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Executive Summary

Atrial fibrillation diagnosis, affects more than 14 million over-65s for which the European Society of Cardiology has risen need for urgent action¹. As computational power increases, machine learning techniques are becoming more and more present and are integrated into many fields, especially in the healthcare sector. Machine learning has been used previously for both risk prediction and identification of the phenotypes of atrial fibrillation (AF). However, the resulting machine learning models were not externally validated or showed moderate predictive ability and high risk of bias in an external validation. Undoubtedly, there is room for improvement for the AF. We propose an unsupervised machine learning technique applied to an integrative model including clinical data, imaging data, electrocardiogram (ECG) signals and genetic variants. We will detect phenotypes within the population of AF using an initial cohort in a first stage, and then, extending the study to other cohorts to generalize the model in a federated learning scheme. In the context of the HealthyCloud, we will show the whole process from the data discoverability to the technical part and the development of the machine learning models. This will have a high impact in the other WPs, particularly in WP2 and WP5, considering a real case going through all the steps of implementation. With the inclusion of the functional requirements of the AF use case mapped as analysis requirements, WP5 can have a better understanding in order to perform a broad analysis of existing and planned computational solutions, in terms of both infrastructures for research and advanced data analysis. The legal barriers, we had to face to implement a federated learning, will be a potential source of information for WP2 that will incorporate by design the ethical and legal considerations. The discoverability of data is also a key point for other WPs which focus on how data is structured, organised, and accessed either individually (WP3), or through data hubs (WP4) and/or potentially discovered through the FAIR health data portal (WP6).

¹ <https://www.escardio.org/The-ESC/Press-Office/Press-releases/Atrial-fibrillation-set-to-affect-more-than-14-million-over-65s-in-the-EU-by-2060>

1. Background

1.1. Use case description

Atrial Fibrillation (AF) is the most frequently encountered cardiac arrhythmia in clinically practice². It manifests itself as an irregular and often rapid heart rate that might cause the increase of risk of strokes, heart failure and even death. Atrial fibrillation diagnosis, affects more than 14 million over-65s for which the European Society of Cardiology has risen need for urgent action.

The main issue in AF is that some of the patients are asymptomatic and an early detection cannot be diagnosed. Patients who develop AF have a higher risk of thromboembolic events, in particular stroke, because of the pooling of blood in the left atrium and embolization to the brain. The risk of stroke is increased fivefold in individuals with AF³.

For patients with undiagnosed AF, ischaemic stroke may be the first clinical manifestation of the condition. Only 10% of people who had an ischaemic stroke have been first diagnosed with AF. If it was possible to detect asymptomatic AF patients in an earlier stage, it would be possible to prevent strokes by offering anticoagulation treatments³.

Approximately one-sixth of all strokes are attributed to AF. Patients with thromboembolic stroke from AF have a higher mortality and morbidity than patients with other stroke types. Moreover, the more AF progresses, the more the stroke risk increases. The presence of AF is also associated with an approximately twofold higher risk of future acute myocardial infarction. It is estimated that, of those with persistent AF, one-third will not have symptoms and therefore a first presentation of persistent AF might be a stroke. Patients with persistent AF are the ones who would benefit the most from anticoagulation therapy for stroke prevention².

Some studies have shown that vascular risk factors (VRF) such as age, hypertension, obesity and other cardiovascular diseases (CVDs) predispose to AF. However, those models were not externally validated or showed moderate predictive ability and high risk of bias in an external validation⁴.

² Welton, Nicky J. et al. "Screening strategies for atrial fibrillation: a systematic review and cost-effectiveness analysis." *Health technology assessment* vol.21 (2017): 29.

³ Wolf, Philip A et al. "Atrial fibrillation as an independent risk factor for stroke: the Framingham Study." *Stroke* vol.22 (1991): 8.

⁴ Nadarajah, R et al. "Prediction of incident atrial fibrillation in community-based electronic health records: a systematic review with meta-analysis." *Heart* (2021).

In our knowledge, an integrative model considering different modalities for incident AF has not been yet explored. We propose an unsupervised technique applied to an integrative model including clinical data, imaging data, electrocardiogram (ECG) signals and genetic variants. We will detect subgroups within the population of AF of the UK Biobank⁵ (UKB) cohort in a first stage, and then, extended to other cohorts to generalize the model in a federated learning scheme.

1.2. Use case opportunities

This work will allow us a more early and precise AF diagnosis as well as a better personalised treatment for each patient. Moreover, it will help to have a better understanding of the complex cardiac structure and remodelling taking advantages of combining features of different modalities in an integrative hierarchical model. A similar study has not been analysed in literature, yet.

Apart from the clinical part, we will identify all the issues that we need to deal with from the initial stage of the study until we reach the technical part, starting from the discovery of potential data and fulfilment of the requirements for the ethical and legal regulations, up to the harmonization of the data from the different cohorts and creation of the models. This will have a high impact in the other WPs, particularly in WP2 and WP5, by considering a real case going through all the steps of implementation.

1.3. Use case challenges

The main challenge was to obtain sufficient incident AF events to build the models. Generally, research institutions start recording healthy participants. Some of these participants develop cardiovascular diseases and are tracked in a continuous and longitudinal follow-up. However, we found the number of incident AF cases very limited for each research centre, making it difficult to find powerful datasets to build the proposed models. In the case of the UKB, the main cohort that we used for our study, there are over half a million individuals recruited between 2006 and 2010. The incident CVDs are tracked using Hospital Episode Statistics (HES) and death registers to provide continuous tracking of the participants. In spite of the big number of participants included in the UKB, the number of patients who develop incident AF decreases up to 193 cases. The same occurred with the other research centres that we collaborated with. Hence, a multi-setting study approach will be considered. With the inclusion of different cohorts, problems of heterogeneities in the data and imbalance of the incident events distributions may be faced.

⁵Petersen, S. E et al. "The impact of cardiovascular risk factors on cardiac structure and function: Insights from the UK Biobank imaging enhancement study." PLOS vol 12 (2017):10.

The use of the data from different cohorts will result in a robust model externally validated decreasing the high risk of bias in an external validation. We will directly deal with the most important issues in literature and the main reason that previous machine learning models have not been introduced as a clinical tool for prediction of incident AF.

2. Data requirements

Initially, we identified the databases that contain the necessary information given the nature of the AF use case to conduct the proposed analysis. The data required includes health clinical data, biomarkers, genetic variants, imaging and ECGs. We identified possible cohorts in literature or via some connections of the group. From those, we selected the ones that had this data available and were willing to participate in this study.

2.1. Existing data

The patient registries used to support open challenges in conferences organized by PhysioNet or MICCAI were firstly identified. However, only the ECGs were available and there was no possibility to obtain the clinical data from those subjects except from the UKB repositories. Then, the public patient registries were discarded for this project. To identify potential databases, we requested a minimum data requirement to the cohorts in order to participate in our study:

- Health and clinical data (AF related outcomes such as medication, interventions e.g. ablation, treatment response, hospitalisation, doctor visits, mortality, etc.);
- Imaging to: first, quantify cardiac structure, function and viability, thus to assess aetiology and associated cardiac comorbidities, e.g. heart failure; second, brain imaging to avoid side-effects and first choice therapy, as AF is a major risk factor for transient ischemic attack /stroke (due to emboli) and anticoagulation treatments may lead to a higher chance of brain haemorrhage.
- ECG to assess heartrhythm and electrical activity across individuals.
- Genetic variants (Single-nucleotide polymorphism) to estimate associated risks (including genome-wide association studies such as AFGEN but also CARDIOGRAMplusC4D and HERMES);
- Biomarkers (High-sensitive troponin, N-terminal B-type natriuretic peptide, and C-reactive protein) and lab results (e.g. blood pressure, glucose/insulin levels, etc.);
- Medical history, lifestyle information and family history (history of stroke);
- Data from research (rich phenotypes and omics data), clinical registries (longitudinal follow-up) and digital technologies (app-based follow-up of AF patients).

Only the cohorts fulfilling the minimum requirement are considered. We reached an agreement with the UKB to start our experiments. A second agreement was reached with the University of Greifswald where the contract is in process to be signed by the University of Barcelona. Finally, in a more initial stage, we found two

more databases available from the University Medical Center Hamburg and McGill University Health Center, which are currently collecting all the data requested. Those databases are described in Table 1. In Annex I, the variables extracted are described. At this stage, only the UKB variables are available as we are waiting for the data extraction from the other cohorts.

Participant No	Participant organisation name	Short name	Country
1	UK Biobank Team	UKB	United Kingdom
2	University of Greifswald	SHIP	Germany
3	University Medical Center Hamburg	HCHS	Germany
4	McGill University Health Centre	MUHC	Canada

Table 1: The databases available for the atrial fibrillation use case.

2.2. Desired data

At this point, we have only available the UKB data. In the case of SHIP, we are still waiting for the signature from our home institution, University of Barcelona, before we can send the contract back to the research institution and move forward with the data request. In the case of the HCHS and the MUHC, the process just started. They are still extracting the data. We expect to have the extraction of the variables finished by the end of May, 2022. Unfortunately, HCHS does not fulfil all the requirements as the genetic variants are not available. The reason for this is that the procedure of data recording is in an initial stage and genetic variables are not usually collected. However, we will continue with the request procedure. In the future, we will discuss if it is possible to obtain the missing variables. If it is not the case, we will decide if the HCHS cohort or those variables will be included in the analysis.

2.3. Data access challenges

The procedure to request data is relatively slow both for the discoverability of the data and for the procedure to obtain the data. For discoverability, you need to identify, through Google Scholar or from collaborators' contacts, the research institutions who have data fulfilling the requirements, as there are not available

any patient registries in Europe containing all the required information, except the UKB. Once the cohorts are identified, an initial meeting must be held to explain the research project proposal. If they are satisfied with the proposal, a formalization by writing the project proposal will be the next step. In a centralized system, you must include the following specifications:

- Background, objectives and methodology of the project.
- The required variables you want them to extract: ECGs, biomarkers, CMR images and so on.
- Sample size
- The server specifications and what levels of security are available to store the data, clarifying what methods for anonymization are going to be used and confirming that no datasets are going to be shared to third parties.
- Dissemination plan indicating the number of papers and conferences you expect to publish using the requested database.

