner Health System from 1995 to 1999. Dr. Zhang obtained her bachelor degree in Beijing Medical University in 1986 and was recommended for a five-year doctoral program in Peking Union Medical College (PUMC).

Mr. Luke Elias
Director, Business Analytics & Performance, Blacktown & Mount Druitt Hospitals, Western Sydney Local Health District, Australia

Luke Elias is the Director of Business Analytics & Performance within Western Sydney Local Health District in New South Wales, Australia. Luke has worked extensively in clinical

capacity, health management and administration roles in both the public and private sector over the past 2 decades. He has held senior management and operational positions within the NSW public health system is dedicated to working collaboratively with health professionals and administrators. Luke commenced his health career in 2001 as a Physiotherapist and is currently responsible for operational performance management of two public hospitals in one of the fastest growing, ethnically diverse populations within Australia.

He is passionate about provision of best practice service delivery to improve health outcomes and patient experiences, and doing so with a strong understanding of efficient resource utilisation and the operational design requirements critical to large scale health service innovation, redesign, reform and sustainable change. He has a particular interest in timely access to appropriate health care, chronic and complex disease management, improving health system literacy and fostering consumer advocacy to deliver patient centred models of care.

Mr. Hyun Min Shin
Chairman, Korean Organisation for Rare Diseases, Republic of Korea

In addition to serving as the Chairman of the Korean Organisation for Rare Diseases (KORD) since 2001, Mr. Hyun-Min Shin is also an advisory committee member of Korea Orphan & Essential Drug Center Drug Center (KODC). Mr. Shin previously served as a committee member of Export the department for rare medical device in Korea Food & Drug Administration (KFDA), We Start Movement Headquarters, rare disease patient's center in Korea Centers for Disease Control and Prevention (KCDC), and medical support project for rare disease patients in the Ministry of Health & Welfare (MW). For his contributions, Mr. Shin has received numerous awards, most notably a volunteer service award for The 21st Gil prize by Women doctors by the Korean Medical Women's Association in 2011, a merit of National Healthcare business for The 37th Health Day in 2009, and a merit of medical support project for rare disease patients in 2006.

Mr. Kevin Huang
President, Founder & President, Chinese Organization for Rare Disorders

Kevin graduated from Zhejiang University in 2006, with a major in advertising. As a rare disease patient, Kevin is very committed to rare disease communities and has conducted in-depth studies of public service industry and public policy in China since 2003, when he began to be interested in this area. Before he co-founded China-Dolls Center for Rare Disorders, he worked as a specialist and advocate for human rights of people affected by HIV/AIDS. When he co-founded China-Dolls Center for Rare Disorders in 2008, the concept of "rare disease" was still unknown in China and the rare disease communities were invisible in the society. He has successfully made "rare disease" well-known to millions of people in the past four years. Kevin also forges ahead with developing the rare disease network, and providing training and

educational opportunities for rare disease patient groups. Until now, there are over 50 rare disease organizations in the network. In 2012, Kevin successfully localized International Rare Disease Day in China and makes it a leader brand in the non-profit sector. In 2013, he founded Chinese Organization for Rare Disorders, the only organization representing all types of rare diseases in China. Chinese Organization for Rare Disorders has achieved great social impact throughout the country and Kevin's leadership and efforts have been recognized and acclaimed by the public.

Mr. Peter Fang
Regional Head – APAC, Shire

Peter Fang is Head of Asia Pacific at Shire, a leading global biotechnology company focused on rare diseases and specialty medicines. Peter has responsibility for Shire's operations in the region, with headquarters in Singapore. Prior to Shire, Peter spent over 14 years at Baxter / Baxalta's Hematology and Immunology divisions in a variety of global, regional, and country commercial roles in the United States, Switzerland, and the UK. He was most recently responsible for commercial operations in over 40 small- and mid-sized markets across Europe, Middle East, and Africa. Peter is from Chicago, Illinois and has a degree from the Wharton School of the University of Pennsylvania. With a passion for Singapore as the business hub for the Asia Pacific region, Peter is committed to ensuring Singapore continues to embrace and celebrate the role of businesses with significant United States interests as part of its commercial fabric and economic future.

