The Diagnosis of Liver Tumors with SMI and Contrast Enhanced Ultrasound Imaging with Sonazoid

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Doppler techniques are well known as important tools to evaluate vessel of tumor. Those Imaging techniques are color (CDI) and power Doppler (PDI) imaging used by clinicians for characterization of tumor vascularity.

Toshiba Medical Systems has recently developed a new Doppler technique called Superb Micro-Vascular Imaging (SMI). SMI is a new vascular imaging technology that enables the visualization of low-velocity blood flow in tumor vessels without the use of contrast medium. This improve the visualization of blood flow with high frame rates (> 50 fps). The SMI technology is able to remove the motion artifact (clutter) while visualizing low velocity blood flow in Liver tumor. This will be helpful diagnosis tumor characteristics.

The other hand CHI using Sonazoid™ can be visualized vessel and stain in liver tumor in vascular phase. Sonazoid™ provides parenchyma-specific contrast imaging (Kupffer imaging) based on its accumulation in Kupffer cells. This agent also facilitates imaging of the fine vascular architecture in tumors through maximum intensity projection (MIP).
Application of Contrast Ultrasound and Ultrasound Elastography to Diagnosis and Intervention Ultrasound for Liver Cancer.

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**Contrast Enhanced Ultrasound:** Intervention ultrasound has been developed for local ablation therapy of liver cancer. New technologies of local ablation for liver cancer treatment have been developed adding to RFA. High intensity focused ultrasound (HIFU), 2nd generation microwave (MWA) and irreversible electroporation (IRE) have been introduced to clinical settings.

From viewpoint of imaging technologies, contrast ultrasound (CEUS) can assist precise needle puncturing and evaluation of ablation therapy. Especially Kupffer phase imaging using Sonazoid which is obtained 10 minutes after injection can make it sure to detect small lesions and to delineate border of the tumor.

Since thermal ablation techniques such as RFA, HIFU and MWA make vascularity of the tissue loss, vascular enhancement is useful to evaluate the ablation effects. On the other hand, vascularity of the tissue is maintained in the case of non-thermal ablation technique, IRE. Kupffer phase imaging is useful for efficacy evaluation because IRE provokes apoptosis of Kupffer cell in the ablation area.

**Elastography:** Ultrasound elastography is divided to strain modulus and shear wave elastography. Shear wave elastography is divided to Acoustic radiation force impulse (ARFI) and shear wave velocity mapping. The latter is called simply SWE, which is provided from SSI and Toshiba at the present time.

SWE can be used not only for stiffness quantification of diffuse liver diseases but also used for distribution of stiffness as physicality of tumorous diseases. At the same time, SWE is used for efficacy evaluation of ablation therapy of liver cancer.
Celebrating the 30th Anniversary of TSUM

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On June 17, 1984 Taiwan Society of Ultrasound in Medicine was officially launched at national Taiwan University Hospital, Taipei, Taiwan. To cope with the rapid progress and proliferation of the use of medical ultrasound in the 1980’s, TSUM was established to provide knowledge, techniques, research expertise of medical ultrasound through comprehensive educational programs.

Under the guidance and promotion of the late Professor Hsi-Yao Chen, leaders of medical ultrasound in all major hospitals spanning different specialties gathered together to establish this society. So, this society represents the ultrasound community of this island country. Starting from 465 members covering 6 specialties, TSUM grew rapidly to a membership of more than 6000 in 2009. More and more new specialties joined the society. Eventually, TSUM became one of the largest medical society in Taiwan and a sizable ultrasound society in the Asia and the world. Over the years, through many educational programs and hand on workshops, TSUM effectively raised the standard of medical ultrasound all over the country and brought financial security to the society for its continuous progress and growth. With its domestic success, the society extended its friendship to the international ultrasound community. Despite repeated political drawbacks, the society has successfully become an important and active members of the AFSUMB and WFUMB and contribute substantial fund to both organizations. Leaders of TSUM had served at different important administrative post in AFSUMB and WFUMB. In 1998 the 6th AFSUMB conference was successfully held at Taipei and TSUM will 16th WFUMB conference in 2017.

In the past 30 years, TSUM has successfully met the expectations of the founding members. It has provided high quality medical ultrasound education and, through this, substantially raised the standard of medical care in Taiwan and enhanced the wellbeing and health of fellow citizens. It also plays an important and active role and contributes its support and resources to the international ultrasound community.