Once, the project proposal is accepted, the research institution must extract all the variables available of the ones you requested in the proposal, and it can take up to four months to be collected. Mapping variables is a manual process and it usually takes several months. The research institution are usually in contact with the accountable researcher in case that some variables are not found and a solution is discussed between both institutions. Before the delivery of the datasets, a contract must be signed by both sides. Digital signatures are not usually allowed for security reasons and the contract cannot be sent via email if there is not a justification for that. The whole procedure can take up to one year.

In a federated scheme, that it is what we want finally to achieve, this process becomes even more complex and slower than a centralized system. The project proposal must also include the goal of the project, the clinical problem definition, sample size, hardware specifications and some explanation of the technology. The most significant difference of the project proposal compared with the one of a centralized system is that you need to specify the hardware requirements on their side as the training is happening locally in each research centre. They also need to be supplied with the necessary tools to run machine learning models as the data should not be exposed to anyone outside the research centre.

3. Analysis requirements

First, the feature extraction must be performed. Some of the variables can be directly used such as the diabetes or hypertension status, but some others must be extracted. This is the case for the CMR radiomics⁶ which aim to extract a large number of quantitative features from medical images using data characterization algorithms. Radiomics features will be extracted from the CMR images and the corresponding contours using the open-source python-based PyRadiomics library (version 2.2.0) in end-diastole and end-systole. The features encode two phases: end-diastolic and end-systolic information of left ventricle, right ventricle and myocardium.

To compute the Radiomic features, we extract the relevant information present in the image by using three classes of features (Figure 1):

- First-Order Features: are histogram-based features related to the distribution of the grey level values in the tissue, without focusing on their spatial relationships.
- Shape Features: describe geometrical properties of the organ, such as volume, diameter, minor/major axis and sphericity.
- Texture Features are derived from images which encode the global texture information considering their spatial relationships.

For each chamber, 16 shape, 19 first-order, and 73 texture features will be estimated. To reduce the number of features, an initial correlation analysis will be performed reducing the features that are highly correlated and keeping only one. The resulting radiomic features will be combined with the variables considered in our study such as medical history, ECG signals, biomarkers and genetic variants. The extraction of ECG features or the use of the whole signal will also be analysed.

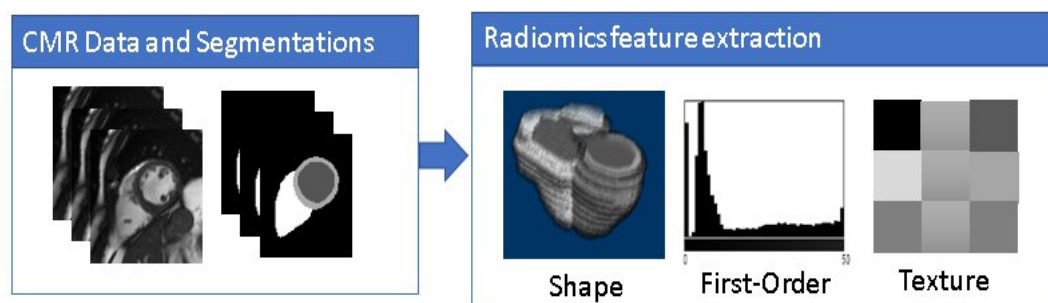


Figure 1: The CMR Radiomics extraction based on shape, first-order and texture features.

⁶ Raisi-Estabragh, Z. et al. "Cardiac magnetic resonance radiomics: basic principles and clinical perspectives." European heart journal vol 21 (2020):4.

3.1. Types of analysis envisaged

We aimed to identify different groups of patients with AF who shared common clinical phenotypes to evaluate the association between identified clusters. The hierarchical clustering technique will be considered due to its numerous properties. The main advantages of the clustering analysis algorithm are that the number of clusters are computed automatically and the resulting dendrogram gives a visualization of the hierarchical relationship between the identified groups. The clustering procedure starts by treating each observation as a separate cluster. Then, it iteratively identifies the two clusters that are closest together and merge the two most similar clusters. The process is repeated until all the clusters are merged together as shown in Figure 2.

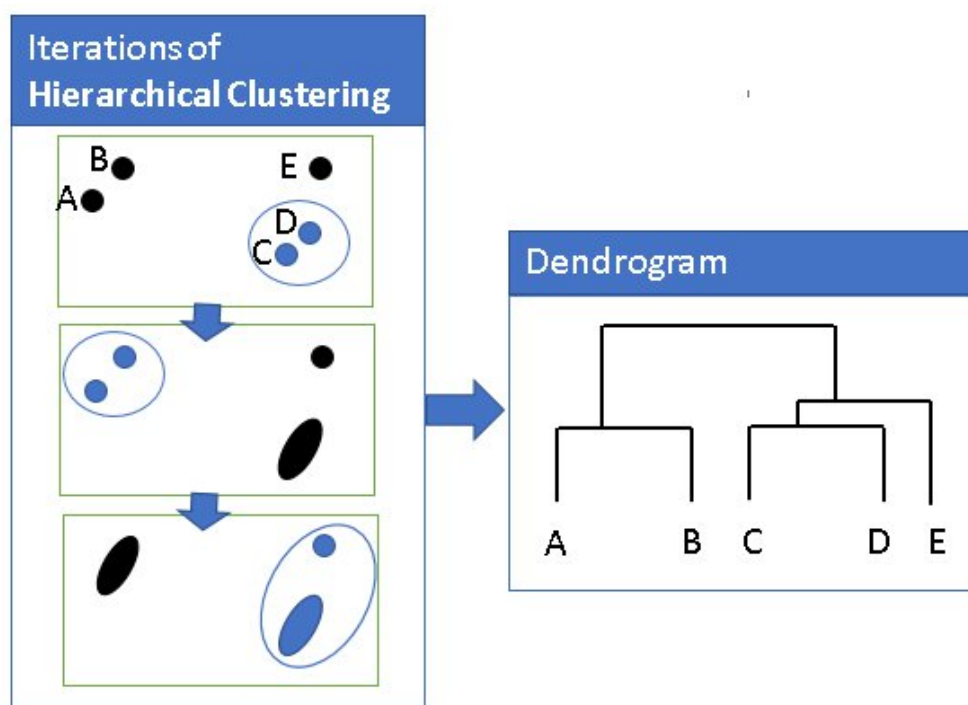


Figure 2: The process of the Hierarchical Clustering algorithm detecting the two clusters that are closest together and merging the two most similar clusters. The circles show the two selected clusters. The method results in a dendrogram showing the relationship among clusters.

Continuous variables will be reported as mean and standard deviations and categorical variables as percentages. For comparison among clusters, Chi-square test or Fisher's exact test will be used for categorical variables, and Kruskal-Wallis test for continuous features. P-values of less than 0.05 will be considered statistically significant.

Proportional hazards regression models will be computed to examine the differences in hazard ratios of the variables between the identified groups. While mortality is usually the primary event of interest for survival analysis, this type of

analysis can also be used to assess treatment failure including outcomes such as hospitalization or ablation. We will also examine interactions between variables for the binary outcomes related to the AF case (e.g., ablation, treatment response and hospitalisation) using classical machine learning classifiers.

3.2. Analysis development challenges

The main limitations come from moving from a centralized scheme to a federated learning framework⁷. Fortunately, the legal issues of the patient data in a federated learning is not something that we must deal with, as the patient data is not exposed outside the research centre and the legal regulations are performed within each research institution to collect the data. However as described in Section 2.3, we still need to write a project proposal for their own ethical committee. This process must be performed for each cohort you want to include in your study, so this makes the process relatively slow. Each institution usually has their own template. You can use the same information for all the cohorts but a different document must be filled in for each participant.

From a technical perspective, the process itself is also very challenging. We first initialize a global model on a central server that will be initially pre-trained with the UKB cohort. Then, the pre-trained model will be distributed across the research institutions. The initialization of each model must be the same in all the research centres in order to aggregate the information of each model. Each model will be trained in each client in the research centre. Each client computes the model performance on each cluster model and gets assigned to the cluster with the most fitting mode. The scheme of the federated learning for the AF use case is shown in Figure 3.

⁷ Linardos, A. et al. "Federated learning for multi-center imaging diagnostics: a simulation study in cardiovascular disease." Scientific Reports vol 12 (2022):1.

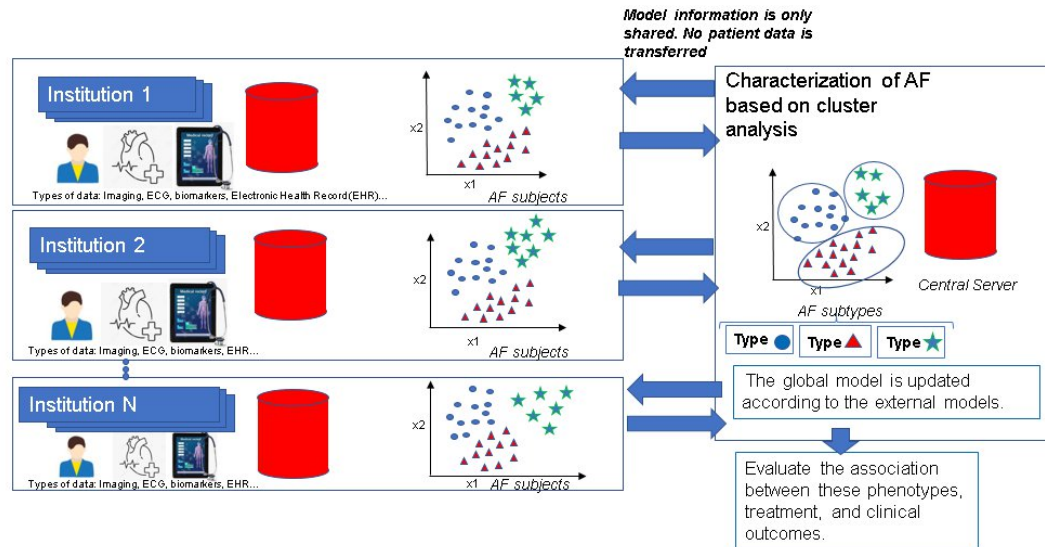


Figure 3: The federated learning process which shows how a global model pre-trained in the central server is shared across the research institutions and the resulting information is sent back again to the central server whose global model is updated and sent again until certain convergence is reached. No patient data is transferred or exposed in this scheme.