Dr. Duangrurdee Wattanasirichaigoon
Professor of Pediatrics & Medical Genetics and Chief of Division of Medical Genetics, Department of Pediatrics, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Thailand

Duangrudee Wattanasirichaigoon is Professor in the Faculty of Medicine at Ramathibodi Hospital at Mahidol University in Bangkok, Thailand. Dr. Duangrudee is a pediatrics specialist. She co-founded the Thai Rare Disease Foundation and is affiliated with the Thailand Rare Disease Network. Dr. Duangrudee's research interests include study on molecular genetics of congenital deafness; study on molecular genetics of rare diseases, deformities, and inherited metabolic disorders; and citrin deficiency and its genetic epidemiology, prevalence, roles in tropical diseases, and molecular study and mechanism.

Dr. Eva Maria C. Cutiongco-De La Paz
Vice Chancellor for Research & Executive Director, National Institutes of Health, University of the Philippines-Manila

Dr. Eva Maria C. Cutiongco-De La Paz, MD, FPPS, is Vice Chancellor for Research, University of Philippines Manila,

Executive Director, National Institutes of Health and Program Director for Health, Philippine Genome Center, University of the Philippines. Dr. Cutiongco-De La Paz received her Bachelor of Science degree in biology at the UP College of Science in 1984. She finished her Doctor of Medicine degree from the UP College of Medicine in 1989, and completed her pediatric residency at the Philippine General Hospital in 1992. She received awards as an outstanding intern and most outstanding resident in pediatrics in the same institution. Dr Cutiongco-De La Paz was a Ten Outstanding Young Men (TOYM) awardee for the field of Genetic Medicine in 2002, and was also recognized by the National Academy of Science and Technology as one of the Outstanding Young Scientists (OYS) in the same year. She was also recognized as one of the Outstanding Women in the Nation's Service (TOWNS) for medicine in 2007. She received the 2011 UP Manila's Outstanding Researcher and the Professorial Chair for Excellence in Teaching and Research in Pediatrics and Genetics.

Dr. Yin-Hsiu Chien
Department of Pediatrics and Medical Genetics, Taiwan University Hospital, Chinese Taipei

Dr. Yin-Hsiu Chien graduated from Chang Gung Medical School and obtained her PhD from Taiwan University. She undertook pediatric residency training at Taiwan University Hospital, and completed her fellowship in Pediatric Allergy, immunology, and rheumatology before she completed her fellowship in Medical Genetics and Metabolism both at Taiwan University Hospital. Dr. Chien has made diverse contributions in the field of inborn errors of metabolisms and primary immunodeficiency, publishing over 50 original research articles in last 5 years. She is director of newborn screening center at Taiwan University Hospital, which routinely screens around one third of newborn infants in Taiwan. Her team, led by Dr. Wuh-Liang Hwu, is devoted to the diagnosis and treatments of several metabolic disorders including phenylketonuria, Niemann-Pick C disease, and aromatic l-amino acid decarboxylase deficiency. She is currently focusing on Pompe disease, specifically on early diagnosis and improvement of treatment, as well as on early diagnosis of severe immunodeficiency.

