序文

新しいメスの概念とは、ある種の物理的エネルギーを生体に与えても組織を破壊するものであり、それは銃であるものが鈍であろうが関係はない。マイクロターゼ、銃利なメスの追求、つまり組織、病巣の破壊を意味する広義のメスの概念を生み出した。電気メス、レーザーメス、超音波メス、ハーモニックスカルベル等は、異なる物理的エネルギーを生体に作用させて組織を破壊する。従来の鋼刀のメスに近づけようと開発された機械である。これらの切開機能にこそわら、組織の凝固・固定を追求したメス。これがマイクロ波組織凝固装置=マイクロ波メス=マイクロターゼである。これは、モノポーラテナカ焼発するマイクロ波を組織に効率よく吸収させ、いわゆるメス的効果を発揮する。極超短波（マイクロ波）は、空中より体内に射出すると効率が極めて悪いが、組織内で発振させると極めて効率がよくなるという特徴があることについては言うまでもない。また、周知の通り、超音波診断装置は、3.5～20MHz（温熱療法では8MHz等）では生体内を通過しにくく発熱しにくいが、2.5kMHzになると生体を通過しにくく発熱し易いことも特徴である。これをいかに生体内でコントロールし、メスとしてより高度な治療を可能とするかが今後の課題である。もちろん物理学の世界でも、空中における電磁波の問題は研究し尽くされていないと思われるが、生体内でのかかわりについて未知であると言わざるを得ない。生体内組織内で生じた電磁波の発振・受信に関しては物理学も弱いようで、生体に及ぼす影響についての研究が発達し難しいのはこの理由からである。生体内における磁界の測定やcontrolが可能になれば、外科学として更に発達するであろう。

1979年にArch Jpn Chirに掲載されたSeminal paper「A new operative procedure for hepatic surgery using a microwave tissue coagulator」を基にして、1981年に肝癌の自然破壊に対する止血・凝固・壊死効果を世界で初めて臨床応用に成功して以来、2000年までの約20年間で1,000以上の論文を発表し収集することができた。ME（medical engineering）と産学官機体を組み、普及活動がスタートし、1983年にはMicrowave Surgery研究会が発足した。その後、論文数は増加の一途をたどり、1988年にはpeakを迎え、以後1993年まではやや衰退気味であったが、1996年「マイクロ波手術器の研究」に対して日本科学技術庁長官賞（研究録写真）を受賞し、更に同年、肝腫瘍のマイクロ波凝固法が日本の保険適応として認められてから年間100件以上の論文が発表されるようになった。海外での反響は確かにあったが欧米における安全規格（EUのCE-marking、米国のUL規格）の調査のため、この手術器の海外進出も遅れていた。しかし、2001年度にはこの1,000件以上にのぼる論文のおかげで臨床検査の必要もなくEUのCE-markingが取得できる行き直っている。また、外資系企業の参入によって、米国においても新しい規格、規格を得てできない可能性、日本で反響を呼んでいるRFAの上陸がよりライバルとなり、Microwave Surgeryの発展もより一層期待できると確信している。Microwave Surgeryは、外科学としてのカテゴリーを確立に向けて、経験的Dataだけでなく、科学的Dataの裏づけによって一層の理論武装が可能となるであろう。

さて、Home Page開設の決意をした理由の1つとして、21世紀のIT革命があらゆる分野に変革をもたらすことは疑いの余地のない事柄である。情報革命による相互の知的技術の共有化は、情報革命時代における情報公開と、情報発信による相互の知的技術の共有化である。

企業においては特許権所有による利益の追求があるように、学問の世界において、価値ある論文の発表による名誉と著作権の保護、それに伴う研究の継続がある。情報発信による相互の知識の共有化を進めば、より早く有益な効果・成果が生まれ、人類のための役立つことになるだろう。

価値ある論文の発表には、競争原理に伴う意欲的な研究開発が期待できるmeritがあるが、反面、情報公開が進れ、学問や医療の発展を阻む可能性を生むdemeritもある。21世紀のIT革命のなか、医学・医療界における著作権と特許権の規制に伴うmeritとdemeritを調和することこそが、現在我々に求められている課題であろう。個人のoriginality、privacyの尊重を重視しつつ、上記課題を克服していきたい。

ホームページ開設のうえで電子化を進めるにつれて、paperless、filmlessの時代を迎えるこれから、研究会、学会、雑誌編集のあり方についても考えざるを得ない。皆様からの御理解、御意見を切望し、御協力を求めてお願いいたします。

2001年9月

Microwave Surgery研究会会長

田伏 克哉

President of the Study Group of Microwave Surgery

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http://plaza.umin.ac.jp/~mws
Preface

