SERUM LIPIDS DISTRIBUTION and DYSLIPIDEMIA in the FRENCH FLIGHT POPULATION

6th ECAM, Prague, 20-23 September 2018

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Disclosure Information

6th European Congress of Aerospace Medicine
Nicolas HUIBAN

I have no financial relationships to disclose

I will not discuss off-label use and/or investigational use in my presentation

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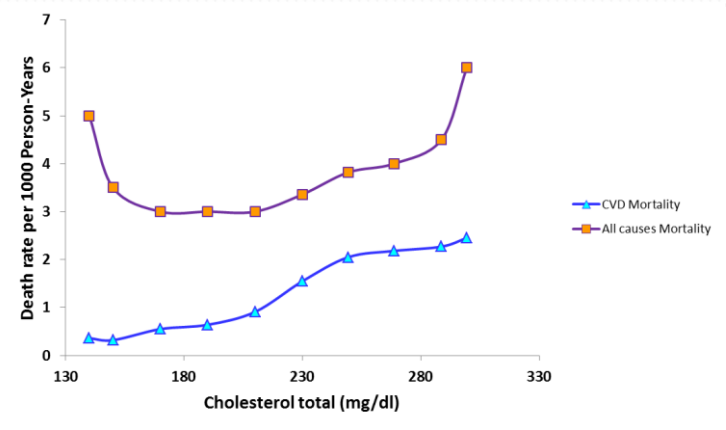
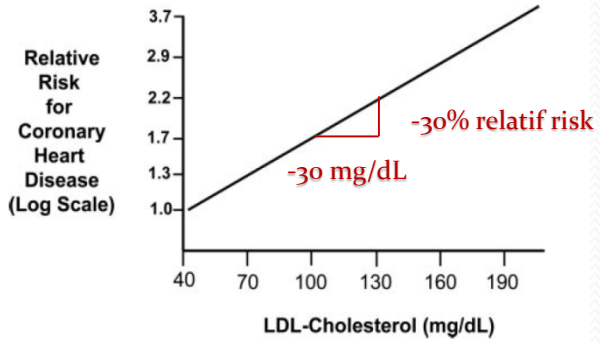
From epidemiology…



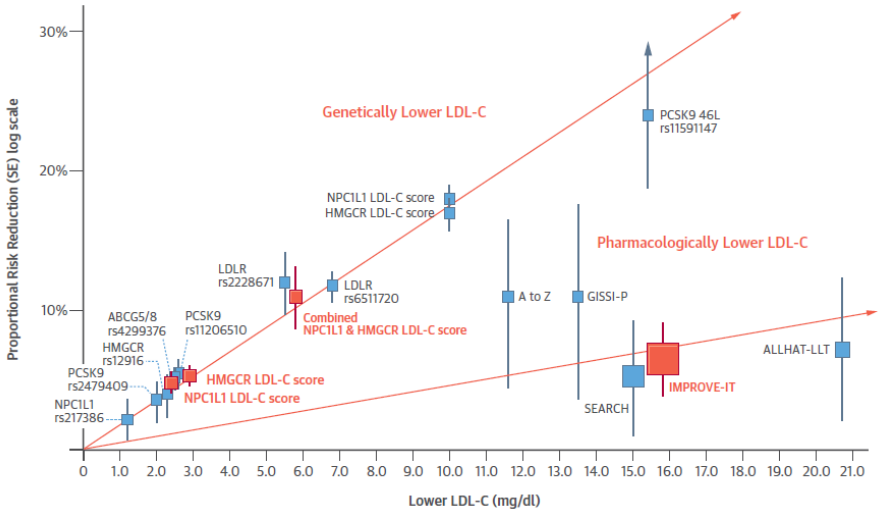
Neaton JD et al. Arch Intern Med 1992

Iso H et al. N Engl J Med 1989



Grundy SM et al. Circulation 2004

…to genetic proofs and clinical trials



Ference BA et al. J Am Coll Cardiol 2015

From epidemiology…

Jarcho JA and Keaney JF. N Engl J Med 2015

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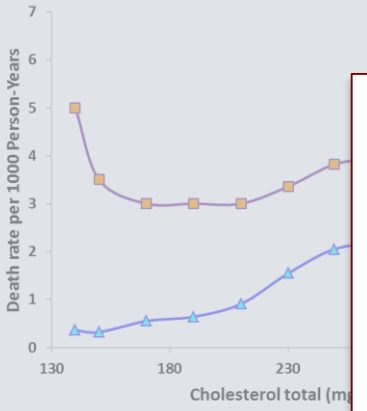
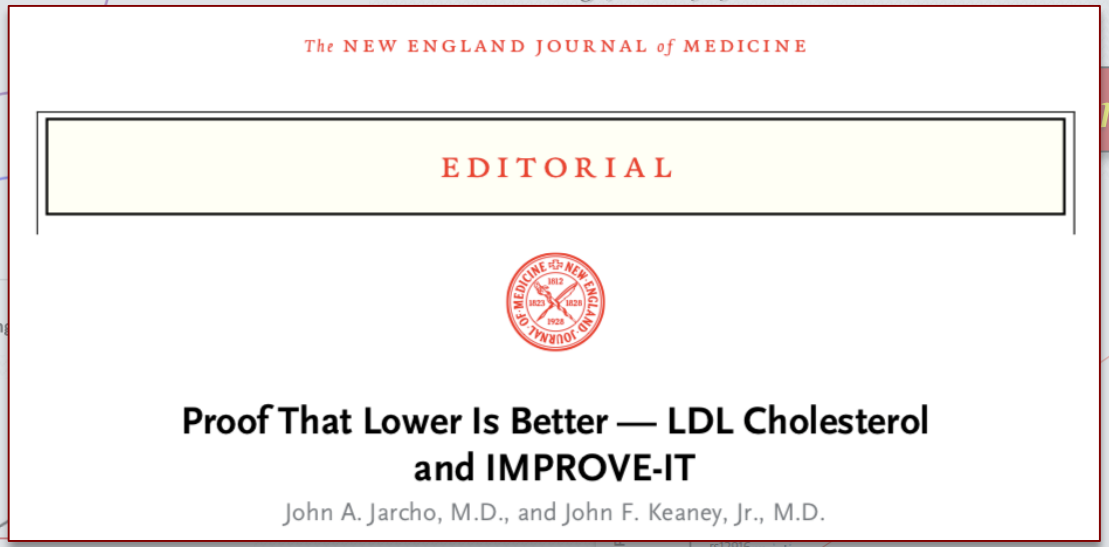