Dr. Joan Keutzer, Ph.D.
Moderator, Vice President and Head, Integrated Solutions, Rare Diseases Franchise, Sanofi Genzyme, Sanofi

Joan Keutzer is Vice President and Head of Integrated Solutions for Rare Diseases at Sanofi Genzyme. She is a member of the National Tay-Sachs and Allied Diseases Corporate Advisory Council, and has served as an advisor the Lysosomal Storage Disorder Network, the American College of Medical Genetics LSD Newborn Screening workgroup, and several NIH initiatives on rare diseases. Joan joined Genzyme Diagnostics in 1995, and in 1998, she became involved in the development of therapies for Fabry disease, MPS I and Pompe disease. Joan has had many roles at Genzyme, including managing the early stage R&D portfolio, running an R&D group focused on diagnostic assays and newborn screening, and establishing Scientific Affairs. Before joining Genzyme, Joan was a post-doctoral

research fellow at Beth Israel Deaconess Medical Center and the Harvard Medical School. She received her Ph.D. in cellular and molecular biology from the University of Kentucky, School of Biological Sciences, and her B.S from Northern Kentucky University.

Dr. Elena Nicod, Ph.D.
Senior Consultant, Dolon Ltd; Co-Leader of IMPAC-HTA Work Package 10 on Appraisal of Orphan Medicinal Products, Bocconi University, Italy

Elena Nicod is a Senior Consultant at Dolon Ltd, a London-based consultancy specialised in strategic pricing and market access for rare and severe diseases. She is also a Research Fellow at the Centre for Research on Health and Social Care Management (CERGAS), at Bocconi University Milan, where she co-leads a Work Package in a European funded Horizon 2020 project with Dr Karen Facey on Health Technology Assessment for medicines to treat rare diseases. Dr. Nicod also serves as a member of the European Working Group for Value Assessment and Funding Processes in Rare Diseases (ORPH-VAL). ORPH-VAL is a working group of European rare disease experts that was formed in 2015 to improve patient access to orphan medicines through the formation of common principles to underpin P&R processes in Europe. Their recommendations were published in 2017 in the Orphanet Journal of Rare diseases: "Recommendations from the European Working Group for Value Assessment and Funding Processes in Rare Diseases". Previously, Elena worked as a Research Officer at LSE Health, as Coordinator of a clinical trial unit at the University Hospital of Lausanne (CHUV), and as administrator of the Swiss Vaccine Research Institute during its launch in 2009. Elena completed her PhD in Social Policy at the London School of Economics in 2016, holds an MSc in Health Policy Planning and Financing from the London School of Hygiene and Tropical Medicines, and a BSc/MSc in Business Administration from HEC Lausanne in Switzerland.

Dr. Jie Ding
Member of the National Committee of the CPPCC; Professor of Pediatric Department, Peking University First Hospital; and Chairman, Rare Disease Branch, Beijing Medical Association

Dr. Ding is a Member of the National Committee of the CPPCC, Professor of the Pediatric Department at Peking University First Hospital, and Chairman of the Rare Disease Branch at the Beijing Medical Association. She is also Vice-President of the Peking University First Hospital. Dr. Ding is also a member of the International Pediatric Association, the Asian Society of Pediatric Nephrology, and the Chinese Society of Pediatric Nephrology. She received a M.D. from Beijing Medical College, a Ph.D. from the University of Minnesota and from the Beijing Medical University.

Mr. Prasanna Shirol
Co-Founder & Executive Director, Organization for Rare Disease India

Prasanna Shirol serves as a founder member of the Organization for Rare Diseases in India and a Founder Former President of LSD Support Society (Lysosomal Storage Disorder Support Society), This is the first National Level Parents support group for children suffering from ULTRA RARE Diseases in India. The society initiated observing International Rare Disease day for the first time in India on a national scale under his leadership. He has worked extensively to create awareness on LSD and Rare disease in India. He has represented India in various conferences and meetings internationally and developed a strong network of international Parent and Rare disease groups. Prasanna has a Post Graduate in Business Management and over 16 years of sales experience in telecom and consumer industry. He worked with companies like Sony, Reliance, and Bharti. He has experience in launching product and services.