In order to implement this framework, some issues must be considered:

- The communication overhead between the clients and the centre server. In addition to that, there is certain risk of loss of transmission packets, limited network bandwidth or security/privacy breach. Then, some encryption and compression techniques must be adopted to reduce the model size and secure the privacy. The encryption methods make the federated learning framework even more secure; although as discussed, no patient data is shown outside the research centre, not even to the programmer.
- Moreover, the models are trained in each research centre so a heterogeneous aggregation can produce a degradation of the performance. Different computational power and variety of data such as a different acquisition protocols, the variety of scanners, label imbalance and size might cause a drastically variation, making the trained client models hard to aggregate. In order to alleviate these issues some pre-processing techniques will be considered such as histogram matching from a reference data sample from the central server⁸.

⁸ Sada, A. et al. "Histogram-based image pre-processing for machine learning." Global Conference on Consumer Electronics (2018).

4. Summary

4.1. Detected data access challenges

The procedure for data request is relatively slow both for the data discoverability and for the procedure to obtain the data. For discoverability, you need to identify the research institutions which have available the required data via google scholar or from personal contacts and have an initial meeting to explain your project proposal. If they accept the proposal, a formalization by writing the project proposal will be the next step to address their ethical committee. In the case of federated learning, the project proposal must also include what technical requirements will be necessary in the research centre, making this process even slower as the research institution must provide the minimum technical specifications in order to run the necessary tools that we will provide to run the machine learning models.

4.2. Detected data analysis challenges

The main limitations come from the distribution issues of the federated learning framework. The legal issues of the patient data in a federated learning is not something that we must deal with, as the patient data is not exposed outside the research centre and the legal regulations are performed within each institution to collect the data. However, we still need to write a project proposal for their own ethical committee. This process must be performed for each cohort you want to include in your study so this makes the process relatively slow. Each institution usually has their own template. You can use the same information for all the cohorts but a different document must be filled in for each participant. The technical part is also very challenging. Some of the technical aspects, we need to face are the following: the communication overhead between the research institutions and the centre server, the risk of loss of transmission packets, limited network bandwidth or privacy breach. Then, some encryption and compression techniques must be adopted to reduce the model size and secure the privacy. The encryption methods make the federated learning framework even more secure; although as discussed, no patient data is shown outside the research centre, not even to the programmer. In addition to the transmission issues, the heterogeneities of each research centre (different acquisition protocols, the variety of scanners, label imbalance, size and different computational power) must also be dealt as heterogeneous aggregation can produce a degradation of the performance of the model making the trained client models hard to aggregate. In order to alleviate these issues some pre-processing techniques will be considered such as histogram matching from a reference data sample from the central server.

Annex I: Extraction of Variables

Name	Label	Type	Categories
'MBIRTH'	'Month and year of birth (month, year)'	'Textual'	'99999: insufficient data'
'SEX'	'Sex'	'Integer'	'1: male 2: female'
'COHORT'	'Cohort identification'	'Textual'	'Id cohort'
'DEXAM'	'Date of examination (day, month, year)'	'Date'	'99999999: insufficient data'
'EAGE'	'Age on the date of examination'	'Integer'	'99: insufficient data'
'ROUNDS'	'Measurement round'	'Textual'	'1: baseline measurement round of the cohort 2: second measurement round of the cohort 3: third measurement round of the cohort 4: fourth measurement round of the cohort 5: fifth measurement round of the cohort 6: sixth measurement round of the cohort 7: seventh measurement round of the cohort 8: 8th measurement round of the cohort 9: 9th measurement round of the cohort'
'ENTRY'	'First measurement round for the person'	'Textual'	'1: 01 if the person entered the cohort in ROUNDS 01 2: 02 if the person entered the cohort in ROUNDS 02 3: 03 if the person entered the cohort in ROUNDS 03 4: 04 if the person entered the cohort in ROUNDS 04 5: 05 if the person entered the cohort in ROUNDS 05 6: 06 if the person entered the cohort in ROUNDS 06 7: 07 if the person entered the cohort in ROUNDS 07 8: 08 if the person entered the cohort in ROUNDS 08 9: 09 if the person entered the cohort in ROUNDS 09'
'MG_MARIT'	'Marital status'	'Integer'	'1: single 2: married or cohabiting 3: separated or divorced 4: widowed 5: other 9: insufficient data'
'MG_EDLEVEL'	'"What is the highest level of education you have completed?"'	'Integer'	'1: university or college or equivalent 2: intermediate between secondary level and university (e.g. technical training) 3: secondary school 4: primary school only (or less) 9: insufficient data'
'MG_SCHOOL'	'"How many years have you spent at school or in full time study?"'	'Integer'	'99: insufficient data'
'MG_CIGS'	'"Do you smoke cigarettes now?"'	'Integer'	'1: yes, regularly 2: no 3: occasionally 9: insufficient data'
'MG_NUMCIGS'	'"On average how many cigarettes do you now smoke a day?"'	'Integer'	'888: irrelevant if CIGS = 2 999: insufficient data'
'MG_DAYCIGS'	'"On how many days a week do you smoke cigarettes?"'	'Integer'	'1: usually on one day a week or less 2: usually on 2 to 4 days a week 3: almost every day 8: irrelevant if CIGS = 1 or 2 9: insufficient data'

'MG_evercig'	""Did you ever smoke cigarettes regularly in the past?""	'Integer'	'1: yes, regularly in the past, but not now 2: no 8: Irrelevant if CIGS = 1 9: insufficient data'
'MG_STOP'	""When did you stop smoking cigarettes regularly?" Record the year (four digits)""	'Integer'	'8888: irrelevant if CIGS = 1 or EVERCIG = 2 9999: insufficient data'
'MG_IFLYEAR'	""When did you stop smoking cigarettes regularly?" If in the last 12 months""	'Integer'	'1: less than a month ago 2: between 1 and 6 months ago 3: between 6 and 12 months ago 8: not in the last 12 months, or CIGS = 1 or EVERCIG = 2 9: insufficient data'
'MG_MAXCIGS'	""What is the highest average daily number of cigarettes you have ever smoked for as long as a year?""	'Integer'	'888: irrelevant if EVERCIG = 2 999: insufficient data'
'MG_CIGAGE'	""How old were you when you began to smoke cigarettes regularly?""	'Integer'	'88: irrelevant if EVERCIG = 2 99: insufficient data'
'MG_CIGARSM'	""Have you ever smoked cigars/cigarillos?""	'Integer'	'1: now smoke regularly 2: no 3: now smoke occasionally (less than one/day) 4: used to, but not now 9: insufficient data'
'MG_CIGAR'	""About how many cigars/cigarillos do you smoke per week?" "	'Integer'	'888: irrelevant if CIGARSM = 2 or 4 999: insufficient data'
'MG_PIPESM'	""Have you ever smoked a pipe?""	'Integer'	'1: now smoke regularly 2: no 3: now smoke occasionally (less than once a day) 4: used to, but not now 9: insufficient data'
'MG_PIPE'	""About how many grams of pipe tobacco do you smoke per week?" Record the number of grams. (1 ounce = 30 grams)""	'Integer'	'888: irrelevant if PIPESM = 2 or 4 999: insufficient data'
'MG_OTHERSM'	""For how many hours, on average each day, are you closely subjected to other people's tobacco smoke?" Record the number of hours.""	'Integer'	'88: irrelevant if CIGS = 1 99: insufficient data'
'MG_HIBP'	""Have you ever been told by a doctor or other health worker that you have high blood pressure?""	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_DRUGS'	""Are you taking (in the last two weeks) drugs for high blood pressure?""	'Integer'	'1: yes 2: no 3: uncertain 8: irrelevant if HIBP = 8 9: insufficient data'
'MG_BPRED'	""Have you had your blood pressure measured in the last year?""	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HICH'	""Have you ever been told by a doctor or other health worker that you have high	'Integer'	'1: yes 2: no 9: insufficient data'

	blood cholesterol?""		
'MG_CHDT'	""Are you on a special diet prescribed by a doctor or other health worker to lower your blood cholesterol level?""	'Integer'	'1: yes 2: no 3: uncertain 8: irrelevant if HIGH = 2 9: insufficient data'
'MG_CHRX'	""Are you taking (in the last two weeks) pills or other medicine prescribed by a doctor to lower your blood cholesterol level?""	'Integer'	'1: yes 2: no 3: uncertain 8: irrelevant if HIGH = 2 9: insufficient data'
'MG_CHRECD'	""Have you had your blood cholesterol measured in the last year?""	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_ASP'	""Are you taking (in the last two weeks) aspirin tablets to prevent or treat heart disease?""	'Integer'	'1: yes, taking tablets for this reason 2: no, I am not taking aspirin tablets 3: no, but I am taking tablets for reasons unconnected with heart condition 9: insufficient data'
'MG_MENOP'	""Are you still having monthly periods?""	'Integer'	'1: yes, as usual 2: yes, but irregularly 3: no 8: not relevant 9: insufficient data'
'MG_AGEM'	""How old were you when your periods stopped completely?""	'Integer'	'88: not relevant 99: insufficient data'
'MG_HORM'	""Are you taking (in the last month) sex hormones (estrogens) for menopausal symptoms?""	'Integer'	'1: yes 2: no 8: not relevant 9: insufficient data'
'MG_PILL'	""Are you taking (in the last two months) contraceptive pills or injections?""	'Integer'	'1: yes 2: no 8: not relevant 9: insufficient data'
'MG_CUFF'	'Cuff used for blood pressure measurement'	'Integer'	'9: insufficient data'
'MG_ARM'	'Upper arm circumference (cm)'	'Integer'	'99: insufficient data'
'MG_BPCODER'	'Blood pressure measurer'	'Integer'	'88: blood pressure not measured 99: insufficient data, although blood pressure measured'
'MG_TIMEBP'	'Time of day of blood pressure measurement (hour, minute)'	'Textual'	'8888: blood pressure not measured 9999: insufficient data, although blood pressure measured'
'MG_RTEMP'	'Room temperature during blood pressure measurement (^o^C)'	'Integer'	'88: blood pressure not measured 99: insufficient data, although blood pressure measured'
'MG_DCHOL'	'Date of the serum total cholesterol laboratory analysis '	'Date'	'99999999: total cholesterol was not measured or the date is not available'
'MG_DHDL'	'Date of HDL cholesterol laboratory analysis (day,	'Date'	'99999999: HDL-cholesterol was not measured or the date is not available'