TSUM, KEEP ON ONGOING!!
The Relationship Among Chinese Taipei Society of Ultrasound in Medicine, Asian Federation of Societies for Ultrasound in Medicine & Biology and World Federation for Ultrasound in Medicine & Biology

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The World Federation for Ultrasound in Medicine & Biology (WFUMB), the Asian Federation of Societies for Ultrasound in Medicine & Biology (AFSUMB) and the Society of Ultrasound in Medicine of the R.O.C (SUMROC) were founded in 1973, 1987 and 1984 respectively. Because the society of Ultrasound in Medicine of Chinese Medical Association (SUM/CMA) was involved in founding the AFSUMB earlier than the SUMROC, we were forced to change the name to Chinese Taipei Society of Ultrasound in Medicine (CTSUM) in order to be a member of the AFSUMB (and automatically to be a member of the WFUMB). This has been a very unfair political event in the history of the AFSUMB.

With more than 5000 members of the CTSUM has been the second biggest member society of the AFSUMB, and played an important role in the development and advance of the AFSUMB.

Prof. Hsi-Yao Chen (1995 – 1998) and me (2007 – 2010) had been Presidents of the AFSUMB while Prof. Yi-Hong Chou is currently the President –Elect (2012 – 2014). The CTSUM had host the 5th AFSUMB Congress in 1998 in Taipei with a great success. And since 1999 the journal of the CTSUM, Journal of Medical Ultrasound, has also become the official journal of the AFSUMB.

The WFUMB is composed of 6 Continental Federations, including European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB), Asian Federation of Societies for Ultrasound in Medicine & Biology (AFSUMB), American Institute of Ultrasound in Medicine (AIUM), Latin-American Federation of Societies for Ultrasound in Medicine and Biology (FLAUS), Australasian Society for Ultrasound in Medicine (ASUM), and Mediterranean and African Society of Ultrasound (MASU).

Prof. Hsi-Yao Chen (1994 – 1997) and me (2009 – 2011) had been the Vice-president 2 of the WFUMB, currently (2013 – 2015) Prof. Yi-Hong Chou is a Councilor. It is very exciting that the CTSUM will host the 16th WFUMB Congress in Taipei, Oct 23 – 27, 2017. We promise to organize a successful and fruitful meeting and look forward to seeing friends from around the world.
Medical Ultrasound Education in Taiwan

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The Society of Ultrasound in Medicine of the R.O.C. (SUMROC), also known as Taiwan Society of Ultrasound in Medicine (TSUM) or Chinese Taipei Society of Ultrasound in Medicine (CTSUM), was established in 1984. There were 467 members when the society was founded. The founding president was Dr. Hsi-Yao Chen, Professor of Ob/Gyn at National Taiwan University. The number of members has been growing steadily over time, up to 6,300 in the year 2008. Medical ultrasound education in Taiwan was basically oriented by the SUMROC, although it is generally conducted in the medical centers and teaching hospitals with qualified faculty and facility. After completion of medical school, young interns in Taiwan are often expected to already have fundamental theoretical and practical skills in medical ultrasound, as there are an integral part of clinical practice and problem-oriented clinical skills which have been implemented in Taiwan for more than 10 years. Interns rotate in internal medicine, surgery, pediatric, and ob/gyn departments, are usually trained for diagnostic ultrasound under the supervision of senior attending specialists. While residents after residency training for 3 years may take the basic ultrasound education course(s) (8-16 hrs) designed and certified by the SUMROC. Trainees may also take the course model approved by the SUMROC under the supervision of the SUMROC-qualified medical ultrasound instructors. The complete curriculum consisted of 48 hrs. Take our department as example, the course consists of 2 hrs of orientation, 4 hrs of introduction of ultrasound covering ultrasound principles, and knobology and handling ultrasound device, 2 hrs of Pretest, 32 hrs of bed-side teaching including observation of examinations done by senior sonographers and sonologists, practice of examination skills, demonstration of normal anatomy and pathologies in the abdominal, small parts, and application of Doppler techniques. Image interpretation and case conferences are also included. The others are 8 hrs (2 half-days) for assessment of scanning skill by the instructor, and 2 hrs for After Test. Examples of Basic and Advanced Courses in the year 2013 will be shown. Since there are various models in different institutions, we believe in the near future we should assess the quality of faculty and facility in the medical centers and teaching hospitals so that the trainees can be adequately properly trained. An SUMROC Course Guideline for teaching of ultrasound should be established with consensus of the Education Committee of the SUMROC. A standardized questionnaire should be also designed to evaluate the efficacy of an individual course model. Since some patients may disagree with bed side observation and practice by the trainee, special simulator may be used to promote the scanning skill teaching for trainees.
From SUMROC to CTSUM
— A Brief History of Politics in Ultrasound —