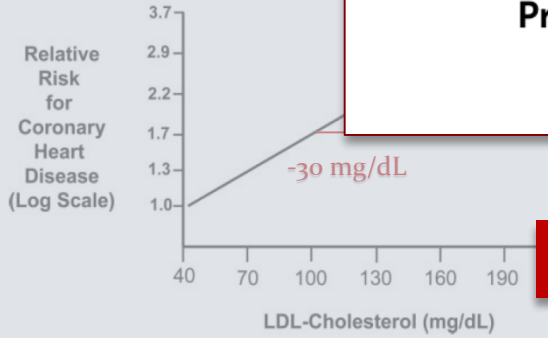
The NEW ENGLAND JOURNAL of MEDICINE

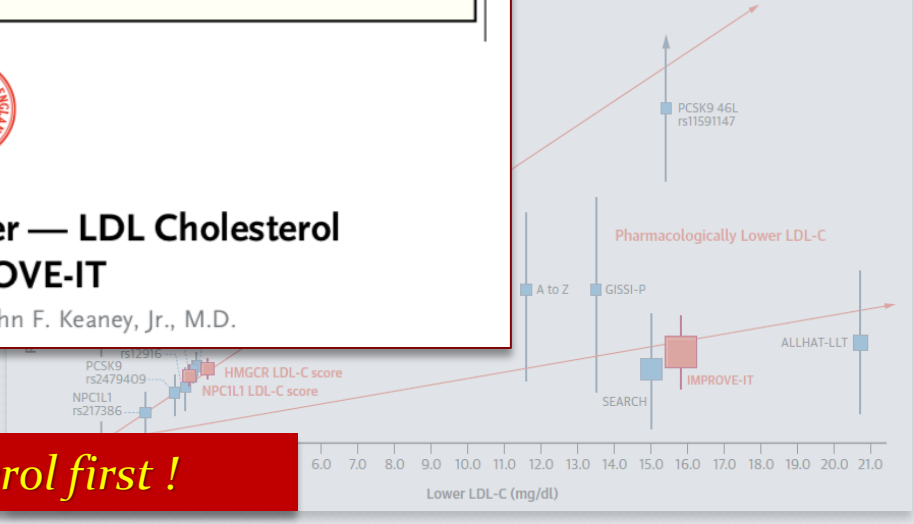
EDITORIAL

Proof That Lower Is Better — LDL Cholesterol and IMPROVE-IT

John A. Jarcho, M.D., and John F. Keaney, Jr., M.D.

nd clinical trials





LDL-cholesterol first !

Grundy SM et al. Circulation 2004

Ference BA et al. J Am Coll Cardiol 2015

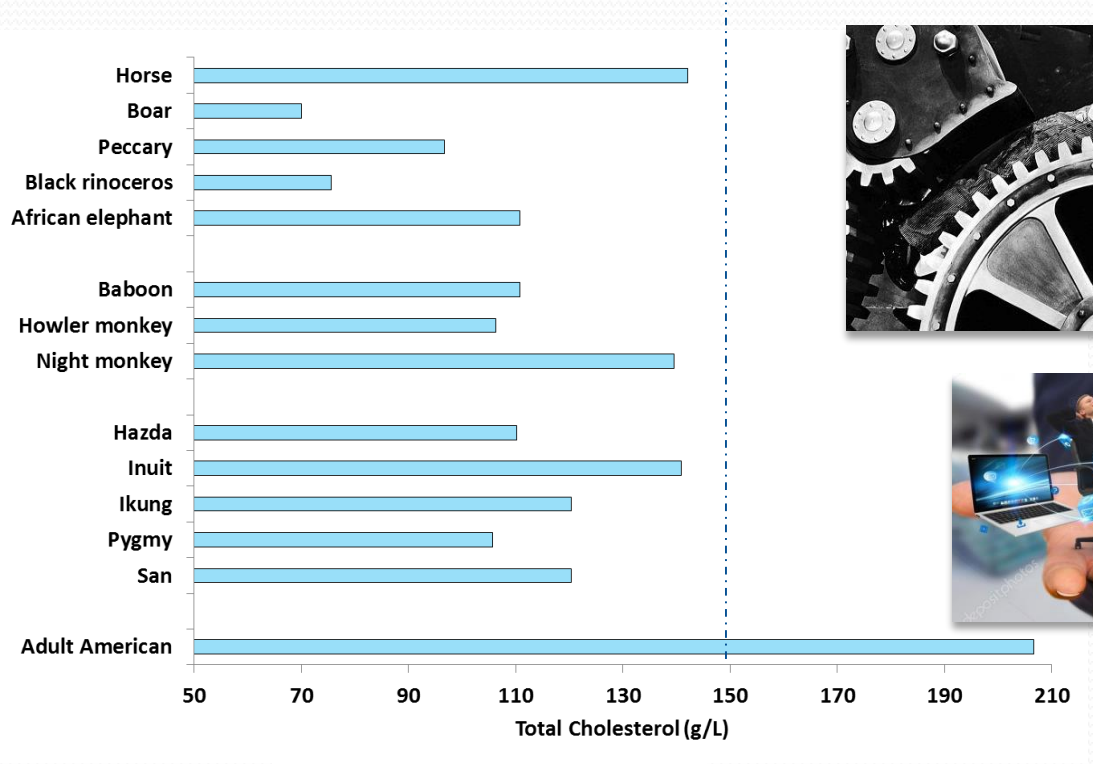
A « modern » risk ?

WILD MAMMALS

WILD PRIMATES

HUNTER-GATHERER HUMANS

MODERN HUMANS



Adapted from O'Keeffe Jr JH et al. J Am Coll Cardiol, 2004

Aeromedical Concerns

1. Lipids Screening

Lipid screening in aircrew: pros and cons

A. Keech and P. Sleight

Clinical Trial Service Unit and Department of Cardiovascular Medicine, John Radcliffe Hospital, Oxford OX3 9DU, U.K.

« … An active screening for lipid programme for lipids for pilots and potential pilots should be instituted »

Keech A and Sleight P. Eur Heart J 1992

Introduction and summary of principal conclusions to the first European workshop in aviation cardiology

M. Joy

Civil Aviation Authority, Gatwick Airport, Sussex

« Plasma lipid estimation should form an integral part of any serious multifactorial risk assessment for CAD… »

Joy M. Eur Heart J 1992

Aeromedical Concerns

1. Lipids Screening

BULLETIN OFFICIEL DES ARMEES

Edition Chronologique

PARTIE PERMANENTE
État-Major des Armées (EMA)

INSTRUCTION N° 800/DEF/DCSSA/AST/AME
relative à l'aptitude médicale aux emplois du personnel navigant des forces armées.