	month, year)'		
'MG_SCN'	'Serum thiocyanate (?mol/l). '	'Integer'	'777: this optional measurement not done in the survey 888: blood specimen not taken or mislaid in the laboratory 999: person did not attend the survey examination'
'MG_COTIN'	'Serum cotinine (nmol/l). '	'Integer'	'7777: this optional measurement not done in the survey 8888: blood specimen not taken or mislaid in the laboratory 9999: person did not attend the survey examination'
'MG_CARBMON'	'Expired air carbon monoxide (ppm). '	'Integer'	'77: this optional measurement not done in the survey 99: insufficient data'
'MG_HEIGHT'	'Height, centimetres'	'Integer'	'999: insufficient data'
'MG_WEIGHT'	'Body weight (100 g) to nearest 200 g'	'Integer'	'9999: insufficient data'
'MG_WAIST'	'Waist circumference (cm and a decimal, rounded to the nearest 0 or 5)'	'Decimal'	'9999: insufficient data'
'MG_HIP'	'Hip circumference (cm and a decimal, rounded to the nearest 0 or 5)'	'Decimal'	'9999: insufficient data'
'MG_WHCODER'	'Waist and hip measurer'	'Integer'	'88: waist and hip not measured 99: insufficient data'
'MG_CTRY'	'Country of birth'	'Integer'	'1: in the country of the Participating Centre (MPC) 2: outside the country of the Participating Centre (MPC) 9: insufficient data'
'MG_PARCTRY'	'Parents' country of birth'	'Integer'	'1: both parents born in the country of the Participating Centre (MPC) 2: at least one parent born outside the country of the Participating Centre (MPC) 9: insufficient data'
'MG_ETHNIC'	'Ethnic group'	'Integer'	'1: European 2: other 9: insufficient data'
'MG_PREGNA'	'Have you ever been pregnant?'	'Integer'	'1: yes 2: no 8: irrelevant (SEX = 1, male) 9: insufficient data'
'MG_NPREGNA'	'How many times have you been pregnant?'	'Integer'	'88: irrelevant (SEX = 1, male. Optionally also if PREGNA = 2) 99: insufficient data'
'MG_PARITY'	'How many live births have you given?'	'Integer'	'88: irrelevant (SEX=1, male. Optionally also if PREGNA = 2) 99: insufficient data'
'MG_REMENOP'	'If you have stopped having monthly periods was it because of 1-4 reasons'	'Integer'	'1: hysterectomy, alone 2: hysterectomy, oophorectomy unknown 3: bilateral oophorectomy with or without hysterectomy 4: menopause 8: irrelevant (MENOP on Form 20 is 1 or 2 still having monthly periods, or male) 9: insufficient data'
'MG_EMPLOY'	'Are you currently in employment?'	'Integer'	'1: yes, in a full-time or part-time job 2: housewife, homemaker 3: no, unemployed, seeking work 4: no, retired or long-term disabled 5: no, a full-time student 9: insufficient data'
'MG_WKTYPE'	'Your type of work?'	'Integer'	'1: manual 2: non-manual 3: self-employed - owner of shop, small enterprise or business, or farmer 8: irrelevant (optional, if WKTYPE refers to current work and EMPLOY is

			2, 3, 4 or 5) 9: insufficient data'
'MG_WKSET'	'What is your work setting?'	'Integer'	'1: agriculture 2: industry 3: services (hospital, education, public administration and services) 4: commerce, trade or business 8: irrelevant (optional, if WKTYPE refers to current work and EMPLOY is 2, 3, 4 or 5) 9: insufficient data'
'MG_ALCAVE'	'Average daily consumption of alcohol (g)'	'Integer'	'0: none 999: insufficient data'
'MG_ALCPROW'	'Wine as a proportion of total alcohol consumption (%)'	'Integer'	'888: irrelevant (ALCAVE is 000 or 999) 999: insufficient data'
'MG_ALCPROB'	'Beer as a proportion of total alcohol consumption (%)'	'Integer'	'888: irrelevant (ALCAVE is 000 or 999) 999: insufficient data'
'MG_ALCPROS'	'Spirits as a proportion of total alcohol consumption (%)'	'Integer'	'888: irrelevant (ALCAVE is 000 or 999) 999: insufficient data'
'MG_ALCPAT'	'Drinking pattern'	'Integer'	'1: lifelong abstainer 2: ex-Drinker 3: less than once a week 4: 1-2 days per week 5: 3-5 days per week 6: 6-7 days per week 9: unknown'
'MG_HISMI1'	'Documented history of myocardial infarction or unstable angina pectoris'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISMI2'	'Self-reported history of myocardial infarction'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISMI3'	'ECG changes indicating myocardial infarction'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISMI4'	'"Rose questionnaire: "Have you ever had a severe pain across the front of your chest lasting for half an hour or more?"'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISREV1'	'Documented history of cardiac revascularization'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISREV2'	'Self-reported history of cardiac revascularization'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISAP1'	'Documented history of stable angina pectoris'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISAP2'	'Stable angina pectoris by Rose" questionnaire (chest pain on effort)'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISAP3'	'Self-reported history of stable angina pectoris'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISUC'	'History of coronary heart disease, type unspecified'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISSTR1'	'Documented history of stroke'	'Integer'	'1: yes 2: no 9: insufficient data'

'MG_HISSTR2'	'Self-reported history of stroke'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISDIAB'	'History of diabetes'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_ABLAT'	'History of Ablation'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HOSP'	'History of Hospitalization'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_TREAT'	'History of Treatment'	'Integer'	'1: anticoagulants 2: beta-blockers 3: Intravenous diltiazem 4: None 5: insufficient data'
'MG_TREDIAB'	'Current treatment of diabetes'	'Integer'	'1: insulin 2: tablets, but not insulin 3: diet only 8: irrelevant (HISDIAB is 2, no) 9: insufficient data'
'MG_FHISCHD'	'Family history of coronary heart disease (CHD)'	'Integer'	'1: yes, first degree relative has had a premature CHD event 2: no 9: insufficient data'
'MG_FHISSTR'	'Family history of stroke'	'Integer'	'1: yes, first degree relative has had premature stroke 2: no 9: insufficient data'
'MG_CPAIN'	'"Have you ever had any pain or discomfort in your chest?" (Chest pain on effort, Rose" questionnaire)'"	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_CPAINUP'	'"Do you get it when you walk uphill or hurry?" (Chest pain on effort, Rose" questionnaire)'"	'Integer'	'1: yes 2: no 3: never hurries or walks uphill 8: irrelevant (CPAIN = 2, no) 9: insufficient data'
'MG_CPAINOP'	'"Do you get it when you walk at an ordinary pace on the on the level?" (Chest pain on effort, Rose" questionnaire)'"	'Integer'	'1: yes 2: no 8: irrelevant (CPAINUP = 2 or 8) 9: insufficient data'
'MG_CPAINDO'	'"What do you do if you get it while you are walking?" (Chest pain on effort, Rose" questionnaire)'"	'Integer'	'1: stop or slow down 2: carry on 8: irrelevant (CPAINUP = 2 or 8) 9: insufficient data'
'MG_CPAINST'	'"If you stand still, what happens to it?" (Chest pain on effort, Rose" questionnaire)'"	'Integer'	'1: relieved 2: not relieved 8: irrelevant (CPAINDO = 2 or 8) 9: insufficient data'
'MG_CPAINHS'	'"How soon?" (Chest pain on effort, Rose" questionnaire)'"	'Integer'	'1: 10 minutes or less 2: more than 10 minutes 8: irrelevant (CPAINST = 2 or 8) 9: insufficient data'
'MG_CPLOC1'	'"Will you show me where it was?" Sternum (upper or middle) (Chest pain on effort, Rose" questionnaire)'"	'Integer'	'1: yes 2: no 8: irrelevant (CPAINHS = 2 or 8) 9: insufficient data'
'MG_CPLOC2'	'"Will you show me where it was?" Sternum (lower) (Chest pain on effort, Rose" questionnaire)'"	'Integer'	'1: yes 2: no 8: irrelevant (CPAINHS = 2 or 8) 9: insufficient data'
'MG_CPLOC3'	'"Will you show me where it was?" Left anterior chest (Chest pain on effort, Rose" questionnaire)'"	'Integer'	'1: yes 2: no 8: irrelevant (CPAINHS = 2 or 8) 9: insufficient data'

	questionnaire)""		
'MG_CPLOC4'	""Will you show me where it was?" Left arm (Chest pain on effort, Rose" questionnaire)""	'Integer'	'1: yes 2: no 8: irrelevant (CPAINHS = 2 or 8) 9: insufficient data'
'MG_CPLOC5'	""Will you show me where it was?" Other (Chest pain on effort, Rose" questionnaire)""	'Integer'	'1: yes 2: no 8: irrelevant (CPAINHS = 2 or 8) 9: insufficient data'
'MG_CPLOC'	""Do you feel it anywhere else?" (Chest pain on effort, Rose" questionnaire)""	'Integer'	'1: yes 2: no 8: irrelevant (CPAINHS = 2 or 8) 9: insufficient data'
'MG_MINN1A'	'Minnesota code 1: Q and QS patterns, if present in anterolateral site (leads I, aVL, V6)'	'Integer'	
'MG_MINN1B'	'Minnesota code 1: Q and QS patterns, if present in posterior (inferior) site (leads II, III, aVF)'	'Integer'	
'MG_MINN1C'	'Minnesota code 1: Q and QS patterns, if present in anterior site (leads V1, V2, V3, V4, V5)'	'Integer'	'100: absent Minnesota code refer to "http://ers.stlcc.edu/departments/fvbio/ECG_MNcode.pdf" 199: insufficient data 188: irrelevant (MINN1A, MINN1B or MINN1C is other than 199)'
'MG_MINN1U'	'Minnesota code 1: Q and QS patterns, if present, but the site was not recorded'	'Integer'	'100: absent Minnesota code refer to "http://ers.stlcc.edu/departments/fvbio/ECG_MNcode.pdf" 199: insufficient data 188: irrelevant (MINN1A, MINN1B or MINN1C is other than 199)'
'MG_DTRIGL'	'Date of the laboratory analysis of serum triglycerides (day, month, year)'	'Date'	'99999999: triglycerides were not measured or the date is not available'
'MG_FASTING'	'Fasting status'	'Integer'	'1: fasting, overnight fasting or fasting known to have lasted at least 8 hours before blood sampling 2: semi-fasting, fasting before blood sampling lasted at least 4 hours but less than overnight or 8 hours 3: non-fasting, has eaten within 4 hours before blood sampling 9: insufficient data'
'MG_DFIBR'	'Date of the laboratory analysis of plasma fibrinogen (day, month, year)'	'Date'	'99999999: fibrinogen was not measured or the date is not available'
'MG_PULSE'	'Pulse rate (beats/60 seconds)'	'Integer'	'999: insufficient data'
'MG_PREG_STATUS'	'Pregnancy status'	'Integer'	'1: pregnant 2: not pregnant 8: irrelevant (SEX = 1) 9: insufficient data'
'MG_HIST1DM1'	'Documented history of type 1 diabetes mellitus'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HIST1DM2'	'Self-reported history of type 1 diabetes mellitus'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HIST2DM1'	'Documented history of type	'Integer'	'1: yes 2: no 9: insufficient data'