Dr. Vinciane Pirard
Co-Chair, Joint Task Force on Rare Diseases & Orphan Medicinal Products, European Federation of Pharmaceutical Industries & Associations

Vinciane is the co-chair of the joint task force on rare diseases and orphan medicinal products between the European Federation of Pharmaceutical Industries and Associations (EFPIA) and the European Association of Bioindustries (EuropaBIo). Previously, she worked 8 years in Genzyme medical department on diagnosis, registries and product development for rare genetic diseases. She also worked at Solvay Pharma and Wyeth.

Prof. John CW Lim
APEC LSIF Board Member; Executive Director, Duke-NUS Centre of Regulatory Excellence; Chairman, Singapore Clinical Research Institute, Singapore

Prof John CW Lim brings a wealth of experience in public health and management to CoRE. Prof Lim draws on his long-standing international expertise and networks to enhance regulatory capacity and scientific excellence in the Asia-Pacific, having served in leadership roles in numerous public health agencies. Prof Lim is a medical graduate of the National University of Singapore (NUS), and holds Masters Degrees in Public Health from NUS and in Health Policy and Management from Harvard University. He is a Specialist in Public Health Medicine, a Fellow of the Singapore Academy of Medicine, and Adjunct Associate Professor at the NUS Saw Swee Hock School of Public Health and the Duke-NUS Graduate Medical School in Singapore. In the course of his career, he has served as Administrator of the Singapore Blood Transfusion Service, Special Assistant to the Permanent Secretary for Health & Director of Medical Services, Deputy Medical Director of the Institute of Mental Health, and Director, Human Resource in Singapore's Ministry of Health (MOH). He has also been Director of Higher Education and Director of Public Affairs in the Singapore Ministry of Education. Following the establishment of the Health Sciences Authority (HSA), Prof Lim became Director of its Centre for Drug Administration. He was appointed HSA's Chief Executive Officer in 2006 and led the organisation for eight years during a period of

major development and growth. In July 2014, Dr Lim assumed the concurrent appointments of Deputy Director of Medical Services (Industry & Research Matters) in MOH and Executive Director of the Centre of Regulatory Excellence (CoRE) at the Duke-NUS Graduate Medical School, Singapore.

Dr. Kyu-Been Sohn
Asia Regional Regulatory Strategist, Pfizer

Dr. Kyu-Been Sohn is the Asia Regional Regulatory Strategist for Pfizer, a position held since 2013 based in Korea. Prior to her appointment to this position, Dr. Sohn was the Senior Regulatory Affairs Associate at Pfizer Korea. Her expertise spans regulatory submissions to regulatory requirements.

Ms. Eileen Ang
Head of Regulatory Affairs – APAC, Shire

Ms. Ang has more than 20 years of experience handling regulatory affairs in the Asia Pacific region involving a wide range of products including pharmaceuticals and biologicals/vaccines in different therapy areas. She has lobbied and shaped regulatory environment to overcome challenges and delivered registration approvals in China, Taiwan, Korea and Vietnam. This includes her leadership in registering 8 biologics across the region in 4 therapy areas and an MS drug in China. Prior to joining Shire, Ms. Ang was the Head of Regulatory Affairs in Asia Pacific at GSK for 6 years and Director, Asia Pacific at Merck Serono for 13 years.

Camila Quirland Lazo, PharmD, MSc.
Unit Chief, Health Technology Assessment, Oncology Institute, Arturo Lopez Perez Foundation, Chile

Camila is a Pharmacist from the University of Chile, she has a Master in Pharmaceutical Science degree from the same University and postgraduate studies in health technology assessment and pharmacoeconomics. Sin 2012 her research field have been rare diseases policies, with special focus on the insurance arrangements and health technology assessment processes for orphan drugs. She has presented her work in this area on different ISPOR conferences and she also participates on different ISPOR Rare Diseases Special Interest Groups.