Du *20 février 2008*

REGULATIONS

COMMISSION REGULATION (EU) No 1178/2011

of 3 November 2011

laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council

French Military

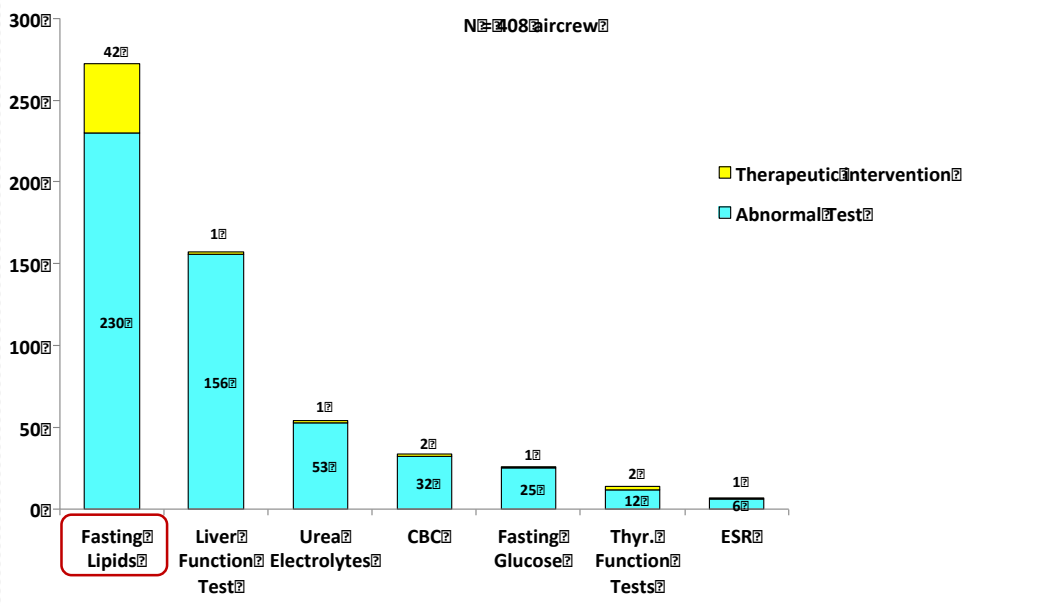
« Are practiced at least every five years before 40 years, and at least every two years after 40 years, the following laboratory tests : [...] total cholesterol, triglycerides [...]; after age 40, total hypercholesterolemia will lead to determine the subfractions of cholesterol. »

Civilians

« For a Classe 1 medical certificate, estimation of serum lipids, including cholesterol, shall be required at the examination for the first issue of a medical certificate, and at the first examination after having reached the age of 40. »

Aeromedical Concerns

1. Lipids Screening



« No evidence to support the continuation of routine blood testing was found other than in the case of lipid estimation »

Curry IP. Aviat Space Environ Med 2003

Aeromedical Concerns

1. Lipids Screening
2. Cardiovascular Diseases

SHORT COMMUNICATION

Coronary Artery Disease in Aircrew Fatalities: Morphology, Risk Factors, and Possible Predictors

Thomas Dumser, Mathias Borsch, and Christoph Wonhas

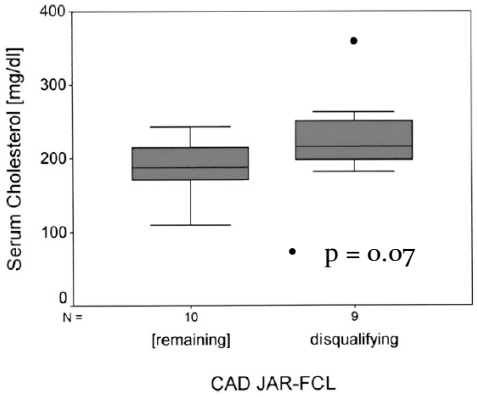


Fig. 2. Box plots of serum cholesterol levels in CAD severity grades, classified according to JAR-FCL.

Dumser T et al. Aviat Space Environ Med 2013

Aeromedical Concerns

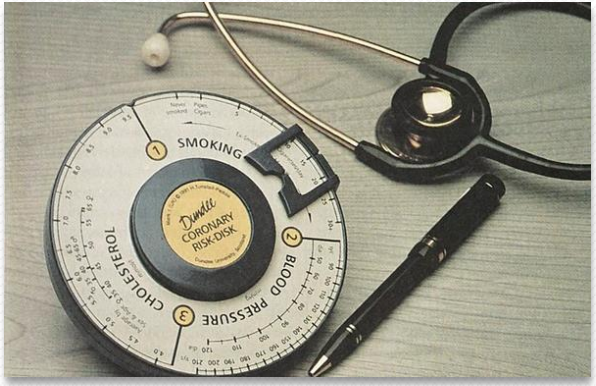
1. Lipids Screening
2. Cardiovascular Diseases
3. Recent Data

Cardiovascular Risk Factors in Commercial Flight Aircrew Officers Compared with Those in the General Population

Cardiovascular Risk Factors: Comparison Between Aviators and Reference Group 2

		Aviators	Reference Group	P Value
SBP (mm Hg)	n	113	5004	
	M	130.97	123.71	
	SD	11.91	12.72	0.001
DBP (mm Hg)	n	113	5004	
	M	84.25	83.44	
	SD	8.79	8.86	0.338
S-Chol (mmol/L)	n	89	4999	
	M	5.83	5.54	
	SD	0.86	1.06	0.011
Height (cm)	n	113	5005	
	M	178.02	177.70	
	SD	5.90	6.85	0.621
Weight (kg)	n	113	5005	
	M	76.93	76.89	
	SD	9.20	11.25	0.965
BMI (kg/m^2)	n	113	5005	
	M	24.27	24.34	
	SD	2.64	3.22	0.831
Smokers	%	50.9	50.3	0.976
SBP > 145	%	11.5	4.4	0.001
S-Chol > 5.7	%	51.7	40.0	0.033

SBP: systolic blood pressure at rest; DBP: diastolic blood pressure at rest; S-Chol: total serum cholesterol; BMI: kg/m^2; SBP > 145: percentage of population with systolic blood pressure > 145 mm Hg; S-Chol > 5.7: percentage of population with total serum cholesterol > 5.7 mmol/L.



The « Dundee Coronary Risk Disk ». Tunstall Pedoe H. Eur Heart J, 1992

Ekstrand K et al. Angiology 1996

Aeromedical Concerns

1. Lipids Screening
2. Cardiovascular Diseases
3. Recent Data

RESEARCH ARTICLE

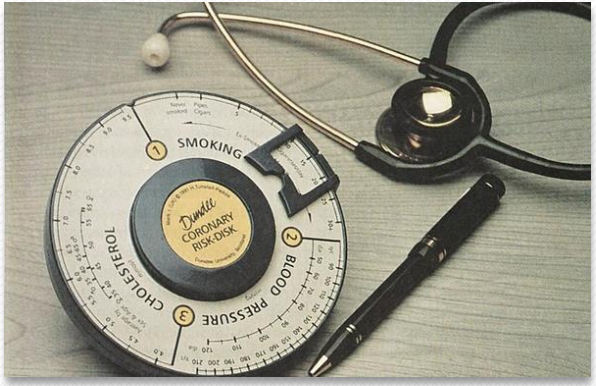
Application of a Cardiovascular Disease Risk Prediction Model Among Commercial Pilots

Table 2. Age-standardised statistics of pilots and highest income quintile of the general population with 95% confidence intervals

Statistic	Pilots (95% CI)	General population highest income quintile[a]
Males		
Mean BMI (kg/m^2)	26.0, (23.4–28.6)	27.1
Prevalence overweight (%)	46.8, (45.4–48.2)	47
Prevalence obesity (%)	12.4, (11.4–13.3)	21[b]
Prevalence current smoking (%)	7.7, (6.8–8.5)	16[b]
Prevalence hypertension (%)	28.7, (27.3–30.0)	30
Females		
Mean BMI (kg/m^2)	23.9, (20.0–27.7)	25.9
Prevalence overweight (%)	27.5, (21.3–33.7)	31
Prevalence obesity (%)	5.6, (2.5–8.8)	19[b]
Prevalence current smoking (%)	6.0, (3.5–8.6)	13[b]
Prevalence hypertension (%)	13.9, (8.3–19.5)	23[b]

[a]Source: Health Survey for England cardiovascular risk factors, 2006[6].
[b]= statistically significant.