	2 diabetes mellitus'		
'MG_HIST2DM2'	'Self-reported history of type 2 diabetes mellitus'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISHF1'	'Documented history of heart failure'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISHF2'	'Self-reported history of heart failure'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISAF1'	'Documented history of atrial fibrillation'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISAF2'	'Self-reported history of atrial fibrillation'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISPVD1'	'Documented history of peripheral vascular disease'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISPVD2'	'Self-reported history of peripheral vascular disease'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISVTE1'	'Documented history of venous thromboembolism'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_HISVTE2'	'Self-reported history of venous thromboembolism'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_EXREAS'	'Reason for exit from the study'	'Integer'	'1: death 2: end of the follow-up period of the cohort 3: the person moved away 4: refusal to participate in the study 5: other, person's vital status known or likely to be known until the date specified, but not thereafter'
'MG_DEATHDU'	'ICD code of the underlying cause of death'	'Textual'	'888: irrelevant (EXREAS = 2, 3, 4 or 5) NNN: insufficient data'
'MG_UCDSOUR'	'Source of the diagnosis of the underlying cause of death'	'Integer'	'1: final official codes 2: death certificate 8: irrelevant (DEATHDU = 888 or NNN) 9: insufficient data'
'MG_DEATHDA'	'Death certificate or final death diagnoses. ICD code of the disease or condition directly leading to death'	'Textual'	'888: irrelevant (EXREAS = 2, 3, 4 or 5) NNN: insufficient data'
'MG_DEATHDB'	'Death certificate or final death diagnoses. ICD code of the intervening antecedent cause of death'	'Textual'	'888: irrelevant (EXREAS = 2, 3, 4 or 5) NNN: insufficient data'
'MG_DEATHDC'	'Death certificate or final death diagnoses. ICD code of the underlying antecedent cause of death'	'Textual'	'888: irrelevant (EXREAS = 2, 3, 4 or 5) NNN: insufficient data'
'MG_DEATHDO'	'Death certificate or final death diagnoses. ICD code of other significant condition contributing to '	'Textual'	'888: irrelevant (EXREAS = 2, 3, 4 or 5) NNN: insufficient data'
'MG_ICDVERD'	'Death certificate or final death diagnoses. ICD-version'	'Integer'	'1: ICD 8 2: ICD 9 3: ICD 10 8: irrelevant (each DEATHD* = 888 or NNN)'

	used for causes of death'		
'MG_NECP'	'Necropsy performed, if the person died during the follow-up'	'Integer'	'1: yes 2: no 8: irrelevant (EXREAS = 2, 3, 4, 5 or 6) 9: insufficient data'
'MG_AGEGR5'	'Age group on the date of examination in 5-year age groups'	'Integer'	'1: Age in years on the date of examination < 35 2: 35 <= Age in years on the date of examination < 40 3: 40 <= Age in years on the date of examination < 45 4: 45 <= Age in years on the date of examination < 50 5: 50 <= Age in years on the date of examination < 55 6: 55 <= Age in years on the date of examination < 60 7: 60 <= Age in years on the date of examination < 65 8: Age in years on the date of examination >= 65'
'MG_AGEGR10'	'Age group on the date of examination in 10-year age groups'	'Integer'	'1: Age in years on the date of examination < 35 2: 35 <= Age in years on the date of examination < 45 3: 45 <= Age in years on the date of examination < 55 4: 55 <= Age in years on the date of examination < 65 5: Age in years on the date of examination >= 65'
'MG_AGE1'	'Derived age at the date of examination (in years)'	'Decimal'	'999.99: insufficient data'
'MG_EXREASC'	'Reason for the exit from the follow-up for non-fatal coronary events. If the date of exit for non-fatal coronary events is different from the date of exit for fatal events, here is described the reason for the earlier exit.'	'Integer'	'1: the MPC stopped the follow-up for non-fatal coronary events on that day 2: the person moved away 3: refusal to participate in the follow-up for nonfatal coronary events 4: other 8: irrelevant'
'MG_EXREASS'	'Reason for the exit from the follow-up for non-fatal stroke events. If the date of exit for non-fatal coronary events is different from the date of exit for fatal events, here is described the reason for the earlier exit.'	'Integer'	'1: the MPC stopped the follow-up for non-fatal stroke events on that day 2: the person moved away 3: refusal to participate in the follow-up for nonfatal stroke events 4: other 8: irrelevant'
'MG_HFCHD'	'Underlying diseases or conditions for heart failure, coronary heart disease'	'Integer'	'1: yes 2: no 8: irrelevant (no heart failure) 9: insufficient data'
'MG_HFCMY'	'Underlying diseases or conditions for heart failure, cardiomyopathy'	'Integer'	'1: yes 2: no 8: irrelevant (no heart failure) 9: insufficient data'
'MG_HFVALVE'	'Underlying diseases or conditions for heart failure, valve disorder'	'Integer'	'1: yes 2: no 8: irrelevant (no heart failure) 9: insufficient data'
'MG_HFARR'	'Underlying diseases or conditions for heart failure, arrhythmia'	'Integer'	'1: yes 2: no 8: irrelevant (no heart failure) 9: insufficient data'
'MG_HFHYPERT'	'Underlying diseases or conditions for heart failure, hypertension'	'Integer'	'1: yes 2: no 8: irrelevant (no heart failure) 9: insufficient data'

	hypertension'		
'MG_HFDIAB'	'Underlying diseases or conditions for heart failure, diabetes'	'Integer'	'1: yes 2: no 8: irrelevant (no heart failure) 9: insufficient data'
'MG_HFALK'	'Underlying diseases or conditions for heart failure, alcohol abuse'	'Integer'	'1: yes 2: no 8: irrelevant (no heart failure) 9: insufficient data'
'MG_AFCHD'	'Underlying diseases or conditions for atrial fibrillation, coronary heart disease'	'Integer'	'1: yes 2: no 8: irrelevant (no atrial fibrillation) 9: insufficient data'
'MG_AFVALVE'	'Underlying diseases or conditions for atrial fibrillation, valve disorder'	'Integer'	'1: yes 2: no 8: irrelevant (no atrial fibrillation) 9: insufficient data'
'MG_AFCARD'	'Underlying diseases or conditions for atrial fibrillation, other cardiac condition'	'Integer'	'1: yes 2: no 8: irrelevant (no atrial fibrillation) 9: insufficient data'
'MG_AFHYTHY'	'Underlying diseases or conditions for atrial fibrillation, hyperthyroidism'	'Integer'	'1: yes 2: no 8: irrelevant (no atrial fibrillation) 9: insufficient data'
'MG_AFALK'	'Underlying diseases or conditions for atrial fibrillation, alcohol abuse'	'Integer'	'1: yes 2: no 8: irrelevant (no atrial fibrillation) 9: insufficient data'
'MG_PVATH'	'Further specification of the peripheral vascular disease'	'Integer'	'1: yes 2: no 8: irrelevant (no peripheral vascular disease) 9: insufficient data'
'MG_PVCMY'	'Further specification of the peripheral vascular disease'	'Integer'	'1: yes 2: no 8: irrelevant (no peripheral vascular disease) 9: insufficient data'
'MG_PVDIAB'	'Further specification of the peripheral vascular disease'	'Integer'	'1: yes 2: no 8: irrelevant (no peripheral vascular disease) 9: insufficient data'
'MG_VTESURG'	'Underlying disease or condition for venous thromboembolism, surgery'	'Integer'	'1: yes 2: no 8: irrelevant (no venous thromboembolism) 9: insufficient data'
'MG_VTETRA'	'Underlying disease or condition for venous thromboembolism, trauma'	'Integer'	'1: yes 2: no 8: irrelevant (no venous thromboembolism) 9: insufficient data'
'MG_VTECAN'	'Underlying disease or condition for venous thromboembolism, malignant neoplasm'	'Integer'	'1: yes 2: no 8: irrelevant (no venous thromboembolism) 9: insufficient data'
'MG_VTENEUR'	'Underlying disease or condition for venous thromboembolism, neurologic disease'	'Integer'	'1: yes 2: no 8: irrelevant (no venous thromboembolism) 9: insufficient data'
'MG_SYSTC1'	'Systolic blood pressure (mmHg), first measurement,	'Integer'	'999: insufficient data'

	corrected for random zero'		
'MG_VTEPREG'	'Underlying disease or condition for venous thromboembolism, pregnancy or childbirth'	'Integer'	'1: yes 2: no 8: irrelevant (no venous thromboembolism) 9: insufficient data'
'MG_SYSTC2'	'Systolic blood pressure (mmHg), second measurement, corrected for random zero'	'Integer'	'999: insufficient data'
'MG_SYSTM'	'Systolic blood pressure (mmHg and one decimal), mean of two measurements'	'Decimal'	'999.9: insufficient data'
'MG_DIASTC1'	'Diastolic blood pressure (mmHg), first measurement, corrected for random zero'	'Integer'	'999: insufficient data'
'MG_DIASTC2'	'Diastolic blood pressure (mmHg), second measurement, corrected for random zero'	'Integer'	'999: insufficient data'
'MG_DIASTM'	'Diastolic blood pressure (mmHg and one decimal), mean of two measurements'	'Decimal'	'999.9: insufficient data'
'MG_HIGHBP1'	'High blood pressure'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_DRUG_HYPERT'	'Taking antihypertensive drugs'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_CHOLA'	'Total serum cholesterol (mmol/l and two decimals)'	'Decimal'	'99.99: insufficient data'
'MG_HDLA'	'HDL serum cholesterol (mmol/l and three decimals)'	'Decimal'	'9.999: insufficient data'
'MG_RCHOL'	'Ratio of total to HDL cholesterol'	'Decimal'	'99.99: insufficient data'
'MG_NONHDL'	'Difference of total and HDL cholesterol (mmol/l and two decimals)'	'Decimal'	'99.99: insufficient data'
'MG_LDLA'	'LDL cholesterol (mmol/l and two decimals)'	'Decimal'	'99.99: insufficient data'
'MG_TRIGLA'	'Serum triglycerides (mmol/l and two decimals)'	'Decimal'	'99.99: insufficient data'
'MG_FIBRA'	'Plasma fibrinogen (g/l and two decimals)'	'Decimal'	'99.99: insufficient data'
'MG_DRUG_HYPERL'	'Taking drugs for lowering cholesterol levels'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_BMI'	'Body Mass Index (kg/m2)'	'Decimal'	'99.99: insufficient data'
'MG_WHR'	'Waist to Hip Ratio'	'Decimal'	'9.99: insufficient data'