From 2014 to 2017 Camila was researcher and academic coordinator of the pharmacoeconomics and health technology assessment Diploma in the Pharmacoeconomics and Health Economics Unit, at the University of Chile's Public Health School. Also, from 2015 to 2018 Camila was Consultant in the Economics and Bussiness Faculty in the University of Chile, specifically in the Institute of Health Administration. She is also Invited Professor in different Evidence Based Medicine and Pharmacoeconomics courses for undergraduate and graduate pharmacy students in the University of Chile and academic coordinator of the first one. Since 2017 she is ISPOR Chilean Chapter President. Since the

present year, she is Head of the Health Technology Assessment Unit in the Oncology Institute, Arturo López Pérez Foundation.

Ms. Julie Kim
Global Franchise Head, Hematology, Shire

Julie Kim was previously Head of International Value Demonstration & Access for Shire. Prior to Shire's acquisition of the companies, Julie held a diverse number of senior leadership roles in Baxalta & Baxter, including Head of Business Model Innovation, North/South Europe Cluster Head for Immunology, General Manager for Baxter UK/Ireland & Global Franchise Head for BioTherapeutics. She began her Baxter career in 2001 & over the next 10 years, she advanced through positions of increasing responsibility in various functions. Prior to joining Baxter, Julie worked in healthcare consulting for over seven years. Julie was a 2013 HBA Rising Star. She has an MBA from the J. L. Kellogg Graduate School of Management at Northwestern University and a BA in Economics from Dartmouth College. She is married and has two children.

Dr. Gong Mengchun
Executive Director, National Rare Disease Registry System of China

Graduated from Peking Union Medical College with a Medical Doctor degree in 2011, Dr. Gong Mengchun entered PUMC Hospital and accomplished the internal residency training, during which period he also worked in University of California, San Francisco as a visiting scholar. From 2016, He took the position of the Executive Director of the National Rare Diseases Registry System of China and started to lead the team, composed of over 20 medical institutes in China, to build this nation wide patient registry system for more than 50 kinds of rare diseases, aiming to recruit over 50, 000 cases in 5 years. Dr. Gong also hold the position of Medical Informatics Consultant for the Translational Medicine Center of Fudan University, Children's Hospital, which is ranked as the National Center for Children's Care of China and is one of the leading institutes to provide medical genetics consultancy service to inherited diseases. The major research area of Dr. Gong is medical informatics, covering the directions of ontologies/terminologies, clinical natural language processing, phenotyping based on EMR, integration of phenome and biological omics data and the further data mining. From 2017, Dr. Gong started his standing as one of the seven directors in the management board of SNOMED International, which is the leading clinical terminology organization worldwide.

四、 簡穎秀醫師於專題講座分享新生兒篩檢與診斷系統執行經驗簡報

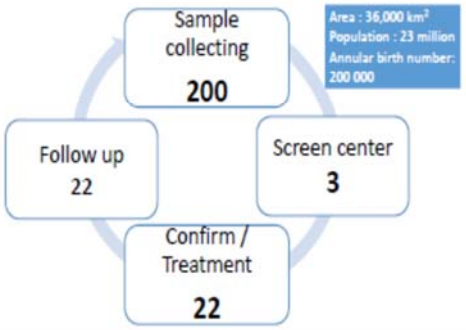
Panel IV: Diagnosing Rare Diseases early, accurately, and systematically

Newborn screening in Chinese Taipei

Yin-Hsiu Chien, M.D., PhD
National Taiwan University Hospital

Chinese Taipei Newborn screening

Genetic Health Law (1984)



Subsidy of Neonatal Screening for Metabolic Disorders

Screened diseases (11)

- ✓ Congenital hypothyroidism
- ✓ Phenylketonuria
- ✓ Homocystinuria
- ✓ Galactosemia
- ✓ Glucose-6-phosphate dehydrogenase deficiency (favism)
- ✓ Congenital adrenal hyperplasia
- ✓ Maple syrup urine disease
- ✓ Glutaric aciduria type I
- ✓ Medium chain Acyl-CoA dehydrogenase deficiency
- ✓ Isovaleric academia
- ✓ Methylmalonic acidemia