Lipids ?



The « Dundee Coronary Risk Disk ». Tunstall Pedoe H. Eur Heart J, 1992

Houston S et al. Aviat Space Environ Med, 2010

Houston S et al. Eur J Cardiovasc Prev Rehabil, 2011

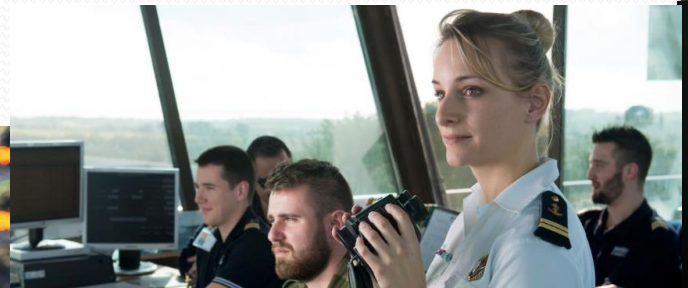




Lipids Distribution and Dyslipidemia in the French Flight Personnel








Materials & Methods

Type :

- Monocentric, prospective and descriptive
- Based on CVRF analysis

Population :

All military and civilian applicants

Duration :

6 month (october 2017-april 2018)

Analysed Parameters :

- Age, Gender, Function
- Smoking, Treatments
- BMI, Waist Circumference, Blood Pressure,
- LDL, TC, HDL, Triglycerides, Fasting Glucose
- Metabolic Sd
- Global cardiovascular risk

French Military Health Service Academy

AeMC Sainte-Anne (Toulon)

WWW.CARDIORISK.FR

The Population

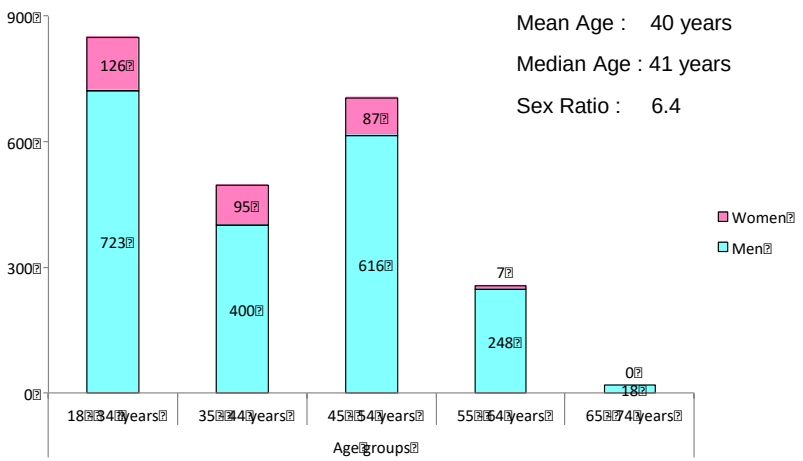
Total N=2821 Assessed for eligibility

Exclude those with age < 18 and ≥ 74 years (N=29)

N=2792, Age ≥ 18 and < 74 years
Men (N=2406)
Women (N=386)

Exclude those with missing data on lipid profiles (N=472)

N=2320, Age ≥ 18 and < 74 years were included in the analysis
Men (N=2005)
Women (N=315)

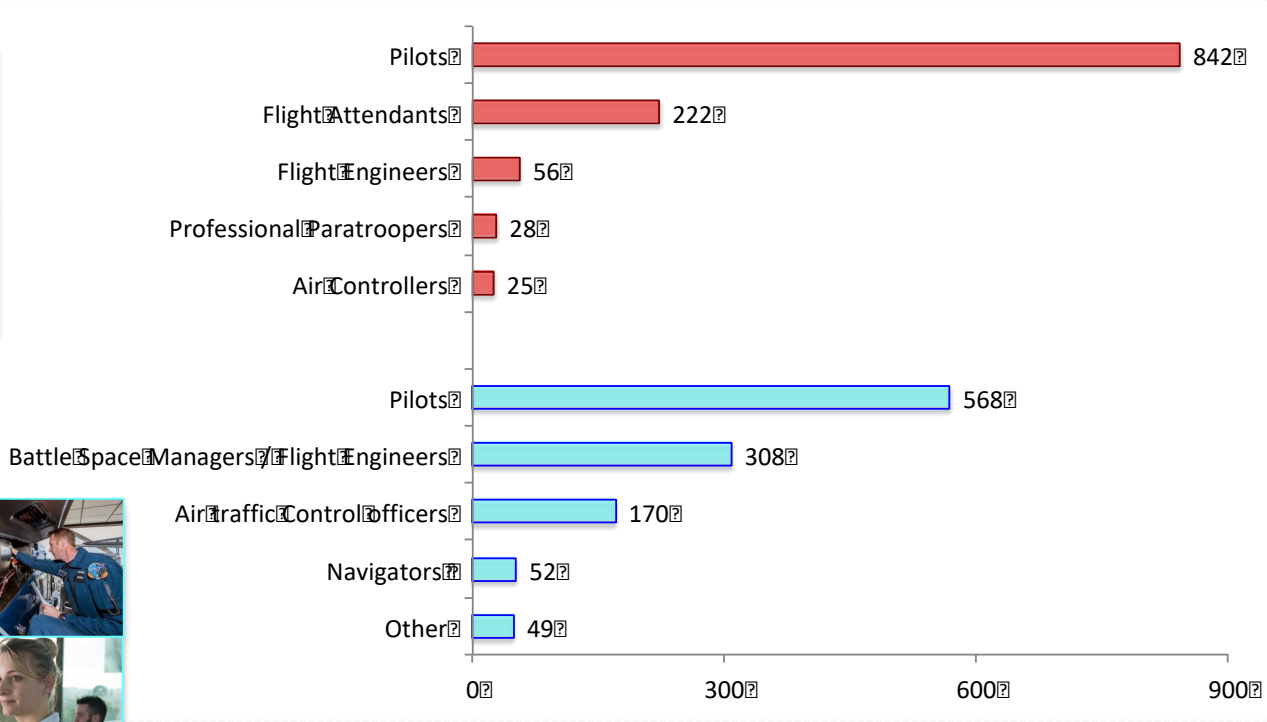


	Gender		Total	P Value
	Men	Women		
Military N (%)	1032 (90.0)	115 (10.0)	1147 (100)	< 0.001
Civilian N (%)	973 (82.9)	200 (17.1)	1173 (100)	

