

Retrospective analysis of serum ferritin, ALAT and gammaGT reported to the typology "morningness / eveningness" assessed using the MEQ questionnaire.

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The systematic use of self-questionnaires MEQ scale (fig 1) during sleep consultation allow us to determine chronobiological type of patients: DET (definitely evening type), ET (evening type), NT (neither type), MT (morning type), DMT (definitely morning type). The use of a database containing all patient data (questionnaires, clinical, biology) allows us to analyse biological parameters according to the typologies .

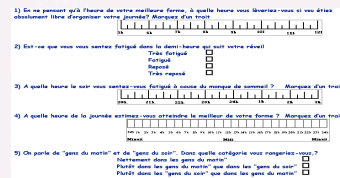


Fig1 : MEQ Morningness, Eveningness Questionnaire

Method :

We have a 6846 patient database (2854 women and 3892 men) integrating typology Morningness / eveningness evaluated using MEQ questionnaire. Inside this base 583 patients had ferritin assay, 571 ALAT and 583 Gamma GT. Withdrawals for bioassays ferritin ALAT and GAMMA GT were carried out in the usual way between 7am and 9am. Assays were reported by ANOVA with groups determined by the MEQ survey (DET, MET, NT, MMT, DMT). We also check the typology by versus average age.

Results :

It is identified significant differences between Average age, Ferritin levels ($p < 0.05$) ALAT ($p < 0.05$) and gamma GT ($p < 0.05$) in relation to the type (DM, MM, M, MS, DE) and sex (women are more evening type and men more morning type)

Tableau ANOVA pour FERRITINE

CAT_MEQ	df	Somme des carrés	Carré moyen	Valeur de F	Valeur de p	Limite	Prévalence
CAT_MEQ	4	13315,520	3328,880	2,449	0,060	0,797	302
Sexe	1	245824,674	245824,674	17,621	<0,001	0,741	304
CAT_MEQ * Sexe	4	28834,520	7208,630	1,058	0,370	0,224	305
Residu	622	770504,024	1239,878				

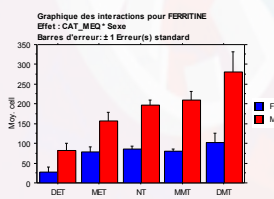


Fig 2 : Ferritin reported to Sex and Typology

Tableau ANOVA pour LOG_GGT

CAT_MEQ	df	Somme des carrés	Carré moyen	Valeur de F	Valeur de p	Limite	Prévalence
CAT_MEQ	4	200	50,000	0,001	0,943	0,001	304
Sexe	1	200	200,000	2,346	0,012	0,368	304
CAT_MEQ * Sexe	4	111	27,750	0,333	0,858	0,232	304
Residu	622	61,640	0,099				

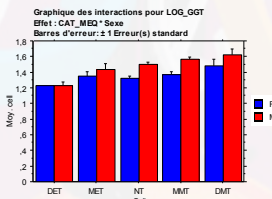


Fig 3 : GammaGT (normalized) reported to Sex and Typology

Tableau ANOVA pour LOG_ALAT

CAT_MEQ	df	Somme des carrés	Carré moyen	Valeur de F	Valeur de p	Limite	Prévalence
CAT_MEQ	4	230	57,500	0,203	0,928	0,008	304
Sexe	1	210	210,000	7,321	0,007	0,212	304
CAT_MEQ * Sexe	4	270	67,500	2,377	0,020	0,187	304
Residu	622	20,270	0,033				

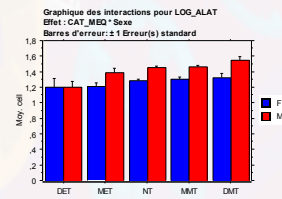


Fig 4 : ALAT (normalized) reported to Sex and Typology

Tableau ANOVA pour Age

CAT_MEQ	df	Somme des carrés	Carré moyen	Valeur de F	Valeur de p	Limite	Prévalence
CAT_MEQ	4	28827,114	7206,778	0,228	0,928	0,008	304
Sexe	1	242,225	242,225	0,757	0,384	0,427	304
CAT_MEQ * Sexe	4	10100,874	2525,218	0,784	0,540	0,188	304
Residu	622	132950,116	2135,855				

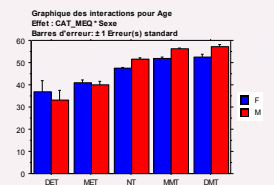


Fig 5 : Average age reported to Sex and Typology

Tableau ANOVA pour FERRITINE

CAT_AGE	df	Somme des carrés	Carré moyen	Valeur de F	Valeur de p	Limite	Prévalence
CAT_AGE	6	80007,123	13334,519	12,220	<0,001	0,748	1020
Sexe	1	100000,074	100000,074	912,000	<0,001	0,741	1020
CAT_AGE * Sexe	6	101000,074	16833,344	1,508	0,204	0,187	1020
Residu	622	720000,000	1157,572				

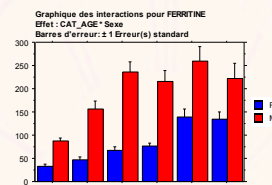


Fig 6 : ferritin reported to Sex and Age

Tableau "résumé" pour Sexe, CAT_MEQ

Manquants	802
Chi 2	4
Chi 2	88,979
p (Chi 2)	<0,0001
G carré	189,280
p (G-carré)	<0,0001
Coef. de contingence	0,120
V de Cramer	0,121

Fréquences observ. pour Sexe, CAT_MEQ

	DET	MET	NT	MMT	DMT	Total
F	4	178	152	788	129	2642
M	13	109	1636	1316	278	3402
Total	21	337	3159	2114	413	6044

Valeurs attendues pour Sexe, CAT_MEQ

	DET	MET	NT	MMT	DMT	Total
F	6,180	147,312	1380,888	824,288	180,534	2642,000
M	11,820	189,688	1778,114	1489,712	232,466	3402,000
Total	21,000	337,000	3159,000	2114,000	413,000	6044,000

Fig 7 : Sex reported to Typology

Discussion :

The interaction between the typology on physiological (sex, age) and biological parameters which are mainly linked to liver metabolism (Ferritin, ALAT, GGT) lets interrogate ourself on the interaction of the liver metabolism and the typology.

It is necessary to notice that the time of blood sampling is habitually fixed between 7 and 9am and than observed differences depending on the type could be directly related to the typology or to a phase effect in relation to circadian variations of the observed parameters.

It is very difficult to determine if the part of the observed effect is mainly in conjunction with typology, age or time of blood sampling.

In any case, it seems necessary to take into account the sex, age and/or the typology of the patient in terms of Morningness/eveningness for the interpretation of the normality of these biological parameters.

Bibliography :

(1) Taillard J & al; Validation of Horne and Ostberg morningness-eveningness questionnaire in a middle-aged population of French workers; J Biol Rhythms. 2004 Feb;19(1):76-86.