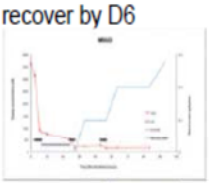
- Subsidize Amount:
  - NT$200 for general public
  - NT$550 for low-income households and medical institutions where medical resources are insufficient
- Small blood sample ("heel stick") is performed within 48 hours of birth

Chinese Taipei performance

- Almost 100% coverage
- 99% report in 6-8 days of age
- Recommended panel: 11 diseases
  - Secondary conditions: >23 conditions
  - Self-paid screening uses the original DBS
- Treatment cost: full covered by National Health Insurance and Health Promotion Administration

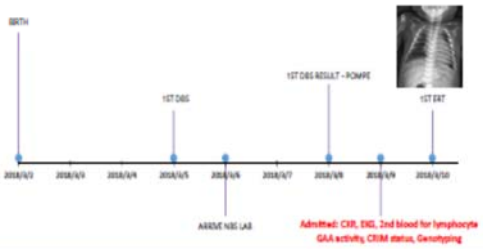
NBS performance in Chinese Taipei : Case demonstration- MSUD

- Notify at D4, treat at D5, recover by D6



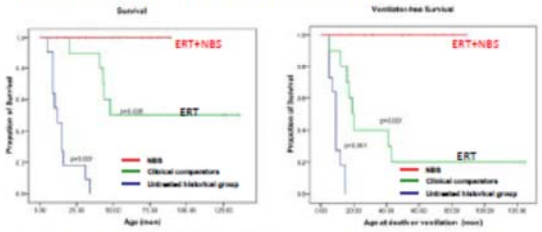
NBS performance in Chinese Taipei : Case demonstration- Pompe disease

- Notify at D6, treat at D8



Pompe newborn screening was initiated in 2005 to achieve best patients' outcomes

- All screened IOPD patients survive without ventilator

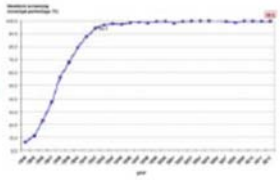


(Left) Kaplan-Meier survival curve for age at death; (Right) Kaplan-Meier survival curve of patients free from ventilation support, for age at death or ventilation

Chien YH, et al. J Pediatr. 2015;166:985-991.

Our advantage: cost of testing

- Subsidy by Health Promotion Administration
  - Full coverage for low-incomes
  - NGO coverage for specific conditions
- Official recommendation: 11 conditions
  - Add-on voluntary available



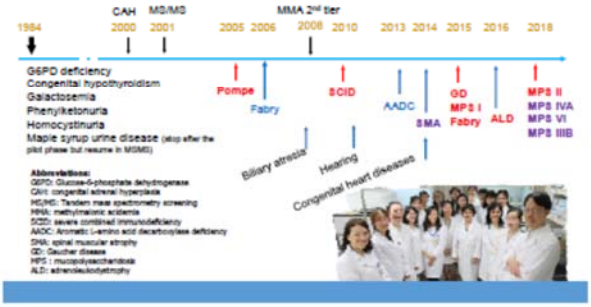
Our advantage: cost of treatment

- Rare Disease and Orphan Drug Act (2000)
  - Orphan drugs
  - Genetic diagnosis
  - Ventilators
  - Life-sustaining nutrition supplements
  - Dietitians consultation

100	98	15,000

Our advantage: program director

Items develop / perform at National Taiwan University Hospital Newborn screening center



五、 會議照片

罕見疾病政策對話會議大合照

APEC 罕病網絡計畫負責人
Prof. Mathew Bellgard 致詞

簡穎秀醫師分享新生兒篩檢及罕病診斷系
執行經驗

簡穎秀醫師分享新生兒篩檢及罕病
診斷系執行經驗

簡穎秀醫師及其他與談人接受提問
回復討論情形

政策對話專題座談情形