The Population

Civilians

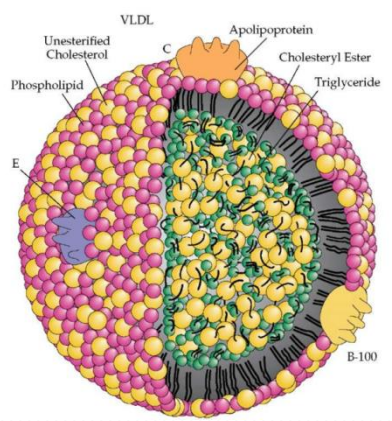
Military



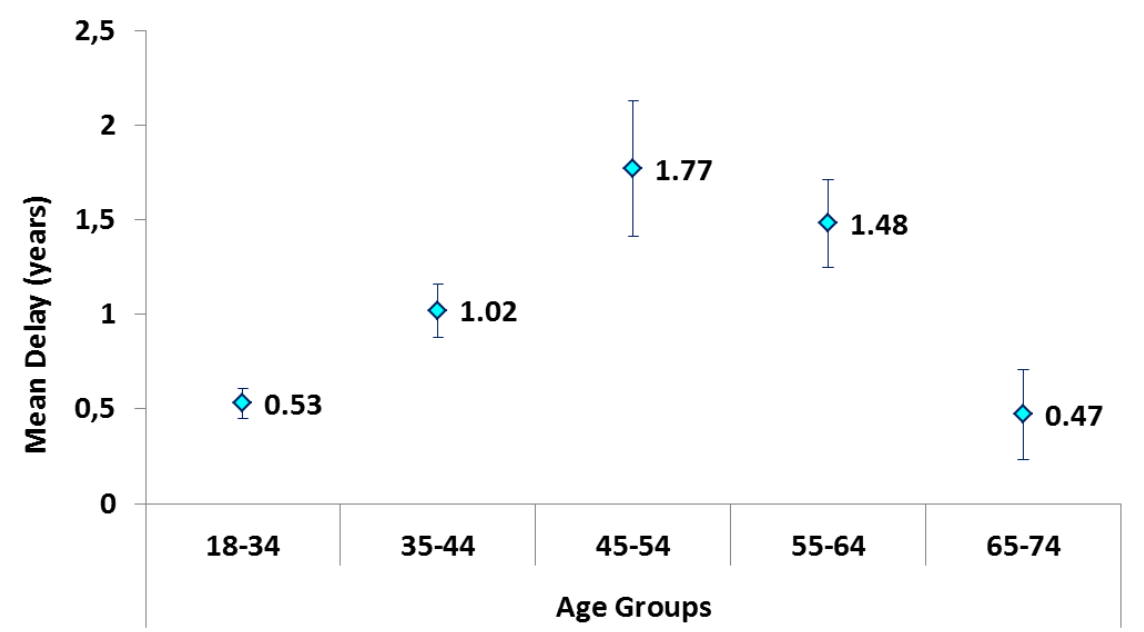
Results & Discussion

1. Serum Lipids

- Flight Personnel



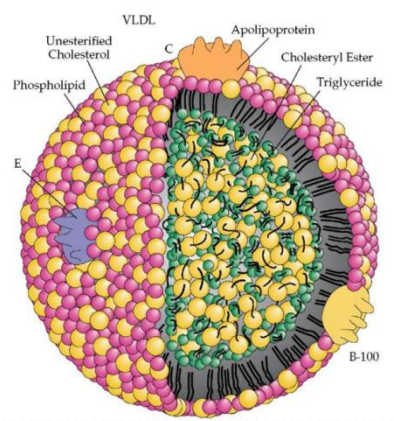
A « close » monitoring…

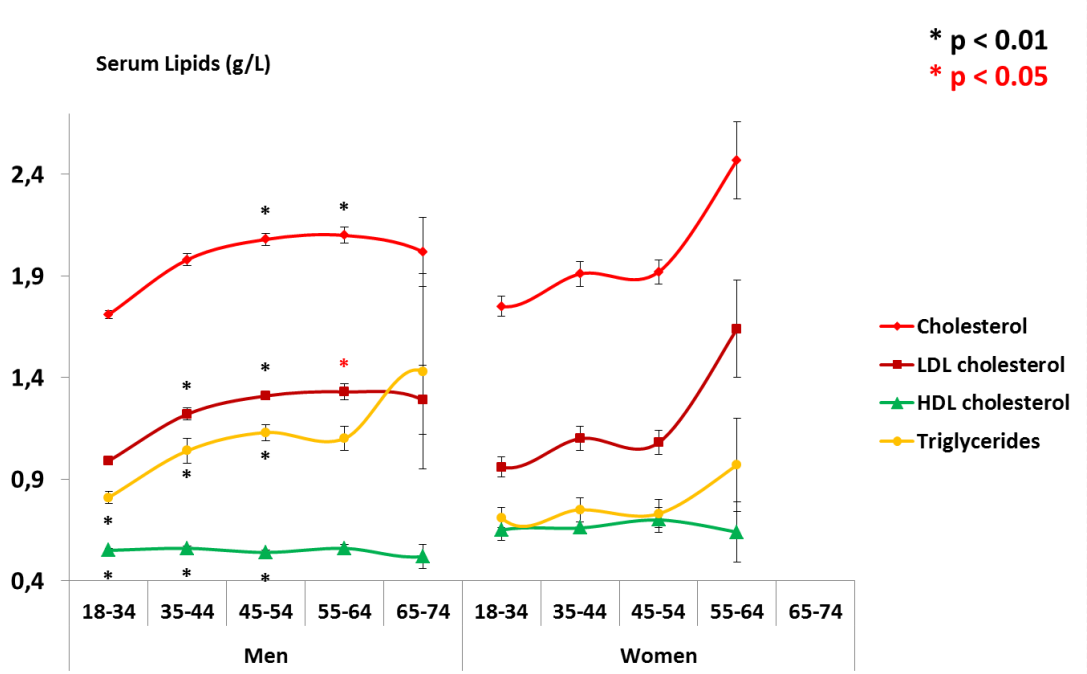


Results & Discussion

1. Serum Lipids

- Flight Personnel





Results & Discussion

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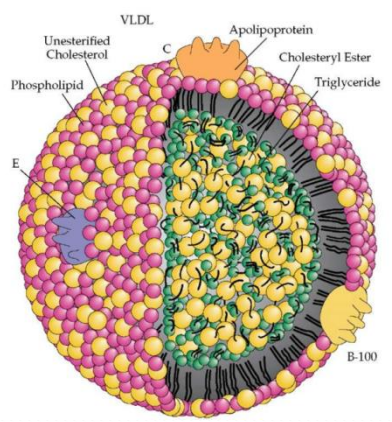
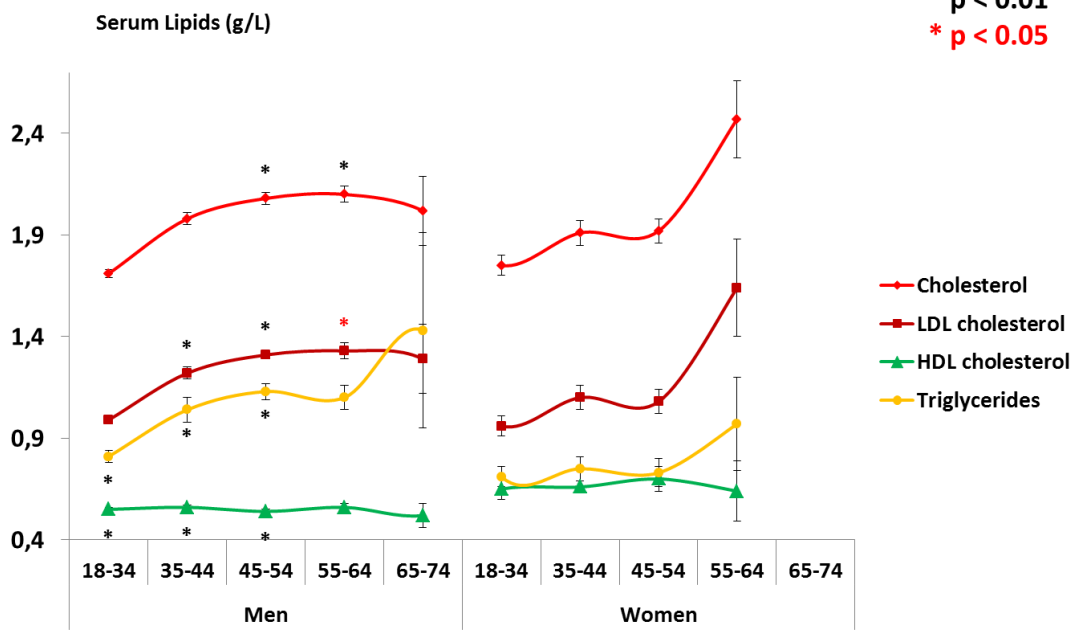
- Flight Personnel



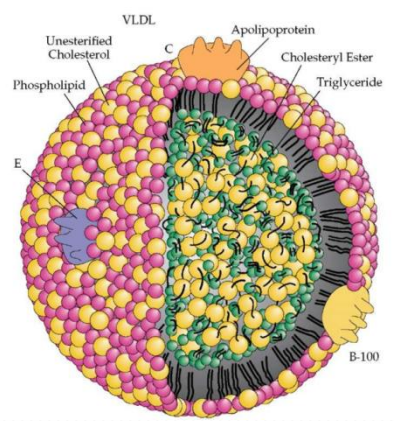


	Men	Women	Global	p
Mean Age (years)	40.4 (39.7-41.1)	37.5 (36.3-38.7)	**40.0 (39.5-40.5)**	
Mean LDL cholesterol (g/L)	1.18 (1.17-1.19)	1.05 (1.02-1.08)	**1.16 (1.14-1.18)**	
Mean Total cholesterol (g/L)	1.93 (1.91-1.95)	1.86 (1.82-1.90)	**1.92 (1.91-1.93)**	< 0.01
Mean Triglycerides (g/L)	0.99 (0.98-1.0)	0.74 (0.71-0.77)	**0.96 (0.94-0.98)**	
Mean HDL cholesterol (g/L)	0.55 (0.53-0.57)	0.62 (0.6-0.64)	**0.57 (0.56-0.58)**	

Results & Discussion

1. Serum Lipids

- Flight Personne
- Military *vs* Civilians Aircrew



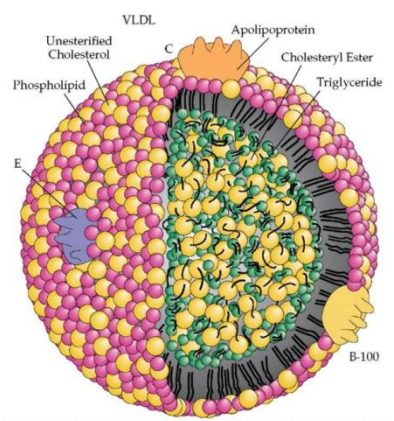
	Military	Civilians	
Men	1032	973	p
Mean Age (years)	34.1 (33.5-34.8)	47.0 (46.3-47.7)	***
Mean LDL Cholesterol (g/L)	1.11 (1.09-1.13)	1.26 (1.24-1.28)	***
Mean Total Cholesterol (g/L)	1.85 (1.83-1.87)	2.01 (1.99-2.03)	***
Mean Triglycerides (g/L)	0.94 (0.90-0.98)	1.05 (1.02-1.08)	***
Mean HDL Cholesterol (g/L)	0.55 (0.54-0.56)	0.55 (0.54-0.56)	NS
Women	115	200	p
Mean Age (years)	31.0 (29.1-32.8)	41,3 (40,0-42,7)	***
Mean LDL Cholesterol (g/L)	1.0 (0.95-1,05)	1.08 (1.04-1.12)	NS
Mean Total Cholesterol (g/L)	1.81 (1.76-1.86)	1.9 (1.85-1.95)	NS