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AFSUMB was established in 1985, as the second and largest geographic federation belonging to WFUMB. At the beginning, it consisted of 6 national bodies, including Japan, China, Korea, Indonesia, Malaysia and India. SUMROC was established in 1984 and was enthusiastic about becoming affiliated to AFSUMB. The complicated political relationship between China (mainland) and Taiwan at that time, however, disturbed the immediate affiliation of SUMROC. The author visited twice the Chinese Medical Association (CMA) in Beijing, which is a part of the Chinese government and the power base of the Chinese ultrasound society, to moderate the affiliation of the Taiwan society. After troublesome negotiation, the problem was finally dissolved under the agreement that the Taiwan society changed its name to CTSUM, which meant a local assembly based in one of the cities in China. Thus the matter was carried unanimously in the AFSUMB Administrative Council Meeting in October, 1988. It might be worthwhile to mention this brief history of politics in ultrasound again, at the memorable 30 years anniversary of the renamed TSUM.
The Perspectives of TSUM

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Thirty years has passed since Taiwan Society of Ultrasound in Medicine (TSUM) was founded in 1984. In the past 30 years, application of ultrasound (US) in clinical medicine has been broadened very much and increased rapidly, including diagnosis and therapeutic intervention. Therefore, various category was established in TSUM, and the number of categories is increasing gradually from 10 to 16 up to now. Many young doctors are interested in performing ultrasound examination and are attracted to join the TSUM, and total number of members has been increased from 469 to 5926. Various educational programs have been held to improve US related knowledge of our members. Today, TSUM already becomes a large union of US expertise from various clinical fields.

At the 30th anniversary of TSUM, we have own a permanent office in Taipei city. It is a significant milestone for the TSUM, consistent with the famous phrase 「三十而立」told by Confucius around 3000 years ago.

The perspectives of TSUM in near future will be as follows:
1. To set up formal qualification system approved by Ministry of Health and Welfare.
2. To attract more young doctors to become members of TSUM through various effective ways.
3. To promote active research and productive development of ultrasound machine, including hardware and software, especially 3D images and US contrast agents.
4. To actively participate in international affairs to enhance the influence of TSUM in Asian-Pacific region and all over the World about ultrasound medicine.
Ultrasound Visual Medicine: Empowering Healthcare Worldwide

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The right to life and health is fundamental for any human being. This right includes the freedom to access a non-discriminatory, equitable, acceptable, and sustainable quality health care. However, over the last century, the development of unsustainable and unequal healthcare provision models has determined a diffuse tangible failure of the WHO “Health Care 4 All” goal, particularly in the developing countries, where out of every 100 world inhabitants, 97 will live in the coming decades.

We cannot solve such global problems with the same thinking we used when we created them! UN reports highlighted that the main key drivers of improvement in health are the capability of innovation and the ICT technology integration. New digital, communication and visual technologies are in fact playing an amazing role in changing our societies and models of life. As a picture is worth 1000 words, “visual-enhanced” services and networks showed to be particularly able to impact educational and health system outcomes.

In this framework, the novel concept of an ultrasound-enhanced visual medicine has recently evolved with the availability of high quality handy point-of-care ultrasound devices, in combination with an increasing number of clinicians (critical care, surgery, emergency medicine, anesthesiology, internal medicine, pediatric physicians, and others), who have developed ultrasound skills to take care of patients, particularly in “critical” situations. This typically occurs in the critically ill patient (see emergency, intensive, and critical care ultrasound), and/or where human or technical resources are limited (see screening, triage, remote, rural, and primary care ultrasound).

Given its relatively low cost and portability, ultrasound has a great potential to improve healthcare outcomes in underserved communities, reducing poverty, empowering the people capacity, facilitating the provision of needed services to everyone, enhancing an adequate level of health care, and a process of social inclusion by more interactive and aware patients and care providers.

Thus, over last decade, the global dissemination of point-of-care ultrasound, thanks to a variety of technical, educational, clinical, organisational and socio-economic visual-enhancements, has increasingly represented a new paradigm for sustainable human health-care development, easy to be replicated ubiquitously within other traditional medical disciplines and methodologies, in order to achieve the fundamental right of a better and healthy life for all.