'MG_DSMOKER'	'Daily cigarette smoker'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_STOPAGE'	'Age when the person stopped smoking cigarettes daily'	'Integer'	'888: irrelevant, never smoked daily or smokes currently 999: insufficient data'
'MG_CIGYRS'	'Years of daily cigarette smoking before examination'	'Integer'	'99: insufficient data'
'MG_SMOKER'	'Current smoker of cigarettes, cigars/cigarillos or pipe'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_SCHOOL3'	'Thirds of schooling years'	'Integer'	'1: lowest category 2: middle category 3: highest category 9: insufficient data'
'MG_BASEMI1'	'Documented or self-reported history of MI'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_BASEMI2'	'Documented or self-reported history of MI, including angina pectoris when the data does not permit its separation from MI'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_BASESTR1'	'Documented or self-reported history of stroke'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_BASECVD1'	'Documented or self-reported history of MI or stroke'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_BASECVD2'	'Documented or self-reported history of MI or stroke, including angina pectoris when the data does not permit its separation from MI'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_BASEDIAB1'	'Documented or self-reported history of diabetes'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_BASEHF1'	'Documented or self-reported history of heart failure'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_BASEAF1'	'Documented or self-reported history of atrial fibrillation'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_BASEPVD1'	'Documented or self-reported history of peripheral vascular disease'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_BASEVTE1'	'Documented or self-reported history of venous thromboembolism'	'Integer'	'1: yes 2: no 9: insufficient data'
'MG_CHD1'	'First fatal or non-fatal definite or possible MI or unstable angina pectoris or unclassifiable death or cardiac revascularization during follow-up'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal coronary events) 9: insufficient data'
'MG_CHDDATE1'	'Date of exit from the follow-up for CHD1 '	'Date'	'88888888: irrelevant 99999999: insufficient data'

'MG_CHDTIME1'	'Follow-up time under CHD1, coronary heart disease event type 1 in days (fatal or non-fatal coronary event)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_CHDAGE1'	'Age at the time of exit under CHD1, coronary heart disease event type 1 in years (fatal or non-fatal coronary event)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_CHD3'	'First fatal or non-fatal definite or possible MI or unstable angina pectoris or unclassifiable death during follow-up'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal coronary events) 9: insufficient data'
'MG_CHDDATE3'	'Date of exit from the follow-up for CHD3'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_CHDTIME3'	'Follow-up time under CHD3, coronary heart disease event type 3 in days (fatal or non-fatal coronary event)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_CHDAGE3'	'Age at the time of exit under CHD3, coronary heart disease event type 3 in years (fatal or non-fatal coronary event)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_CHD4'	'First fatal or non-fatal definite or possible MI or unstable angina pectoris during follow-up'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal coronary events) 9: insufficient data'
'MG_CHDDATE4'	'Date of exit from the follow-up for CHD4'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_CHDTIME4'	'Follow-up time under CHD4, coronary heart disease event type 4 in days (fatal or non-fatal coronary event)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_CHDAGE4'	'Age at the time of exit under CHD4, coronary heart disease event type 4 in years (fatal or non-fatal coronary event)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_CHD5'	'First fatal or non-fatal definite MI during follow-up'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal coronary events) 9: insufficient data'
'MG_CHDDATE5'	'Date of exit from the follow-up for CHD5'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_CHDTIME5'	'Follow-up time under CHD5, coronary heart disease event type 5 in days (fatal or non-fatal coronary event)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_CHDAGE5'	'Age at the time of exit under CHD5, coronary heart disease event type 5 in years (fatal or non-fatal coronary event)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'

	event type 5 in years (fatal or non-fatal coronary event)'		
'MG_CHD6'	'First fatal or non-fatal definite or possible MI or unclassifiable death during follow-up'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal coronary events) 9: insufficient data'
'MG_CHDDATE6'	'Date of exit from the follow-up for CHD6'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_CHDTIME6'	'Follow-up time under CHD6, coronary heart disease event type 6 in days (fatal or non-fatal coronary event)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_CHDAGE6'	'Age at the time of exit under CHD6, coronary heart disease event type 6 in years (fatal or non-fatal coronary event)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_STROKE1'	'First fatal or non-fatal stroke of any type during follow-up'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal stroke events) 9: insufficient data'
'MG_STRDATE1'	'Date of exit from the follow-up for STROKE1'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_STRTIME1'	'Follow-up time under STROKE1 (in days)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_STRAGE1'	'Age at the time of exit under STROKE1 (in years)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_STROKE3'	'First fatal or non-fatal likely cerebral infarction during follow-up'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal stroke events) 9: insufficient data'
'MG_STRDATE3'	'Date of exit from the follow-up for STROKE3'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_STRTIME3'	'Follow-up time under STROKE3 (in days)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_STRAGE3'	'Age at the time of exit under STROKE3 (in years)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_STROKE4'	'First fatal or non-fatal possible cerebral infarction during follow-up'	'Integer'	'1: yes, fatal (validated) 2: yes, non-fatal (validated) 3: yes, fatal (not validated, based on ICD codes) 4: yes, non-fatal (not validated, based on ICD codes) 5: yes, fatal (not validated, not specified by ICD codes) 6: yes, non-fatal (not validated, not specified by ICD codes) 7: no event during the follow-up 8: irrelevant (no follow-up for non-fatal stroke events) 9: insufficient data'
'MG_STRDATE4'	'Date of exit from the follow-up for STROKE4'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_STRTIME4'	'Follow-up time under STROKE4 (in days)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_STRAGE4'	'Age at the time of exit under	'Decimal'	'888.88: irrelevant 999.99: insufficient data'

	STROKE4 (in years)		
'MG_STROKE5'	'First fatal or non-fatal likely haemorrhagic stroke during follow-up'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal stroke events) 9: insufficient data'
'MG_STRDATE5'	'Date of exit from the follow-up for STROKE5'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_STRTIME5'	'Follow-up time under STROKE5 (in days)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_STRAGE5'	'Age at the time of exit under STROKE5 (in years)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_STROKE6'	'First fatal or non-fatal stroke of any type, including self-reported, during follow-up'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal stroke events) 9: insufficient data'
'MG_STRDATE6'	'Date of exit from the follow-up for STROKE6'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_STRTIME6'	'Follow-up time under STROKE6 (in days)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_STRAGE6'	'Age at the time of exit under STROKE6 (in years)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_CVD1'	'First fatal or non-fatal CHD1 (CHD event type 1) or stroke event type 1 (STROKE1) during follow-up (fatal or non-fatal cardiovascular disease event)'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal events or the first event could not be decided) 9: insufficient data'
'MG_CVDDATE1'	'Date of exit from the follow-up for CVD1'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_STROKE7'	'First fatal or non-fatal ischaemic stroke or intracerebral haemorrhage during follow-up'	'Textual'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal stroke events) 9: insufficient data'
'MG_CVDTIME1'	'Follow-up time under CVD1 (in days)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_STRDATE7'	'Date of exit from the follow-up for STROKE7'	'Textual'	'88888888: irrelevant 99999999: insufficient data'
'MG_CVDAGE1'	'Age at the time of exit under CVD1 (in years)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_STRTIME7'	'Follow-up time under STROKE7 (in days)'	'Textual'	'88888: irrelevant 99999: insufficient data'
'MG_CVD3'	'First fatal or non-fatal CHD1, CHD event type 1 or STROKE3, likely cerebral infarction during follow-up (fatal or non-fatal cardiovascular disease event)'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal events or the first event could not be decided) 9: insufficient data'

'MG_STRAGE7'	'Age at the time of exit under STROKE7 (in years)'	'Textual'	'888.88: irrelevant 999.99: insufficient data'
'MG_CVDDATE3'	'Date of exit from the follow-up for CVD3'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_CVDTIME3'	'Follow-up time under CVD3 (in days)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_CVDAGE3'	'Age at the time of exit under CVD3 (in years)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_CVD4'	'First fatal or non-fatal CHD3, CHD event type 3 or STROKE3, likely cerebral infarction during follow-up (fatal or non-fatal cardiovascular disease event)'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal events or the first event could not be decided) 9: insufficient data'
'MG_CVDDATE4'	'Date of exit from the follow-up for CVD4'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_CVDTIME4'	'Follow-up time under CVD4 (in days)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_CVDAGE4'	'Age at the time of exit under CVD4 (in years)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_CVD5'	'First CHD1, CHD event type 1 or STROKE1, stroke event type 1 or HF1, heart failure during follow-up (cardiovascular disease event)'	'Integer'	'1: yes 2: no 8: irrelevant (no follow-up for non-fatal events or the first event could not be decided) 9: insufficient data'
'MG_CVDDATE5'	'Date of exit from the follow-up for CVD5'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_CVDTIME5'	'Follow-up time under CVD5 (in days)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_CVDAGE5'	'Age at the time of exit under CVD5 (in years)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_CVD6'	'First CHD1, CHD event type 1 or STROKE1, stroke event type 1, HF1, heart failure, or PVD1, peripheral vascular disease during follow-up (cardiovascular disease event)'	'Integer'	'1: yes 2: no 8: irrelevant (no follow-up for non-fatal events or the first event could not be decided) 9: insufficient data'
'MG_CVDDATE6'	'Date of exit from the follow-up for CVD6'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_CVDTIME6'	'Follow-up time under CVD6 (in days)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_CVDAGE6'	'Age at the time of exit under CVD6 (in years)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_CVD7'	'First fatal or non-fatal CHD6'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-

