



## Review

## Scientific STAFF and MALT meetings — past, present, and future

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The scientific STAFF and MALT meetings were created around the turn of the century for scientists engaged in enhancing the role of the 12-lead ECG for detection and quantification of involved myocardium in patients with acute coronary syndrome. These meetings were initially focused on computer processing of data from two single-center databases. The STAFF database was collected in the mid-nineties on patients with prolonged total coronary occlusion; high-resolution 12-lead ECGs were collected before, during, and after 5 minutes of occlusion. The MALT database was created in the early years of this century on consecutive patients with chest pain admitted to a large teaching hospital. Delayed enhancement magnetic resonance imaging and electrocardiograms were recorded in these acutely ill patients. The paper highlights the first 2 decades of the STAFF and MALT meetings and details the meeting format.

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**Keywords:**

STAFF; MALT; ECG core labs; ischemic heart disease

**History of the development of the scientific STAFF/MALT studies**

As reperfusion therapy for patients with acute coronary occlusion became feasible in the early 1980s, and randomized clinical trials of comparative outcomes were developed, it became necessary to create independent ECG core labs to document quantitative ECG data. Galen Wagner of Duke University, Durham NC, USA developed a lab for the Thrombolysis and Angioplasty in Myocardial Infarction (TAMI) studies [1]. The directors of ECG core labs formed networks to perform sub-studies using the broad range of databases of clinical trials to answer ECG-related questions. A meeting of ECG core-lab directors was convened during the 26th International Congress on Electrocardiology (ICE) in Bratislava in 1997 to develop guidelines for their scientific function [2,3].

These investigators also developed two prospective studies. The STAFF study of ischemia due to elective prolonged coronary angioplasty balloon dilatation for chronic coronary artery disease [4] was named for the principal investigator, Stafford “Staff” Warren, Charleston, WV, USA. The MALT

study of Magnetic And eLectric Technologies documented serial changes following Glasgow Western Infirmary care of acute coronary syndrome [5]. These studies provided the ECG core labs with databases that also included multimodal “gold-standard” diagnostic methods such as myocardial scintigraphy (SPECT) and magnetic resonance imaging (MRI) analyzed in their independent core labs [6,7]. As explained in the reports of the STAFF studies [4,8] the general research design was opposite to that of the randomized trial, with data generated at a single site distributed to multiple sites for analysis. This logistic design assures that the results of individual studies are directly comparable, and facilitate provision of multiple complementary views on the same problem. Additional benefits are both high effectiveness of the collaborative research, and a high ratio between the number of publications and the effort related to the data collection.

Communication among investigators of these international collaborative studies required the development of scientific meetings for presentation and interactive discussion. The STAFF meetings began in 1997, following completion of the data collection for the STAFF III study in Charleston, WV, USA and the MALT meetings began in 2003 following completion of the data collection for the MALT study in Glasgow, Scotland, UK. Since most of the experimental laboratories analyzing the STAFF data were in Europe, the

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STAFF meetings were scheduled near the sites of the bi-annual occurrence of the Computing in Cardiology (C in C) meetings in Europe. The MALT meetings were scheduled annually near the Glasgow Western infirmary [5] where the database was located. Early participants in the STAFF meetings were from the laboratories of Pahlm and Sörnmo in Lund, Sweden on high frequency ECG [9–11], myocardial scintigraphy [12], and the “24-view ECG” [13]; from the laboratory of Laguna in Zaragoza, Spain, on quantitative ischemia indices [14,15]; Lander in Oklahoma City, USA on abnormal intra-QRS potentials [16]; and Rubel and Fayn in Lyon, France on the CAVIAR method for serial comparison of ECGs [17].

Early participants in the MALT Meetings were from the laboratory of Dargie in Glasgow, Scotland in documenting STEMI-equivalent ECG changes in patients with acute coronary occlusion [4], comparing electrical and anatomic ventricular axes [18,19], and quantifying left ventricular remodeling after acute myocardial infarction [20]; from the laboratory of Grande and Clemmensen in Copenhagen, Denmark, on the effect of acute revascularization on post-infarction QRS evolution [21], and continuous ECG monitoring for risk stratification of patients with acute coronary syndromes [22]; from Pahlm and Arheden in Lund, Sweden on comparative quantification of infarcts by ECG and CMR [23], and the impact of ischemia protection on myocardial salvage by PCI [24]; and Gorgels in Maastricht, the Netherlands on comparative acute and chronic ECG and CMR infarct evolution [25].

Table 1 summarizes the various locations and countries that have hosted the 25 STAFF and MALT meetings during their first 19 years. The STAFF meetings have remained in geographic and temporal proximity with Computing in

Table 1  
STAFF and MALT meetings 1997–2015.