A new concept of the scalpel refers to the applying of a certain type of physical energy to a body and the resulting destruction of tissue. It is not concerned with whether or not the instrument is sharp or dull. The expression “scalpel” is referred to in a broader sense of the word. The microwave scalpel, Microtaze, changes the focus from the pursuit of a sharp scalpel to the pursuit of a dull scalpel. This has resulted in the concept of a scalpel in the sense of destroying tissue and lesions. Devices such as electric scalpsels, laser scalpels, ultrasonic scalpels and harmonic scalpels each destroy tissue by allowing a different form of physical energy to act on the body. In the past, this involved the pursuit of an apparatus that attempted to imitate steel-blade scalpel. Microtaze is a microwave tissue coagulation apparatus that function as a scalpel designed for the purpose of coagulating and fixing tissue without being preoccupied with the pursuit of these incision functions. Microtaze achieves its so-called scalpel effects by enabling the tissue to effectively absorb microwaves generated by a monopolar antenna. The efficiency by which microwaves are radiated from the air into the body is extremely poor. However, by generating microwaves within the tissue, this efficiency is significantly improved. This is the major characteristic of ultra-short waves, i.e., microwaves. As is already well known, ultrasound diagnostic systems and thermotherapy apparatus operating at frequencies of 3.5 to 20MHz and 8MHz, former and latter, are able to easily cause energy to pass through the body. However, the most important issue confronting the systems of the future is the extent to which they can control energy within the body so as to enable more sophisticated treatment in the form of a scalpel. In essence, although considerable research has been conducted on the behavior of high-frequency electromagnetic waves in air in the field of physics, applications utilizing their interaction with the body have unfortunately yet to be developed. It appears that the discipline of physics is somewhat limited when it comes to studying the generation and receiving of electromagnetic waves in body tissue. This is perhaps the reason why it has been difficult for research on the effects on the body to make progress. However, the ability to measure and control magnetic fields in the body would most likely lead to greater progress in the field of surgery.

Roughly 20 years have passed through the year 2000 since hemostatic, coagulation, and necrotic effects were successfully demonstrated in clinical applications for the natural destruction of liver cancer. This was a world first in 1981. The study was based on a seminal paper carried in the Arch. Jpn. Chir. in 1979 entitled, “A new operative procedure for hepatic surgery using a microwave tissue coagulator.” Since that time, the author has been able to find and collect more than 1,000 papers on associated subjects. Activities for proliferation were initiated through collaboration between medical engineering (ME) and a joint alliance of the industrial and academic sectors, and the Study Group of Microwave Surgery was founded in 1983. Over the following period of time the number of papers continued to increase, although after reaching a peak in 1988, then declined somewhat through 1993. In 1996, the Director’s Award of the Japan Agency of Science and Technology was received for “Research on microwave surgical devices.” Additionally in that same year, microwave coagulation treatment for liver tumors was certificated as being applicable for coverage by national health insurance in Japan, since when more than 100 papers on the subject have been published each year. Although there has been a definite response from overseas, the entrance of this surgical device into foreign markets has been delayed. This delay has been due to restrictions resulting from safety standards in Europe and the U.S. including the CE marking of the EU and UL standards in the U.S. However, due in part to the more than 1,000 papers that have been published, it is expected that the CE marking of the EU will be able to be acquired in 2001 without requiring clinical studies. In addition, due to the entrance of foreign-based firms, it is likely that certification will be able to be acquired in the near future in the U. S. as well. Furthermore, although the appearance of radio frequency ablation (RFA) is creating a response in Japan, the author is convinced that it will serve as a friendly competitor that will lead to even greater progress in the field of microwave surgery. This will be necessary for microwave surgery to make the greater effort needed to obtain firm establishment as a technique in the surgery category.

One of the defining reasons behind the decision to create this web site was the changes that are being brought about in various fields by the IT revolution of the 21st century. The basis for this involves the sharing of mutual intellectual technologies through the disclosure and transmission of information in this age of the information revolution.

In the same manner that private corporations pursue earnings through the holding of patent rights, members of the academic world like ourselves achieve prestige and protection by copyrights, along with the accompanying continuation of research, and through the publication of valuable papers. Thus, the mutual sharing of intellectual technology through the transmission of information will lead to the rapid realization of breakthroughs and corresponding beneficial results.
These breakthroughs and results in turn will be of use to humanity.

The publication of valuable papers has the merit of fostering enthusiastic research and development under the principle of competition. Conversely, non-publication has the demerit that there is the possibility withholding the disclosure of crucial information that can slow the progress made in the fields of academia and health care. What we are seeking at present in the midst of the IT revolution of the 21st century is the relaxation of merits and demerits accompanying restrictions on copyrights and patent rights in medicine and health care. We desire to overcome the above problems while emphasizing the protection of individual originality and privacy.

The progress of the creation of websites, accompanying the growing use of computers, has brought us to the beginning of paper-less and film-less age. Since this presses upon us the need to consider the ideal form for the output of research groups, academic gatherings and the editing of scientific journals in the future, I would like to close this introduction by sincerely requesting your valuable knowledge and opinions.

September, 2001

President of the Study Group of Microwave Surgery
Journal of Microwave Surgery, Editor in Chief
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The Study of Microwave Surgery Home Page
http://plaza.umin.ac.jp/mws

Editor’s Message

Dear colleagues,

Since the Study Group of Microwave Surgery (SGMS) was founded in 1983, aimed at developing new frontiers in hepatic surgery with microwave techniques, many colleagues have joined us and presented many reports about microwave surgery including not only endoscopic surgery and percutaneous liver treatment but also new applications to other organs and tissues. Now microwave surgery is widely known throughout the world and more than 1000 reports on it, can be found presented in SGMS journals and other academic journals throughout the world. For quick and easy reference to these reports and the latest activities of SGMS as well, we have decided to have our own home page. A few links are also available in the web site for more information.

We have had the honor of having had distinguished professors and surgeons as presidents of the past nineteen meetings of SGMS, and taking this opportunity I wish to express our sincere thanks to these honorary members and our colleagues for supporting SGMS. We believe that our study will bring more advanced and less invasive treatment which will contribute to overcoming of diseases.

We will be very pleased if the SGMS home page is of help to you, and any suggestions and comments on its content to improve it will be welcomed.

Editor and President
The Study Group of Microwave Surgery
Katsujiyo Tabuse MD, PhD.