Mean Triglycerides (g/L)	0.73 (0.68-0.78)	0.74 (0.70-0.78)	NS
Mean HDL Cholesterol (g/L)	0.66 (0.64-0.68	0.67 (0.65-0.69)	NS

*** $p < 10^{-3}$

Results & Discussion

1. Serum Lipids

- Flight Personne
- Military *vs* Civilians Aircrew



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Results & Discussion

1. Serum Lipids

- Flight Personne
- Military *vs* Civilians Aircrew
- Aircrew *vs* General Population

	Study	Age (yo)	N	Total Cholesterol (g/l)	LDL cholesterol (g/l)	HDL Cholesterol (g/l)	Triglycerides (g/l)
French Flight Personnel	2017-2018	18-74	2320	1.92 (1.90-1.94)	1.16 (1.15-1.17)	0.57 (0.56-0.58)	0.96 (0.94-0.98)
French General Population	NNHS 2006-2007	18-74	1985	2.08 (2.05-2.10)	1.27 (1.27-1.30)	NA	NA
French General Population	ESTEBAN 2015-2016	18-74	2074	NA	1.30 (1.28-1.32)	NA	NA
Spanish General Population	ENRICA 2008-2010	> 18	11554	1.96 (1.95-1.97)	1.21 (1.20-1.22)	0.53 (0.52-0.54)	1.07 (1.06-1.08)
English General Population	HSE 2003	> 16	8269				
Men				2.13 (1.55-2.71)	NA	0.54 (0.39-0.73)	NA
Women				2.36 (1.78-3.0)	NA	0.62 (0.46-0.81)	NA
Chinese and Thai General population	InterASIA 2000-2001	35-74	15838	1.86 (1.85-1.87)	1.10 (1.09-1.11)	0.52 (0.51-0.53)	1.28 (1.27-1.29)
Korean General Population	KHANES 2008-2018	> 20	19489	1.87 (1.86-1.88)	1.13 (1.12-1.14)	0.48 (0.47-0.49)	1.36 (1.33-1.39)
American General Population	NHANES 2007-2010	> 20	11028	1.96 (1.95-1.98)	1.16 (1.14-1.17)	0.53 (0.51-0.54)	1.10 (1.07-1.13)
	MESA 2000-2001	45-84	6074	1.94 (1.58-2.29)	1.17 (0.85-1.49)	0.51 (0.36-0.66)	1.26 (0.6-1.92)
Canadian General Population	1986-1990	18-74	16924	2.0 (1.99-2.1)	1.22 (1.21-1.23)	0.50 (0.49-0.51)	1.36 (1.05-1.38)