	(CHD event type 6) or stroke event type 1 during follow-up (fatal or non-fatal cardiovascular disease event)'		up 8: irrelevant (no follow-up for non-fatal events or the first event could not be decided) 9: insufficient data'
'MG_CVDDATE7'	'Date of exit from the follow-up for CVD7'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_CVDTIME7'	'Follow-up time under CVD7 (in days)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_CVDAGE7'	'Age at the time of exit under CVD7 (in years)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_CVD8'	'First fatal or non-fatal CHD4 (CHD event type 4) or likely cerebral infarction during follow-up (fatal or non-fatal cardiovascular disease event)'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal events or the first event could not be decided) 9: insufficient data'
'MG_CVDDATE8'	'Date of exit from the follow-up for CVD8'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_CVDTIME8'	'Follow-up time under CVD8 (in days)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_CVDAGE8'	'Age at the time of exit under CVD8 (in years)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_CVD9'	'First fatal or non-fatal CHD3 (CHD event type 3) or stroke event type 1 during follow-up (fatal or non-fatal cardiovascular disease event)'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal events or the first event could not be decided) 9: insufficient data'
'MG_CVDDATE9'	'Date of exit from the follow-up for CVD9'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_CVDTIME9'	'Follow-up time under CVD9 (in days)'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_CVDAGE9'	'Age at the time of exit under CVD9 (in years)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_DEATH'	'Death due to any cause during follow-up'	'Integer'	'1: yes 2: no death during follow-up 9: insufficient data'
'MG_CHD2'	'Coronary or unclassifiable death'	'Integer'	'1: yes 2: no coronary death during follow-up 9: insufficient data'
'MG_CHD7'	'Coronary death'	'Integer'	'1: yes 2: no coronary death during follow-up 9: insufficient data'
'MG_STROKE2'	'Stroke death during follow-up (person died due to stroke)'	'Integer'	'1: yes 2: no stroke death during follow-up 9: insufficient data'
'MG_CVD2'	'Cardiovascular death type 2 during follow-up (person died due to coronary heart disease, stroke or unknown cause of death)'	'Integer'	'1: yes 2: no cardiovascular death during follow-up 9: insufficient data'

'MG_CVD10'	'First fatal or non-fatal CHD6 (CHD event type 6) or STROKE7 (ischaemic stroke or intracerebral haemorrhage) during follow-up (fatal or non-fatal cardiovascular disease event)'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal events or the first event could not be decided) 9: insufficient data'
'MG_CVD_SCORE'	'Cardiovascular death during follow-up using end-point definition of SCORE (person died due to cardiovascular causes)'	'Integer'	'1: yes 2: no cardiovascular death during follow-up 9: insufficient data'
'MG_CVDDATE10'	'Date of exit from the follow-up for CVD10'	'Date'	'88888888: irrelevant 99999999: insufficient data 88888: irrelevant 99999: insufficient data'
'MG_CVDTIME10'	'Follow-up time under CVD10 (in days)'	'Integer'	'
'MG_MORTDATE'	'Date of exit from the mortality follow-up '	'Date'	'99999999: insufficient data, DEATH=9'
'MG_CVDAGE10'	'Age at the time of exit under CVD10 (in years)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_MORTTIME'	'Length of mortality follow-up in days'	'Integer'	'99999: insufficient data, DEATH=9'
'MG_CVD11'	'First fatal or non-fatal cardiovascular event using end-point definition of SCORE 2 during follow-up (fatal or non-fatal cardiovascular disease event)'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal events or the first event could not be decided) 9: insufficient data'
'MG_MORTAGE'	'Age at the time of exit from the mortality follow-up in years'	'Decimal'	'999.99: insufficient data, DEATH=9'
'MG_CVDDATE11'	'Date of exit from the follow-up for CVD11'	'Date'	'88888888: irrelevant 99999999: insufficient data 88888: irrelevant 99999: insufficient data'
'MG_DIAB1'	'First documented clinical diagnosis of type 2 diabetes during follow-up'	'Integer'	'1: yes 2: no 8: irrelevant 9: insufficient data'
'MG_CVDTIME11'	'Follow-up time under CVD11 (in days)'	'Integer'	'
'MG_DIABDATE1'	'Date of exit from the follow-up for DIAB1, documented clinical diagnosis of type 2 diabetes in days'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_CVDAGE11'	'Age at the time of exit under CVD11 (in years)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_DIABTIME1'	'Follow-up time under DIAB1, documented clinical diagnosis of type 2 diabetes in days'	'Integer'	'88888: irrelevant 99999: insufficient data'

'MG_CVD12'	'First fatal or non-fatal CHD1 (definite or possible MI or unstable angina pectoris or unclassifiable death or cardiac revascularization) or STROKE6 (stroke of any type) during follow-up (fatal or non-fatal cardiovascular disease event)'	'Integer'	'1: yes, fatal 2: yes, non-fatal 3: no event during follow-up 8: irrelevant (no follow-up for non-fatal events or the first event could not be decided) 9: insufficient data'
'MG_DIABAGE1'	'Age at the time of exit under DIAB1, documented clinical diagnosis of type 2 diabetes in years'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_CVDDATE12'	'Date of exit from the follow-up for CVD12'	'Date'	'88888888: irrelevant 99999999: insufficient data 88888: irrelevant 99999: insufficient data'
'MG_DIAB2'	'First glucose or HbA1c measurement based diagnosis of type 2 diabetes during follow-up'	'Integer'	'1: yes 2: no 8: irrelevant 9: insufficient data'
'MG_CVDTIME12'	'Follow-up time under CVD12 (in days)'	'Integer'	'
'MG_DIABDATE2'	'Date of exit from the follow-up for DIAB2, glucose or HbA1c measurement based diagnosis of type 2 diabetes'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_CVDAGE12'	'Age at the time of exit under CVD12 (in years)'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_DIABTIME2'	'Follow-up time under DIAB2, glucose or HbA1c measurement based diagnosis of type 2 diabetes in days'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_DIABAGE2'	'Age at the time of exit under DIAB2, glucose or HbA1c measurement based diagnosis of type 2 diabetes in years'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_DIAB3'	'First self-reported type 2 diabetes during follow-up'	'Integer'	'1: yes 2: no 8: irrelevant 9: insufficient data'
'MG_DIABDATE3'	'Date of exit from the follow-up for DIAB3, self-reported type 2 diabetes'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_DIABTIME3'	'Follow-up time under DIAB3, self-reported type 2 diabetes in days'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_DIABAGE3'	'Age at the time of exit under DIAB3, self-reported type 2 diabetes in years'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_DIAB4'	'First documented clinical'	'Integer'	'1: yes, documented clinical diagnosis of type 2 diabetes

	diagnosis or self-reported type 2 diabetes during follow-up'		2: yes, self-reported type 2 diabetes 3: no 8: irrelevant 9: insufficient data'
'MG_CVD_SCORE2_DEATH'	'Fatal end-point of ESC SCORE 2, based on ICD-codes'	'Integer'	'1: yes 2: no cardiovascular death during follow-up 9: insufficient data'
'MG_DIABDATE4'	'Date of exit from the follow-up for DIAB4, documented clinical diagnosis or self-reported type 2 diabetes'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_DIABTIME4'	'Follow-up time under DIAB4, documented clinical diagnosis or self-reported type 2 diabetes in days'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_DIABAGE4'	'Age at the time of exit under DIAB4, documented clinical diagnosis or self-reported type 2 diabetes in years'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_HF1'	'First heart failure during follow-up'	'Integer'	'1: yes 2: no 8: irrelevant 9: insufficient data'
'MG_HFDATE1'	'Date of exit from the follow-up for HF1, heart failure'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_HFTIME1'	'Follow-up time under HF1, heart failure in days'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_HFAGE1'	'Age at the time of exit under HF1, heart failure in years'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_AF1'	'First atrial fibrillation during follow-up'	'Integer'	'1: yes 2: no 8: irrelevant 9: insufficient data'
'MG_AFDATE1'	'Date of exit from the follow-up for AF1, atrial fibrillation'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_AFTIME1'	'Follow-up time under AF1, atrial fibrillation in days'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_AFAGE1'	'Age at the time of exit under AF1, atrial fibrillation in years'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_PVD1'	'First peripheral vascular disease during follow-up'	'Integer'	'1: yes 2: no 8: irrelevant 9: insufficient data'
'MG_PVDDATE1'	'Date of exit from the follow-up for PVD1, peripheral vascular disease'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_PVDTIME1'	'Follow-up time under PVD1, peripheral vascular disease in days'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_PVDAGE1'	'Age at the time of exit under PVD1, peripheral vascular disease in years'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_VTE1'	'First venous	'Integer'	'1: yes 2: no 8: irrelevant 9: insufficient data'

	thromboembolism during follow-up'		
'MG_VTE DATE1'	'Date of exit from the follow-up for VTE1, venous thromboembolism'	'Date'	'88888888: irrelevant 99999999: insufficient data'
'MG_VTE TIME1'	'Follow-up time under VTE1, venous thromboembolism in days'	'Integer'	'88888: irrelevant 99999: insufficient data'
'MG_VTE AGE1'	'Age at the time of exit under VTE1, venous thromboembolism in years'	'Decimal'	'888.88: irrelevant 999.99: insufficient data'
'MG_ACTIVE_B12'	'Vitamin B12 (active, Holotranscobalamin)'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_ACTIVE_B12'	'The analysis date of vitamin B12 (active, Holotranscobalamin)'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_ADIPONECTIN'	'adiponectin'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_ADIPONECTIN'	'The analysis date of adiponectin'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_ALT'	'alanine aminotransferase'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample

			was not measured'
'MG_DATE_ALT'	'The analysis date of alanine aminotransferase'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_APO_A'	'apolipoprotein A1'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_APO_A'	'The analysis date of apolipoprotein A1'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_APO_B'	'apolipoprotein B'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_APO_B'	'The analysis date of apolipoprotein B'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_APO_BA1_RATIO'	'apolipoprotein B/A1 ratio'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_APO_BA1_RATIO'	'The analysis date of apolipoprotein B/A1 ratio'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_AST'	'aspartate aminotransferase'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is

			missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_AST'	'The analysis date of aspartate aminotransferase'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_BNP'	'b-type natriuretic peptide'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_BNP'	'The analysis date of b-type natriuretic peptide'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_C_PEPTID'	'c-peptide'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_C_PEPTID'	'The analysis date of c-peptide'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_CD14'	'cD 14'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_CD14'	'The analysis date of cD 14'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_CK_MB'	'creatine-Kinase MB'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the

			result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_CK_MB'	'The analysis date of creatine-Kinase MB'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_CREATININE'	'creatinine'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_CREATININE'	'The analysis date of creatinine'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_CRP'	'c-reactive protein'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_CRP'	'The analysis date of c-reactive protein'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_CT_PRO_AVP'	'Copeptin'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_CT_PRO_'	'The analysis date of Copeptin'	'Textual'	'99999999: missing data 88888888: irrelevant, result is

AVP'			missing'
'MG_CT_PRO_ET1'	'c-terminal-pro Endothelin-1'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_CT_PRO_ET1'	'The analysis date of c-terminal-pro Endothelin-1'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_CYSTATIN_C'	'cystatin C'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_CYSTATIN_C'	'The analysis date of cystatin C'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_D_DIMER'	'd-Dimer'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_D_DIMER'	'The analysis date of d-Dimer'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_EGFR_CKDEPI_C REA'	'estimated glomerular filtration rate, using CKD-EPI formula with creatinine'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem

			111111: the result is missing because duplicate sample was not measured'
'MG_DATE_EGFR_CK DEPI_CREA'	'The analysis date of estimated glomerular filtration rate, using CKD-EPI formula with creatinine'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_EGFR_CKDEPI_C REA_CYS'	'estimated glomerular filtration rate, using CKD-EPI formula with creatinine and cystatin C'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_EGFR_CK DEPI_CREA_CYS'	'The analysis date of estimated glomerular filtration rate, using CKD-EPI formula with creatinine and cystatin C'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_EGFR_MDRD'	'estimated glomerular filtration rate, using Modification of Diet in Renal Disease (MDRD) formula'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_EGFR_MD RD'	'The analysis date of estimated glomerular filtration rate, using Modification of Diet in Renal Disease (MDRD) formula'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_FE'	'iron'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'

'MG_DATE_FE'	'The analysis date of iron'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_FEP'	'transferrin Iron Saturation'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_FEP'	'The analysis date of transferrin Iron Saturation'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_FERRITIN'	'ferritin'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_FERRITIN'	'The analysis date of ferritin'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_GALECTIN_3'	'galectin-3'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_GALECTIN_3'	'The analysis date of galectin-3'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_GDF_15'	'growth differentiation factor 15'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER

			222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_GDF_15'	'The analysis date of growth differentiation factor 15'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_GGT'	'gamma-Glutamyltransferase'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_GGT'	'The analysis date of gamma-Glutamyltransferase'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_GLUCOSE'	'glucose'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_GLUCOSE'	'The analysis date of glucose'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_HBA1C'	'glycated haemoglobin'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_HBA1C'	'The analysis date of glycated haemoglobin'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_HDL'	'high-density lipoprotein cholesterol'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing

			due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_HDL'	'The analysis date of high-density lipoprotein cholesterol'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_HOMOCYSTEINE'	'homocysteine'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_HOMOCYSTEINE'	'The analysis date of homocysteine'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_IL_1_RA'	'interleukin-1 Receptor Antagonist'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_IL_1_RA'	'The analysis date of interleukin-1 Receptor Antagonist'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_IL_18'	'interleukin-18'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_IL_18'	'The analysis date of'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'

	interleukin-18'		missing'
'MG_INSULIN'	'insulin'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_INSULIN'	'The analysis date of insulin'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_LDL'	'low-density lipoprotein cholesterol'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_LDL'	'The analysis date of low-density lipoprotein cholesterol'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_LEPTIN'	'leptin'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_LEPTIN'	'The analysis date of leptin'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_LP_A'	'lipoprotein(a)'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER

			222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_LP_A'	'The analysis date of lipoprotein(a)'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_MPO'	'myeloperoxidase'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_MPO'	'The analysis date of myeloperoxidase'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_MR_PRO_ADM'	'midregional-pro adrenomedullin'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_MR_PRO_ADM'	'The analysis date of midregional-pro adrenomedullin'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_MR_PRO_ANP'	'midregional-pro atrial natriuretic peptide'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_MR_PRO_ANP'	'The analysis date of midregional-pro atrial natriuretic peptide'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_NEOPTERIN'	'neopterin'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the

			result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_NEOPTERIN'	'The analysis date of neopterin'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_NT_PRO_BNP'	'n-terminal-pro B-type natriuretic peptide'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_NT_PRO_BNP'	'The analysis date of n-terminal-pro B-type natriuretic peptide'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_PLA_A'	'lipoprotein-associated phospholipase A2, Activity'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_PLA_A'	'The analysis date of lipoprotein-associated phospholipase A2, Activity'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_PLA_M'	'lipoprotein-associated phospholipase A2, Mass'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'

'MG_DATE_PLA_M'	'The analysis date of lipoprotein-associated phospholipase A2, Mass'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_PLGF'	'placental growth factor'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_PLGF'	'The analysis date of placental growth factor'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_PON_1'	'paraoxonase-1 activity'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_PON_1'	'The analysis date of paraoxonase-1 activity'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_SERPINF2_N1'	'serpin F2 - normalized using BCA protein (1000 x SERPINF2(ng/ml)/BCA(microg/ml))'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_SERPINF2_N1'	'The analysis date of serpin F2 - normalized using BCA protein (1000 x SERPINF2(ng/ml)/BCA(microg/ml))'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_SERPING1'	'serpin G1'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing

			due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_SERPING1'	'The analysis date of serpin G1'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_SFLT_1'	'Soluble Fms-Like Tyrosine Kinase-1'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_SFLT_1'	'The analysis date of sFIT'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_SHBG'	'sex hormone-binding globulin'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_SHBG'	'The analysis date of sex hormone-binding globulin'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_ST2'	'sT2'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_ST2'	'The analysis date of sT2'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'

'MG_TESTOSTERON'	'testosterone'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_TESTOSTERON'	'The analysis date of testosterone'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_TIBC'	'iron Binding Capacity, Total'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_TIBC'	'The analysis date of iron Binding Capacity, Total'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_TIMP_1'	'tissue inhibitor of metalloproteinase 1'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_TIMP_1'	'The analysis date of tissue inhibitor of metalloproteinase 1'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_TRIGLYCERIDES'	'triglycerides'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem'

			111111: the result is missing because duplicate sample was not measured'
'MG_DATE_TRIGLYCERIDES'	'The analysis date of triglycerides'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_TROPONIN'	'troponin I'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_TROPONIN'	'The analysis date of troponin I'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_TROPONIN_HS'	'hs Troponin I'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_TROPONIN_HS'	'The analysis date of hs Troponin I'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_VIT_B12'	'vitamin B12'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_VIT_B12'	'The analysis date of vitamin B12'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_VIT_D'	'vitamin D'	'Decimal'	'999999: the sample is not available in the laboratory 888888: the sample is available but the amount is too small for the analysis 777777: the sample is available but the result is missing due to a technical problem in the analysis 666666: the sample is available but the result is missing due to non-availability of reagents 555555: the result is

			missing due to sample mix-up 444444: the result is missing because it is above LIMIT_UPPER 333333: the result is missing because it is below LIMIT_LOWER 222222: the result is missing because of a sample problem 111111: the result is missing because duplicate sample was not measured'
'MG_DATE_VIT_D'	'The analysis date of vitamin D'	'Textual'	'99999999: missing data 88888888: irrelevant, result is missing'
'MG_FRAMINGHAM08'	'10-year risk of first CVD event (Framingham 2008)'	'Decimal'	'9.999: insufficient data'
'MG_FRAMINGHAM98'	'10-year risk of first CHD event (Framingham 1998)'	'Decimal'	'9.999: insufficient data'
'MG_SCORE'	'10-year risk of a fatal CVD event (SCORE project)'	'Decimal'	'9.999: insufficient data'
'MG_ACC_AHA'	'10-year risk of a first CVD event (ACC/AHA)'	'Decimal'	'9.999: insufficient data'
'MG_SELECTION'	'Case and subcohort selection ID number'	'Integer'	"
'MG_PHASE'	'Phase of selection of cases and subsample in the cohort'	'Integer'	'01: first 02: second 03: third 04: fourth 05: fifth 06: sixth 07: seventh'
'MG_DATE'	'Date when the selection of cases and cohort subsample was done'		
	'Textual'	"	
'MG_ELIGSC'	'Eligibility of the person to the subcohort'	'Integer'	'1: eligible 2: ineligible'
'MG_PROB'	'Selection probability of the person to the random cohort subsample'		
	'Decimal'	"	
'MG_SUBCOH'	'Was the person selected to the random cohort subsample?'		
		'Integer'	'1: yes 2: no'
'MG_PROBDTH'	'Selection probability of the person because of death'		
	'Decimal'	"	
'MG_CASEDTH'	'Was the person selected to the case-cohort set because of death?'		
	'Integer'	'1: yes 2: no'	
'MG_PROBCHD'	'Selection probability of the person because of?CHD'		
	'Decimal'	"	

event during follow-up'			
'MG_CASECHD'	'Was the person selected to the case-cohort		
set because of CHD event during follow-up?'	'Integer'	'1: yes 2: no'	
'MG_PROBSTR'	'Selection probability of the person		
	because of stroke during follow-up'	'Decimal'	"
'MG_CASESTR'	'Was the person selected to the case-cohort		
set because of stroke during follow-up?'	'Integer'	'1: yes 2: no'	
'MG_PROBTED'	'Selection probability of the person		
	because of venous thromboembolism during follow-up'	'Decimal'	"
'MG_CASETED'	'Was the person selected to the case-cohort		
set because of a thrombo-embolic event during follow-up?'	'Integer'	'1: yes 2: no'	
'MG_PROBAP'	'Selection probability of the person		
	because of angina pectoris during follow-up'	'Decimal'	"
'MG_CASEAP'	'Was the person selected to the case-cohort		

Acronyms and Abbreviations

- AF – Atrial Fibrillation
- CA – Consortium Agreement
- CHD – Coronary Heart Disease
- CVD – Cardiovascular Disease
- D – deliverable
- DoA – Description of Action (Annex 1 of the Grant Agreement)
- EB – Executive Board
- EC – European Commission
- GA – General Assembly / Grant Agreement
- HPC – High Performance Computing
- IPR – Intellectual Property Right
- KPI – Key Performance Indicator
- M – Month
- MS – Milestones
- PM – Person month / Project manager
- UKB – UK Biobank
- WP – Work Package
- WPL – Work Package Leader