Year	STAFF/MALT	Venue	Country
1997	STAFF 1	Lund	Sweden
1999	STAFF 2	Braunlage	Germany
2001	STAFF 3	Noordwijk	Netherlands
2001	STAFF 3.5	Wageningen	Netherlands
2003	STAFF 4	Perea	Greece
2003	MALT 1	Glasgow	Scotland
2004	MALT 2	Glasgow	Scotland
2005	STAFF 5	Pizay	France
2005	MALT 3	Glasgow	Scotland
2006	STAFF 6	Albarracin	Spain
2006	MALT 4	Keswick	England
2007	STAFF 7	Wrightsville Beach	USA
2007	MALT 5	Lund	Sweden
2008	STAFF 8	Bertinoro	Italy
2008	MALT 6	Inverary	Scotland
2009	MALT 7	N Berwick	Scotland
2010	STAFF 9	Portrush	N Ireland
2010	MALT 8	Aarhus	Denmark
2011	MALT 9	Maastricht	Netherlands
2012	STAFF 10	Paszkowka	Poland
2012	MALT 10	Papiernicka	Slovakia
2013	MALT 11	Noordwijk	Netherlands
2014	STAFF 11	Dedham	USA
2014	MALT 12	Noordwijk	Netherlands
2015	MALT 13	Lugano	Switzerland
2015	STAFF 12	Vence	France

Table 2

Guidelines for Future MALT and STAFF Meetings.

*Central themes*

STAFF meetings: The ECG manifestations of myocardial ischemia and infarction.

MALT meetings: The ECG in relation to other cardiac imaging modalities.

*Timing and venue*

Preferred timing for future STAFF meetings is September or early October. If practical, the meetings can be organized in conjunction with a Computing in Cardiology conference. Preferred timing for future MALT meetings is April or May. Preferably STAFF and MALT meetings should be organized annually. The venue should be located outside a big city, and ideally in the countryside. The participants should all stay at the same facility. This promotes interaction among participants and helps keep cost down.

*Meeting structure*

A STAFF/MALT meeting typically extends from Wednesday (welcome reception in the afternoon/evening) to Saturday (departure in the morning), which means that all participants are supposed to be present during two full days, on Thursday and on Friday. Symposium hours are Thursday morning 8:30–12:30, Friday morning 8:30–12:30 and Friday afternoon 14:00–18:00. All time slots (presentations and breaks) are 30 minutes. There should be 5 sessions, and a total of 15 presentations. Presenters speak no longer than 15 minutes, leaving at least 15 minutes for discussion. There should be no parallel sessions. It would be optimal to keep the number of formal sessions to no more than 5 to provide adequate time for informal discussion among the participants. Thursday afternoon and evening there is a social event organized.

*Number of participants*

A STAFF/MALT meeting has a limited number of participants (around 30). This facilitates interaction and allows for a round-table lay-out of the meeting room. A significant number of the presentations should be given by scientists-in-training, with the support of an attending mentor. Presenters at STAFF meetings who have not completed a PhD program (or equivalent) may participate in the Michael Ringborn Young Investigators Award (YIA) competition. The YIA competition at MALT meetings has not yet been named.

Participant group numbers should be approximately:

Junior presenters	10
Senior mentors	10
Senior presenters	5
Senior non-presenters with specific leadership roles	5

*YIA committee*

A committee of experienced researchers should judge the performance of the YIA competition, and a winner should be selected. Mentors of YIA candidates should not form part of the committee.

*Participants from industry*

Participants from industry are welcome, but are expected to subsidize participation by young investigators. An industry participant is expected to present a scientific study at the meeting.

Cardiology meetings in Europe, and only ventured into the USA on two occasions. The MALT meetings remained in geographic proximity with their founding Glasgow database in six of their initial seven years, and have since ventured into four other European countries.

### Future scientific STAFF and MALT meetings

The scientific STAFF and MALT meetings have evolved interests beyond their initial focus on specific aspects of

electrocardiography in ischemic heart disease, and have sometimes included participants beyond the numbers who can be comfortably seated in a round-table setting. Although this evolutionary growth resulted from the success of the STAFF and MALT programs, it has the potential to diminish their impact unless limited by leadership initiatives. It was recognized that core interest definitions are needed for future STAFF/MALT meetings. It was also recognized that current STAFF/MALT-meeting participants with core interests beyond those of these two groups should be encouraged to evolve new groups, for which the STAFF/MALT governing principles might serve as a model. Accordingly, a STAFF/MALT council was formed during 2015 to establish governing principles for future meetings.

The guidelines presented in Table 2 were developed by the STAFF/MALT council to consider the central themes, timing, venue, structure, participation, and young investigator recruitment of each meeting.

## Conclusion

The STAFF and MALT studies and the ensuing scientific STAFF/MALT meetings have evolved through two decades beyond the most optimistic expectations of their founding investigators. The primary purpose of both the STAFF and MALT meetings is to facilitate collaboration among a wide variety of investigators of a particular aspect of cardiovascular disease using a common database. The original databases have served to provide access to quantitative information on human subjects that have facilitated the inter-university collaboration required to raise the scientific standards for clinical research toward those of basic research. Clinical and non-clinical investigators have worked as partners in the use of the STAFF and MALT databases to publish manuscripts in scientific journals that have qualified many young investigators to complete their PhD programs. It is the purpose of the STAFF/MALT council to present these guidelines to facilitate the future evolution of the STAFF and MALT meetings, and also to facilitate the development of similarly purposed clinical scientific meetings.

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