octahedral complex up to form eight bonds[9]. As a result, Ca^{2+} would cause a conformational change within the enzyme which would be transmitted to the membrane subunits of the dimeric F_1F_O-ATPase super-complexes. These conformational events may pull the stalk modifying the stalk-to-stalk distance between dimers[10] leading to PTP opening (Figure 1) and consequent mitochondrial swelling and burst.

To sum up, the vestigial F_1F_O-ATPase, lacking the *c*-ring, *a* subunit and A6L subunit, cannot translocate protons but allows PTP opening; at the same time the Ca-activated F_1F_O-ATPase hydrolyses ATP without building the Δp. Both ATP depletion and Δp dissipation are linked to the PTP opening.

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MEETING REPORT

Medical ethics*

The symposium on medical ethics began with a talk on the history and evolution of ethics by A. T. K. Rau (Department of Paediatrics, M.S. Ramaiah Medical College, Bengaluru) who defined medical ethics as a self-regulatory system based on moral principles that apply values and judgements to the practice of medicine. He also mentioned that the pillars of modern medical ethics rest on autonomy, beneficence, non-malfeasance, justice, dignity, truthfulness and honesty. Commenting upon the evolution of medical ethics during the pre-Hippocratic, Hippocratic and post-Hippocratic era, he revealed that the oath of Charaka was the first ever record of medical ethics as early as in 250 BC, which was followed in other parts of the world as well as in Mesopotamia, the Middle East and ancient Korea. The Hippocratic era saw the origin of the Hippocratic Oath, which shifted the focus from class-based medicine to selfless service of individual patients. In the post-Hippocratic era, the first book on medical ethics was written by Ishaq ibn Ali al-Ruhawi in AD 671 and was followed by Thomas Percival's dictum on medical ethics in 1847, which was later modified by Joseph Fletcher. The Nuremberg code of conduct emerged in 1947 after the holocaust of the Second World War. The Hippocratic Oath and Nuremberg code of conduct were combined to form the Geneva declaration in 1948 which is now, after modification, the international code of medical ethics. Further refinement in the ethics came in the form of the Helsinki Declaration in 1964. Newer concepts of bio-ethics which handle ethical issues from the relatively recent aspects of medicine such as CT scans, MRIs, etc. have also come up. All of these have now been amalgamated to form a huge volume of work called medical ethics with the Institutional Review Board (IRB), Data and Safety Monitoring Board (DSMB), Drug Controller General of India (DCGI) and Indian Council of Medical Research (ICMR) acting as the monitors in India. The general principle of medical ethics is 'Do unto others as you would them do unto you'.

The keynote lecture on ethical issues in medical research was delivered by Soumya Swaminathan (ICMR and Department of Health Research, Government of India). She began her address indicating that good and high-quality research is the key for India to be at the cutting edge of any endeavour. She also stressed the need to introduce research methods in the UG and PG medical curriculum and pointed out that ICMR could convince the Medical Council of India (MCI) to introduce research methods into the curriculum for furthering research and also interpreting information correctly in medical publications. She mentioned that ICMR also sponsors various research schemes for medical students.

Soumya talked about the formation of research clusters to facilitate medical research and gave the example of the Indian Statistical Institute, New Delhi, and All India Institute of Medical Sciences, New Delhi, which came together to form a scientific cluster to conduct research. She also mentioned Bengaluru's strength in engineering and technology, computational engineering, bioinformatics and genomics, and indicated that organizations such as the Indian Institute of Science, National Institute of Mental Health and Neurosciences, etc. must come together to form such a cluster.

She also touched upon the need to have registries in medical research and

*A report on the one-day symposium on Medical Ethics conducted at the M.S. Ramaiah Medical College, Bengaluru, on 9 September 2017.

gave the example of how the National Centre for Disease Informatics and Research, Bengaluru had initially started out as a national cancer registry programme in the 1980s. ICMR now also runs registries for several other public health problems such as stroke, cardiac failure and rare diseases. These registries provide a vast amount of information and can be easily maintained in all hospital outpatient settings. To understand the benefits of such registries, she gave the example of the dialysis registry. With dialysis centres being set up in every district, the Government now wants to analyse registry data to assess how the dialysis centres and programmes have improved the quality of life of patients. This might also help conduct a cost–benefit analysis in the future. She also talked about antimicrobial stewardship in hospitals to reduce infections, reduce the use of antibiotics and bring down the rate of drug-resistant organisms. She also talked about building health research capacity in the country. However, the existing scheme is limited to Government medical colleges where there is a grant given to build and staff a research laboratory, but this may be modified in the future to include private institutions as well. ICMR is also looking to establish 20–25 Centres of Excellence in the top medical colleges in the country to improve medical research outputs. The National Institute of Epidemiology in Chennai already hosts on-line schemes on research methods and ethics.

ICMR is also trying to improve the medical cause of death certification. Unlike Western countries, India does not have proper vital registration data to estimate the disease and death statistics. Hence ICMR is setting up a 20 h on-line course on ICD 10 coding for doctors in order to improve the quality of death certification. The council has also set up a health technology assessment programme and evidence to policy unit, so that the policies formulated by the Central and State Governments are based and focused on the evidence generated. This initiative will provide an opportunity for medical colleges to conduct research for the benefit of the Government and country and aid in making policy decisions.

On the subject of biomedical research ethics, Soumya mentioned that ICMR has been working within the existing legal framework as there are no new laws and is focusing its attention to see whether the provisions for penalties for violation of ethics can be brought under the Drugs and Cosmetics Act. Currently this Act deals only with issues related to clinical trials. However, the DCGI has made it compulsory for all ethics committees to register with ICMR for any research, be it clinical or non-clinical.

Soumya stated that recently ICMR has reconstituted the central ethics committee on health research to debate issues of broader public interest. There is a difference between what a doctor does to save the life of a patient and what he does in the interest of the patient. Following the principles, be it the Hippocratic Oath, principles of non-malfeasance, beneficence, transparency and doing things by looking at the harm–benefit balance is one aspect. On the other hand, if a new procedure or technique is tried on a number of patients and is currently not a standard technique and falls into the realm of a research area, then it should be done with proper informed consent and ethics approval.

In conclusion, she hoped that institution like the M.S. Ramaiah Medical College which is highly academic minded and has a huge pool of faculty and students can take the lead in the area of research and medical ethics, and set an example for other medical colleges to follow.

The keynote address was followed by a plenary session on the 2017 ICMR guidelines on medical ethics by Roli Mathur (ICMR Ethical Cell, Bengaluru). She mentioned that ICMR formulates, conducts, coordinates, funds and promotes research, but does not regulate it. The Bioethics Cell of ICMR has formed a group on innovative treatments and prepared the definitions on end-of-life issues. The cell has also carried out capacity building through workshops and training programmes for ethics committees. To aid in multicentric studies, it is also devising a common form for ethics committees to use at the national level. She also mentioned that ICMR had come up with its first ethical guidelines in 1980 for issues related to clinical research, traditional medicines and publications. The guidelines were then revised in 2000 and further expanded in 2006. The Ethics Cell is also developing an ICMR course for ethics committees at the National Institute of Epidemiology, Chennai and is engaged in a number of international activities.

She elaborated on the sections included in the 2017 ethics guideline to be published by ICMR shortly. These include the statement of general principles, general ethical issues, responsible conduct of research, publication ethics, ethical review procedures (section about ethics committees and their functions), informed consent, vulnerability, clinical trials, public health research, socio-behavioural research, genetics, bio-banking and datasets, and research during disaster situations. The guidelines are applicable to all biomedical and health research or socio-behavioural research studies. Under the general ethical issue guidelines, there are paragraphs on benefit and risk assessment, privacy and confidentiality, payments for participation, compensation for research-related harm, ancillary care, investigator-initiated research, student research, conflict of interest, selecting vulnerable and special groups, community engagement, responsible conduct of research, post-research access and benefits.

She also mentioned that there is a whole section on ethical review procedures that talks about how the ethics committee has to be formulated, its composition, its functions, training of the members, their responsibilities, different types of reviews, exemption from ethical reviews, studies expedited for review, studies that need a full review by the whole committee, continuing reviews, communication of decisions, record-keeping, archiving, etc. It should be a multidisciplinary committee that should not be overpowered with scientists so that other participants such as lawyers and social scientists are also able to voice their opinion.

Thereafter, a panel discussion on ethical issues in medicine followed. The panel debated the role of ethics in various case studies involving medical treatments. These cases included surrogate decision making by relatives and role of clinicians in assisting the decision making. Other cases were also presented where the patients' kith and kin requested the physicians not to reveal the nature of disease to the patients. The panel also debated on ethics involved in do-not-resuscitate in terminal clinical situations, its legal implications and the role of advanced health-care directive in such cases.

O. V. Nandimath (National Law School University of India, Bengaluru) gave a talk on the legal considerations in medical ethics. He cited studies that indicated low morale of doctors, loss of professional ideals, especially in the case of youngsters who step into the profession and greater sense of insecurity about professional growth. He mentioned that the reason for this is the loss of autonomy that the profession is facing because of interference by players such as Governments, insurance companies, entrepreneurs and lawyers. He also felt that doctors defined and understood ethics in a simple manner which did not convey the spirit of ethics and cover the grey areas. He also felt the need for doctors to innovate and sharpen their communication skills when it came to ethics in order to create an impact on youngsters in the medical profession. He also stressed on the need to talk about the core ethical values, rather than ethical dilemmas.

He mentioned that there was confusion among the medical fraternity on the difference between morality and ethics. Morality is an universally accepted, inalienable, ultimate truth or a value, while ethics is something that needs transformation each time it is applied to a particular situation. This makes it difficult to bring ethics into a codified format. In 2002, MCI brought about the Indian Medical Council Professional Conduct Etiquette and Ethics Regulation. According to Nandimath, the very attempt by a professional body to bring ethics into a codified format is an indicator of the confusion that existed with respect to morality and ethics. He finally urged the medical fraternity to exercise their autonomy in the area of ethics in the absence of a defined law.

Next, a panel discussion on medical ethics in disorders in women and children was conducted. Case studies on surrogacy, medical termination of unwanted pregnancy in the case of minors, termination of pregnancy when the mother is a carrier of a disease and donation of organs in the case of brain-dead persons were presented before the panel for discussion on the ethics involved. The panel also briefed the audience on informed consent, assent and permission in paediatrics.

A third panel discussion involved ethical practices in surgery. The panelists talked about surgical consent, counselling and ethics involved; ethics involved in ensuring that right surgeries were done on the right patients; ethics behind organ transplantation, and imparting education and ethics to the next generations.

While concluding the discussion 'Who is to blame and what is to be done?', the last panel came up with the following suggestions.

(1) All stakeholders are to blame if the medical fraternity does not self-regulate. They concluded that accreditation, which is a voluntary mechanism, should be the way forward.

(2) Bringing ethics into the curriculum of medical students in India is something that started a decade ago. The panel considered that it does not serve the purpose unless it becomes a part of the assessment criteria and felt that similar to the West, ethical training should be made a part of certification. In India, the ground reality is that students still look at role models for ethical guidance and in the present context, positive role models are hard to find.

(3) Responding to cases when the law seeks ethical advice from the medical fraternity, the panel members concluded that it is only when the medical fraternity shows some amount of maturity and consensus, can it take a call on disputable cases.

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MEETING REPORT

Wind energy systems in India*

An international workshop on the performance and potential of wind energy systems in India was held in Bengaluru recently. It included participants from industry, research organizations, academic institutes and decision-makers from India and the USA. The two-day workshop began with a welcome address by S. K. Satheesh (Chairman, Divecha Centre for Climate Change, IISc, Bengaluru) who highlighted the need for examining the performance of existing power plants and address the challenges to meet the ambitious target of 60 GW of installed wind power capacity by 2022.

In his introductory talk, V. Rao Kotamarthi (Argonne National Laboratory (ANL), USA) described various areas of expertise related to energy at ANL. In the area of wind energy, his group is studying wind energy forecasting under complex terrain, optimal location of turbines, the role of wind shear and micro grids. He concluded with a list of issues that the workshop should address.

On the first day of the workshop, issues related to offshore wind potential and performance of existing wind power plants were discussed. The first session started with a presentation on progress in the wind energy sector by the Ministry of New and Renewable Energy (MNRE, Government of India). This was followed by a presentation on the offshore wind development in India by M. V. Ramana Murthy (National Institute of Ocean Technology (NIOT), Chennai). The assessment of offshore wind potential in Kanyakumari, Tamil Nadu, and Gulf of Khambhat, Gujarat was discussed. The main policy challenges in offshore wind sector are clearance, data availability, supply chain, port infrastructure, grid connectivity and economics. Harsh Pandit (Suzlon Energy Limited, Ahmedabad, India) added the developer's perspective to this discussion. The estimated potential of offshore wind was around 36 MW

*A report on International Workshop on the 'Performance and Potential of Wind Energy Systems in India' held at Divecha Centre for Climate Change, Indian Institute of Science, Bengaluru on 22–23 August 2017.