Results & Discussion

1. Serum Lipids

- Flight Personne
- Military *vs* Civilians Aircrew
- Aircrew *vs* General Population

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American General Population	NHANES 2007-2010	> 20	11028	1.96 (1.95-1.98)	1.16 (1.14-1.17)	0.53 (0.51-0.54)	1.10 (1.07-1.13)
	MESA 2000-2001	45-84	6074	1.94 (1.58-2.29)	1.17 (0.85-1.49)	0.51 (0.36-0.66)	1.26 (0.6-1.92)
Canadian General Population	1986-1990	18-74	16924	2.0 (1.99-2.1)	1.22 (1.21-1.23)	0.50 (0.49-0.51)	1.36 (1.05-1.38)

Results & Discussion

1. Serum Lipids

- Flight Personne
- Military *vs* Civilians Aircrew
- Aircrew *vs* General Population

	Study	Age (yo)	N	Total Cholesterol (g/l)	LDL cholesterol (g/l)	HDL Cholesterol (g/l)	Triglycerides (g/l)
French Flight Personnel	2017-2018	18-74	2320	1.92 (1.90-1.94)	1.16 (1.15-1.17)	0.57 (0.56-0.58)	0.96 (0.94-0.98)
French General Population	NNHS 2006-2007	18-74	1985	2.08 (2.05-2.10)	1.27 (1.27-1.30)	NA	NA
French General Population	ESTEBAN 2015-2016	18-74	2074	NA	1.30 (1.28-1.32)	NA	NA
Spanish General Population	ENRICA 2008-2010	> 18	11554	1.96 (1.95-1.97)	1.21 (1.20-1.22)	0.53 (0.52-0.54)	1.07 (1.06-1.08)
English General Population	HSE 2003	> 16	8269				
Men				2.13 (1.55-2.71)	NA	0.54 (0.39-0.73)	NA
Women				2.36 (1.78-3.0)	NA	0.62 (0.46-0.81)	NA
Chinese and Thai General population	InterASIA 2000-2001	35-74	15838	1.86 (1.85-1.87)	1.10 (1.09-1.11)	0.52 (0.51-0.53)	1.28 (1.27-1.29)
Korean General Population	KHANES 2008-2018	> 20	19489	1.87 (1.86-1.88)	1.13 (1.12-1.14)	0.48 (0.47-0.49)	1.36 (1.33-1.39)
American General Population	NHANES 2007-2010	> 20	11028	1.96 (1.95-1.98)	1.16 (1.14-1.17)	0.53 (0.51-0.54)	1.10 (1.07-1.13)
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Results & Discussion

1. Serum Lipids

- Flight Personne
- Military *vs* Civilians Aircrew
- Aircrew *vs* General Population

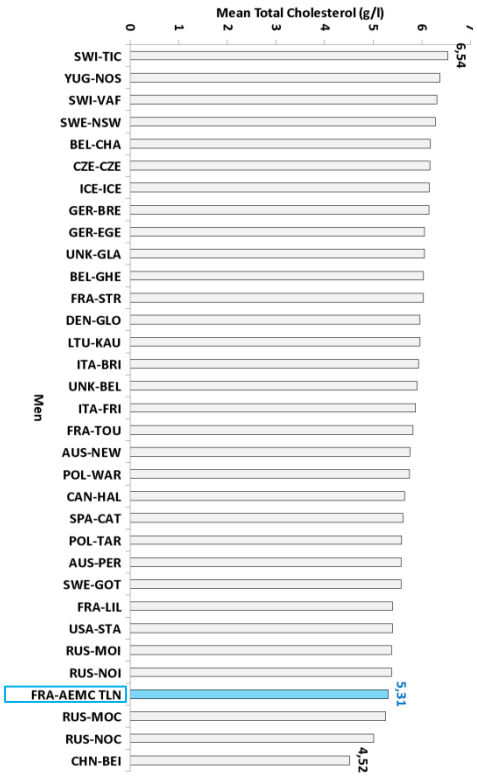
Prevalence, awareness and treatment of hypercholesterolaemia in 32 populations: results from the WHO MONICA Project

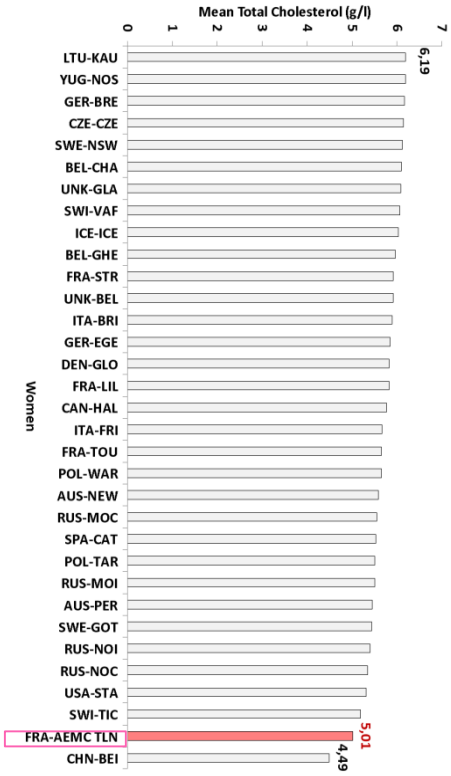
Hanna Tolonen,[1] Ulrich Keil,[2] Marco Ferrario[3] and Alun Evans[4] for the WHO MONICA Project[5]

Data collection : 1989-1997

People included : 35-64 yo

19 countries on 3 continents





♂ ♀

Tolonen H et al. Int J Epidemiol 2005

Results & Discussion

1. Serum Lipids

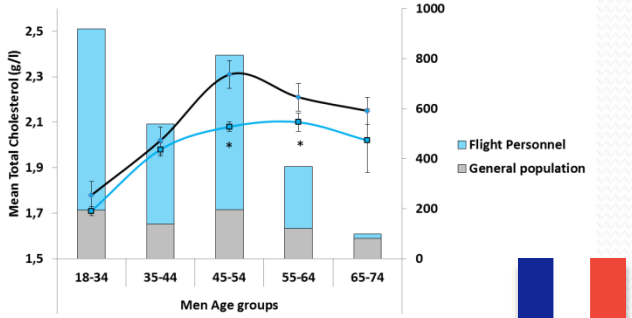
De Peretti C et al. NNHS 2006-2007 (Bull Epidémiol Hebd 2013)

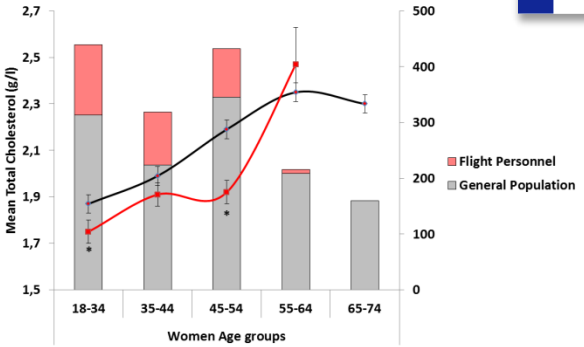
Primatesta P et al. Clin Endocrinol (Oxf) 2006

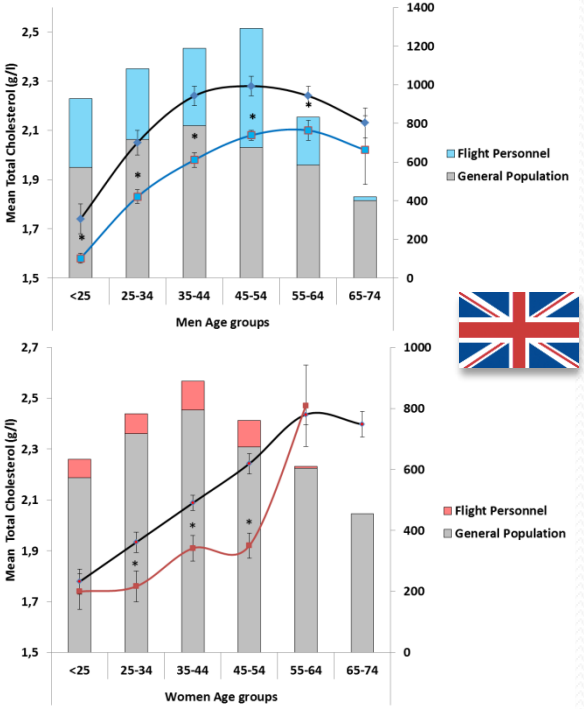
Guallar-Castillon P et al. Rev Esp Cardiol 2012

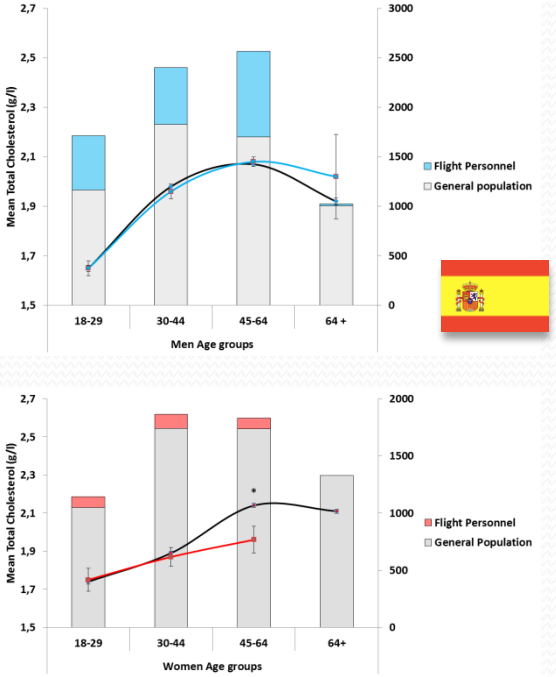
* $p < 0.01$

- Flight Personne
- Military *vs* Civilians Aircrew
- Aircrew *vs* General Population





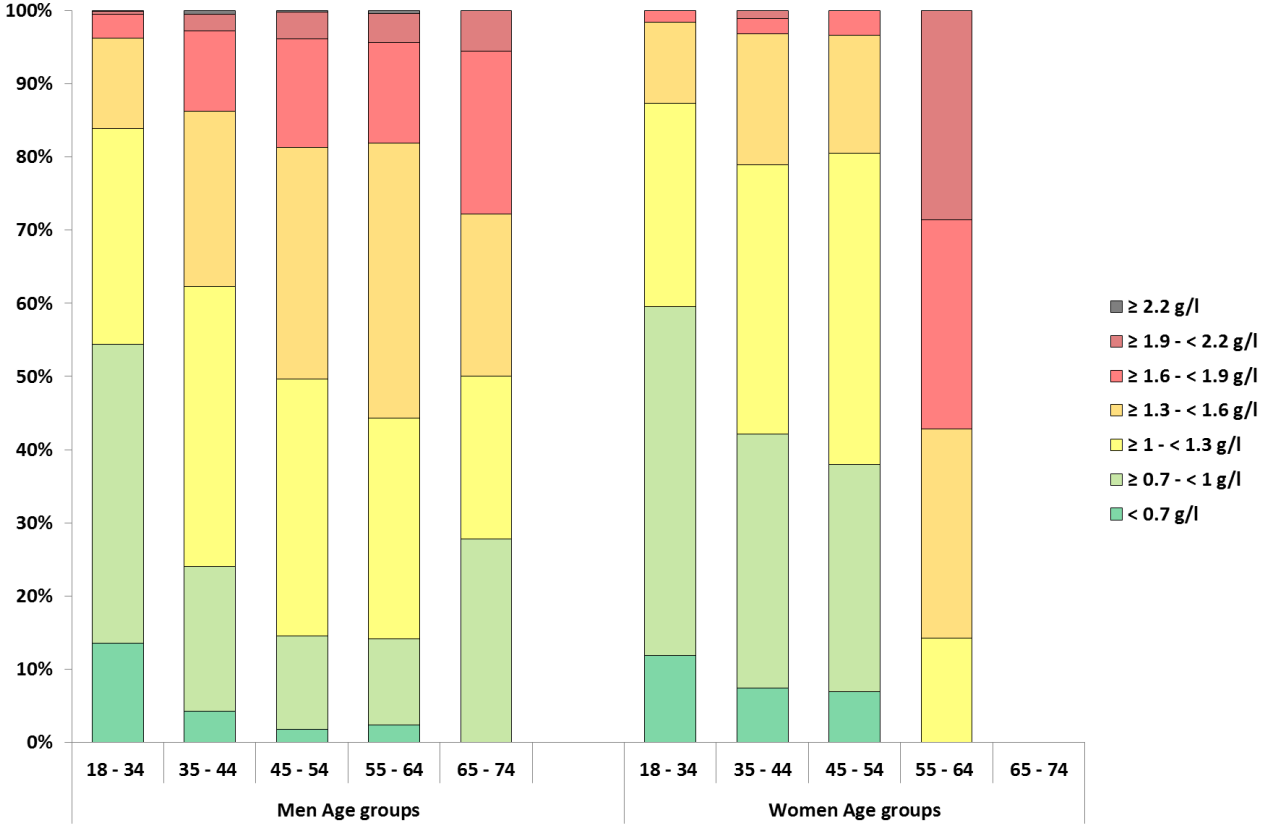




Results & Discussion

1. