

VCM language learning and reference manual

5th October 2007

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1 Introduction

“VCM” is a graphical language for the visualization of medical knowledge (*Visualisation des Connaissances Médicales* in French), destined for health professionals (not rather than patients). VCM can be used to represent medical knowledge with icons. The objective is not to replace medical texts entirely by icons, but rather to combine text and icons, using icons to enable the user to localize pieces of text of interest more rapidly, *e.g.* during a medical consultation.

The current version of VCM (1.0) focuses on drug knowledge, and on SPCs (Summary of Product Characteristics, corresponding to the drug monographs) in particular. It aims to help you find answers to the following questions:

- “What are the main characteristics of this drug?”
- “Can I prescribe this drug to my patient?”
- “What should I tell my patient about this drug?”

This document presents the basics of VCM language, and includes a reference manual with an icon dictionary is included at the end.

VCM distinguishes five basic concepts, each of them is associated with a color:

- the current state of the patient, in **red**, including:
 - diseases and symptoms,
 - physiological states (*e.g.* pregnancy), patient characteristics (*e.g.* age, sex) and lifestyle (*e.g.* diet, alcohol),
- the patient risks, in **orange**, including:
 - risk of diseases or symptoms,
 - adverse effects
- the patient’s antecedents, in **brown**,
- the patient’s treatments, in **green**,
- the patient’s medical monitoring, in **blue**.

Each medical concept is represented by an icon, consisting of a combination of colors, geometrical shapes and pictograms. However, VCM can represent only simple or general concepts. More precise concepts are represented by the more general concept that includes them.

These icons can then be used to build simple medical sentences dealing with contraindications, adverse effects, and so on.

2 The current state of the patient

The current state of the patient is represented using the **red** color. It includes diseases and symptoms, but also non-pathological states such as pregnancy.

2.1 Physiological states, patient characteristics and patient lifestyle

Physiological states, patient characteristics and patient lifestyle are non pathological states. They are represented by a red circle containing a white pictogram; the red color indicates a “current patient state”, the circle indicates a “non-pathological state” and the pictogram represents the state. *E.g.*:



Child



Alcohol consumption

2.2 Diseases and symptoms

VCM doesn’t does not distinguish between diseases and symptoms. Both are represented as a red square containing a white pictogram; the red color indicates a “current patient state”, the square indicates a “pathological state” and the pictogram indicates where the location of the disease or symptom (generally an anatomic or functional site). *E.g.*:



Cardiac disease



Alcoholism

The same pictogram represents both the anatomical site and the corresponding function (*e.g.* the same pictogram is used for the lung and for respiration). Diseases and symptoms may use the same pictograms as than non-pathological states, but inside these pictograms are enclosed within a square rather than a circle. Here, alcoholism is represented as a “pathological alcohol consumption”.

VCM distinguishes two kinds of pathological states, making it possible to represent diseases and symptoms more precisely:

- **Pathological states that apply to several sites**, *e.g.* failures (heart failure, renal failure,...), infections (respiratory infections, urinary infections,...), cancers and tumor (pulmonary cancer, intestinal cancer,...), hemorrhages (brain hemorrhage, digestive tract hemorrhage,...). In such cases, the square is modified, the new shape providing further details concerning the type of diseases, *e.g.*:



Heart failure

- **Pathological states that apply to a single site**, *e.g.* heart rhythm disorders (heart specific), vomiting (stomach specific), epilepsy (specific to the central nervous system). In such cases, a different, more precise, pictogram is used, *e.g.*:



Heart rhythm disorders

These two methods can be combined, *e.g.* :



Tachycardia (increase of the heart rhythm)

VCM provides icons only for the most general, important or common diseases and symptoms. Other diseases or symptoms are represented by a more general icon, *e.g.* VCM represents “cardiac septum abnormality” as



Cardiac disease

The various modifications to the square shape possible include:



Increase / hyper-function, *e.g.*:



Hyperthyroidism (hyper-function of the thyroid)



Decrease / hypo-fonction / insufficiency / failure, *e.g.*:



Heart failure (failure of the heart)



Full decrease / stop / arrest, *e.g.*:



Cardiac arrest



Pain, *e.g.*:



Headache (pain located in the central nervous system)



Inflammation, *e.g.*:



Arthritis (joint inflammation)



Nerve disorders, *e.g.*:



Conduction disorders (nerve disorders located in the heart)



Vascular disorders, *e.g.*:



Coronary disease (vascular disorders located in the heart)



Obstructed vessel / embolism / thrombosis, *e.g.*:



Heart infarct (obstructed vessel located in the heart)



Blood pressure problems, including:



Hypertension (increase in blood pressure)



Hypotension (decrease in blood pressure)



Haemorrhage, *e.g.*:



Digestive tract haemorrhage (haemorrhage located in the digestive tract)



Edema, *e.g.*:



Pulmonary edema



Infections, including:



Viral infection, *e.g.*:



Viral hepatitis (viral infection located in the kidney)



Bacterial infections, *e.g.*:



Bacterial meningitis (bacterial infection located in the central nervous system),



Fungus infections / mycosis, *e.g.*:



Digestive mycosis



Parasitic infections, *e.g.*:



Intestinal parasitic infection



Cancers / tumors, *e.g.*:



Lung cancer



Allergy / hypersensitivity, *e.g.*:



Allergic rhinitis (ear-nose-throat allergies)

3 Risks of diseases or symptoms

Risks of diseases or symptoms are represented in precisely the same way as the corresponding diseases or symptoms, but in orange, *e.g.*:



Risk of tachycardia

4 Antecedents of diseases

An antecedent of a particular disease is represented in precisely the same way as the corresponding disease, but in **brown**, *e.g.*:



Antecedents of heart infarct

5 Treatments

Treatments are represented in **green**.

5.1 Non-pharmacological treatments

Non-pharmacological treatments are represented by a green square containing a white pictogram; the green color means “treatment”, the square “non-normal state” (we consider patients following a treatment not to be in a “normal” patient state and thus use the square and not the circle for treatment), and the pictogram indicates the type of treatment:



Diet



Physical activity



Surgical treatment

5.2 Pharmacological treatments

Drugs are represented by the icon of the disease or symptom the drug is used to treat, with a green cross superimposed on the top right-hand corner. *E.g.*:



Heart failure drug / cardiotoxic drug

When it is relevant, the route of administration can be specified by replacing the green cross by one of the following pictograms:



Topical drug



Enteral systemic route



Parenteral systemic route

These pictograms can be used to distinguish between different drug classes, *e.g.*:



Local anti-asthmatic vs



systemic anti-asthmatic



Oral anti-diabetic vs



insule treatment



Vitamin K inhibitors vs



heparin

VCM provides icons only for the most general, common or important therapeutical classes. More specific classes or drugs indicated by ICD or brand name are represented by the icon for the corresponding therapeutic class. *E.g.* for propranolol:



Anti-hypertensive drug

5.3 Pharmacological treatment properties

The properties of drug treatments are represented by a green square containing a white pictogram; the square may be replaced by the increase, decrease or stop shapes. Events associated with drug administration (*e.g.* overdose) are represented by a red square, and risks of such events, by an orange square.



Absence of effect / treatment failure



Change dose



High dose



Low dose



Decrease dose



Increase dose



Taper dose / decrease the dose slowly



Overdose



Change dose schedule

6 Monitoring

Monitoring is indicated by the icon of the risk which is controlled, with a **blue** pictogram added at the top right-hand corner. The pictogram indicates the type of test associated with this monitoring:



Clinical test



Functional test



Biological test



Imaging test

E.g.:

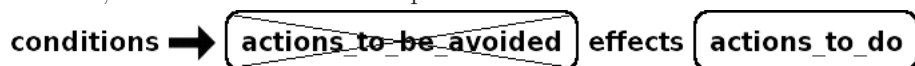


ECG (functional surveillance of the heart rhythm)

7 Sentences

VCM icons can be combined to build graphical sentences. These sentences can represent sentences extracted from SPCs or drug monographs. The drug described by the SPCs is not explicitly stated in the sentence. So, VCM sentences say *e.g.* “contraindicated for asthma” and not “drug XXX is contra-indicated for asthma”.

In VCM, all sentences follows this pattern:



“conditions” are the conditions needed for the rest of the sentence to apply, *e.g.* a sentence may apply only to patients suffering from a given disease. “effects” indicates the effects or properties of the drug described by the SPC (*e.g.* adverse effects). “actions_to_do” and “actions_to_be_avoided” indicate the actions that should be done or that should be avoided.

The conditions are followed by an arrow, all actions are framed and the actions to be avoided are crossed out. The statements are represented “as-is”. All the four elements are optional, and if one is not present, it is hidden. *E.g.* if a sentence has no condition, the “conditions” block and the arrow are hidden.

In some situations, several VCM sentences are required to be represented a single safe practice. In this case, the sentences are placed on the same line, and separated by a semi-colon.



(“actions to be avoided” with no icon inside) means “do not prescribe the drug described by the SPC”. This symbol is frequently used for contraindications.

7.1 Combining several icons into a single icon

VCM can combine several icons, representing them by a more general icon, in order to reduce the length of a sentence. *E.g.* “heart rhythm disorders” and “angor” can be combined and represented as “several cardiac diseases”. In this case, a shadow is added behind the icon, to indicate the superimposition of several icons. *E.g.*



Cardiac disease



Several cardiac diseases

7.2 Negations

The icon is negated by crossing it out, *e.g.*:



= Sedentary patient (no physical activity)

7.3 Actions

Actions the physician should undertake or avoid may be of different types:

Prescribing a treatment: the icon of the treatment of drug to be prescribed is used, *e.g.*:



= The prescription of a diet is recommended



= The prescription of an antiemetic is recommended

Modifying and stopping the current treatment: the icon corresponding to the modification is used, *e.g.*:



= An increase in dose is recommended



= A decrease in dose is recommended



= A change in dose schedule is recommended



= The treatment should be stopped



= The treatment should not be stopped

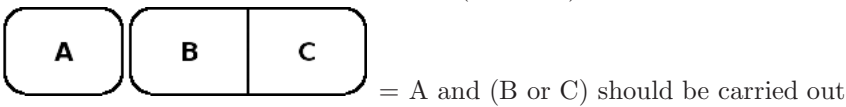
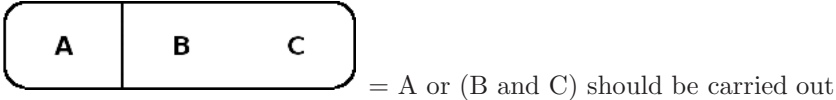
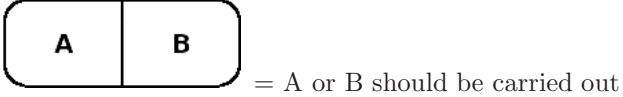
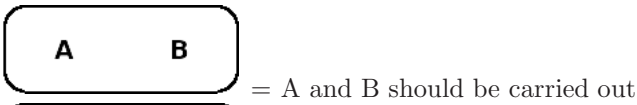
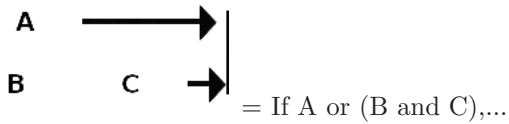
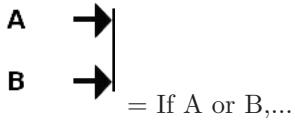
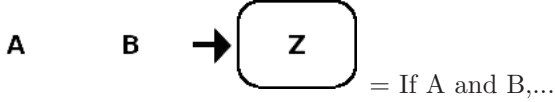
Carrying out or prescribing monitoring, *e.g.*:



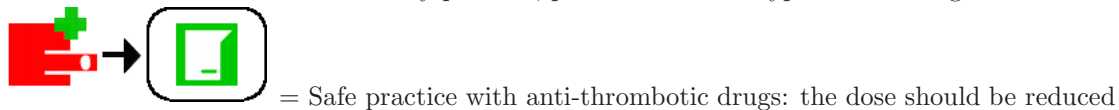
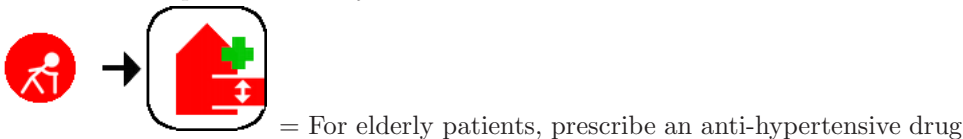
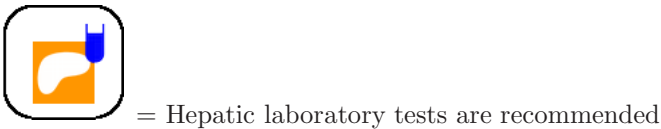
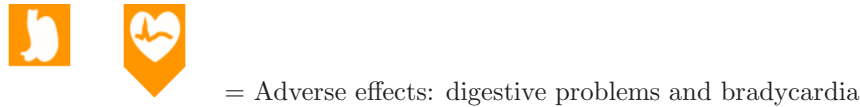
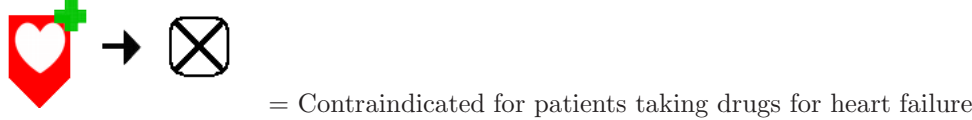
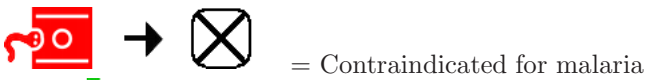
= An ECG should be performed

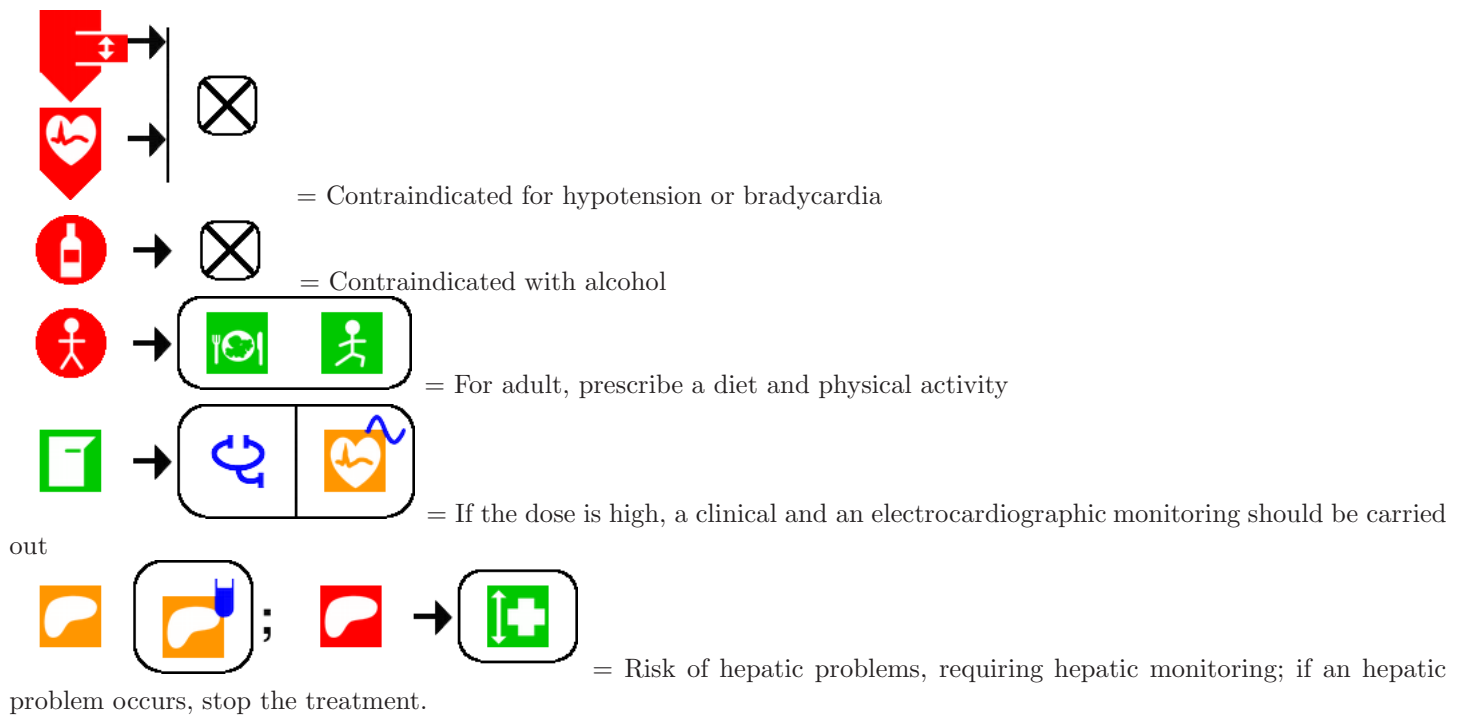
7.4 AND and OR relations

Logical AND and OR relations are represented differently for conditions and actions to be avoided or done:

















7.5 Examples





VCM-English disease and sign dictionary

This dictionary gives the VCM icons for the main diseases and signs; however, it is absolutely not exhaustive.

-  Alcoholism
-  Smoking
-  Obesity
-  Infection
 -  Viral infection
 -  Bacterial infection
 -  Fungal infection
 -  Parasitic infection
-  Cancer, tumor
 -  Lung cancer
- etc
 -  Digestive tract diseases
 -  Buccal diseases
 -  Esophageal and stomachal diseases
 -  Gastroesophageal reflux disease (GERD)



Nausea / vomiting



Peptic ulcer



Diseases of the small intestine



Intestinal fungal infections



Diarrhoea (increase in intestinal transit)



Constipation (decrease in intestinal transit)



Intestinal obstruction (cessation of the intestinal transit)



Inflammatory bowel disease



Digestive bleeding



Diseases of the large intestine, the rectum and the anus



Hepatic diseases



Viral hepatitis



Hepatic failure



Disorders of the biliary tract



Cholelithiasis



Eating disorders



Anorexia nervosa (decrease in food intake)



Endocrine and metabolic diseases



Enzymatic disorders



Thyroid diseases



Hyperthyroidism



Hypothyroidism



Diabetes



Hypoglycemia



Dyslipidemia



Cardiac diseases



Coronary artery disease (vascular disease located in the heart)



Coronary thrombosis (obstructed vessel located in the heart)



Heart rhythm disorders



Tachycardia (increase in cardiac rhythm)



Bradycardia (decrease in cardiac rhythm)



Cardiac conduction disorders (nerve disorder located in the heart)



Heart failure



Cardiac arrest



Vascular diseases



Blood pressure diseases



Hypertension



Hypotension



Blood diseases



Hydro-electrolytic disorders



Red cell diseases



Malaria



Anemia



Platelet and coagulation disorders



Hemophilia



White cells and immune system disorders



Leukemia



Hemorrhage



Thrombosis



Respiratory diseases



Viral pneumopathy



Bacterial pneumopathy



Lung cancer



Pulmonary thromboembolism



Respiratory failure



Bronchitis



Asthma, chronic obstructive pulmonary disease (COPD)



Pulmonary edema



Central nervous system diseases



Viral meningitis



Bacterial meningitis



Cerebrovascular diseases



Cerebral haemorrhage



Headache



Epilepsy (increase in cerebral activity)



Parkinson's disease (central nervous system + tremor)



Alzheimer's disease (central nervous system + "memory holes")



Psychiatric and behavioural diseases



Mood disorders



Manic disorder (increase in mood)



Depression (decrease in mood)



Sleep disorders



Sleepiness, hypersomnia (increase in sleep)



Insomnia (decrease in sleep)



Drug dependence



Vertigo



Anxiety



Asthenia



Bone diseases



Fracture



Osteoporosis (bone with holes)



Paget's disease (reshaped bone)



Joint disorders



Gout, joint pain



Arthritis (inflammation of a joint)



Arthrosis (functional decrease of a joint)



Muscle diseases



Myalgia



Myasthenia



Eye diseases



Glaucoma



Vision deficit (including myopia, diplopia,...)



Blindness



Optic nerve disorders



Ear diseases



Infectious otitis



Deafness (decrease in hearing)



Nose and throat diseases



Infectious rhinitis



Allergic rhinitis



Cough



Skin diseases



Cutaneous inflammation



Photosensitivation (skin + sun)



Psoriasis (skin + red plaques)



Acne (skin + pimples)



Rash, pruritis, erythema,...



Hair loss



Renal disease



Renal cancer



Renal failure



Terminal renal failure (cessation of renal function)



Urinary tract diseases



Urinary tract infection



Urinary bladder cancer



Urinary lithiasis



Male reproductive system disease



Prostate diseases



Prostate cancer



Impotence



Female reproductive system disease



Uterine cancer



Ovary cancer



Abnormal uterine bleeding



Breast diseases



Breast cancer



Gynecomastia



Breastfeeding disorders

VCM-English physiological state, patient characteristic and lifestyle dictionary

VCM distinguishes four age classes:



Infant



Child



Adult



Elderly patient



Male



Female



Pregnancy



Breastfeeding



Car driving and machine usage



Travel



Physical activity



Diet and food intake



Alcohol



Sun exposure

VCM-English treatment dictionary

This dictionary gives the VCM icons for the main treatments; however, it is absolutely not exhaustive.



Anti-infection drugs



Antiviral drugs



Antibiotics



Antimycotics



Antiparasitic drugs



Antineoplastic drugs



Drugs for immune diseases (including immuno-suppressive drugs)



Immunotherapy



Analgesic



Anti-inflammatory drugs



Digestive drugs



Stomachal drugs



Antiacids



Anti-ulcer drugs



Antiemetics



Intestine drugs



Drugs for intestinal infections



Anti-diarrhoea drugs



Laxatives



Drugs for diabetes



Insulin



Oral drugs for diabetes



Vitamins, food supplements



Cardiovascular drugs



Cardiotonics



Anti-anginal agents



Antiarrhythmics



Lipid-lowering drugs



Anti-hypertensive drugs



Hematologic drugs



Anti-coagulants



Vitamin K inhibitors



Heparin and derivatives



Antihaemophilia drugs



Anti-anemic drugs



Anti-malaria agents



Drugs for the respiratory tract



Antitussives



Drugs for pulmonary allergy



Anti-asthma drugs



Topical anti-asthma drugs



Oral systemic anti-asthma drugs



Drugs for nervous system diseases



Anti-migraine drugs



Anti-epileptic drugs



Drugs for Parkinson's disease



Drugs for psychiatric diseases



Psycholeptic drugs



Anxiolytics



Sedatives and hypnotic agents



Psychoanaleptic drugs



Antidepressants



Drugs for bone disorders



Drugs for joint disorders



Antigout drugs



Drugs for muscle disorders



Muscle relaxants



Ophthalmic agents



Topical drugs for eye infections



Anti-glaucoma drugs



Otological agents












Topical drugs for ear infections



Dermatologic agents

-  Antiseptics, disinfectants
-  Antifungal agents
-  Antipsoriatic drugs
-  Anti-acne drugs
-  Urological agents
-  Urinary concrement solvents
-  Drugs used for erectile dysfunction
-  Drugs for prostate disorders
-  Gynecologic agents
-  Drugs for gynecologic infections
-  Oral contraceptives (*i.e.* drugs eliminating the risk of pregnancy)

Concepts associated with drug treatments

-  Dose
-  High dose
-  Low dose
-  Reduce the dose
-  Increase the dose
-  Need for a weaning (dose tapering) / reduce the dose slowly
-  Dose schedule
-  Therapeutic formulation
-  Stop the treatment



Notable excipient



The treatment has no effect / treatment failure



Overdose



May change some test results

VCM-English test dictionary

This dictionary gives the VCM icons for the main tests; however, it is absolutely not exhaustive.



Clinical surveillance



Blood pressure surveillance



Functional surveillance



Lung function tests



ECG



EEG



Laboratory tests



Laboratory tests for renal activity (clearance)



Laboratory tests for hepatic activity (transaminases)



Laboratory tests for thyroid activity



Blood coagulation tests (INR, prothrombin time,...)



Imaging



Chest X ray



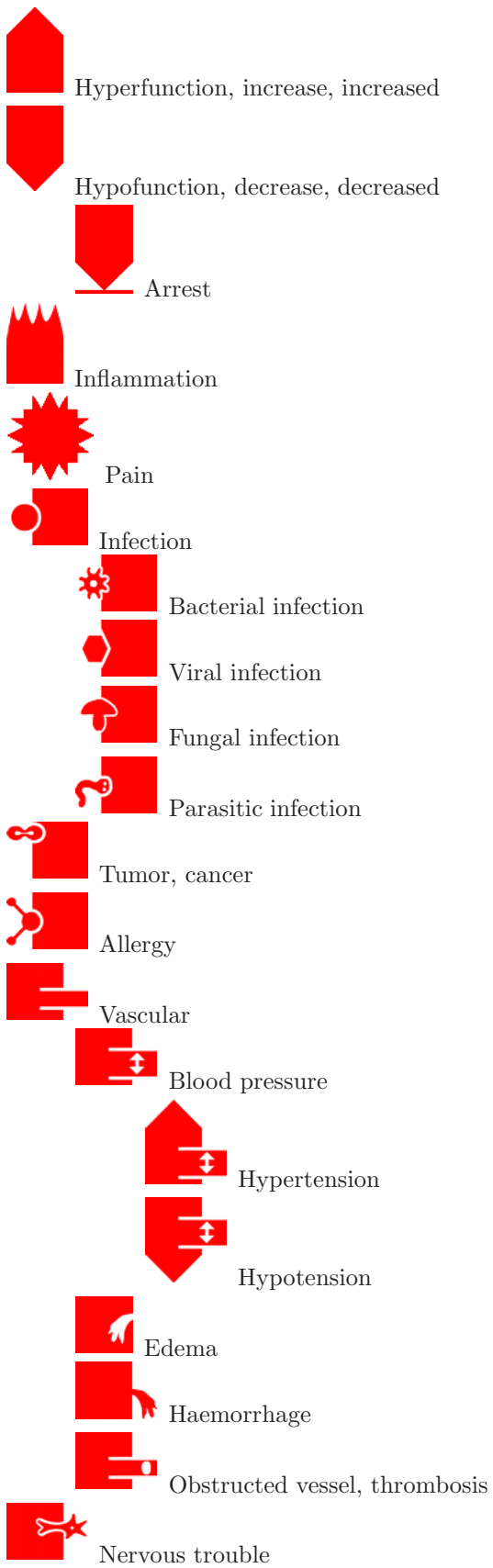
Bone X ray

Pictogram and shape lexicon

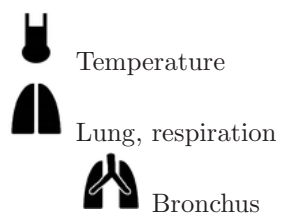
Shapes









































normal, physiological state











Anatomico-functional location











-  Heart
-  Cardiac rhythm
-  Blood
 -  Red cells
 -  White cells, immunity
 -  Platelets, coagulation
 -  Plasma, water balance
 -  Glycemia
 -  Lipidemia
 -  Drug plasmatic concentration
-  Genital system
 -  Male genital system
 -  Prostate
 -  Female genital system
 -  Uterus
 -  Breast
 -  Breastfeeding
-  Pregnancy
 -  Pregnancy, first trimester
 -  Pregnancy, second trimester
 -  Pregnancy, third trimester
-  Kidney, urinary system
 -  Bladder, urinary tract
 -  Urinary lithiasis
-  Diet and food intake
-  Mouth
 -  Throat, nose
 -  Cough


-  Digestive tract, digestion
 -  Stomach
 -  Vomiting, nausea
 -  Gastroesophageal reflux disease (GERD)
 -  Ulcer
 -  Small intestine
 -  Large intestine, rectum
 -  Liver
 -  Gallbladder, biliary tract
 -  Cholelithiasis

-  Gland, endocrine system
 -  Thyroid
 -  Enzymatic disorders
 -  Diabetes

-  Brain, central nervous system
 -  Cerebral activity
 -  Alzheimer disease
 -  Parkinson disease, Parkinson syndrome

-  Behaviour, cerebral function
 -  Sleep
 -  Mood
 -  Asthenia
 -  Anxiety
 -  Vertigo
 -  Drug dependence

-  Eye, vision
 -  Glaucoma

-  Ear, hearing

-  Skin



Photosensibilisation



Psoriasis



Rash, pruritus, erythema



Acnea



Hair loss



Bones



Fracture



Osteoporosis



Paget disease



Join



Muscle, connective tissue

Patient characteristics and lifestyle



Age: infant



Age : child



Age : adult



Age : elderly



Sun exposure



Car-driving and machine usage



Geography



Sport



Alimentation



Alcohol



Smoking



Overweight, obesity

Treatment










Stop the treatment






Drug, monotherapy







Surgery

-  General anaesthesia
-  Dose
-  Low dose
-  High dose
-  Overdose
-  Weaning, withdrawal, progressive dose reduction
-  Dose schedule, chronopharmacology

Route of administration

-  Oral
-  Topical
-  Parenteral

Test

-  Clinical test
-  Biological test
-  Imaging test
-  Functional test

Total : 120 pictograms and shapes.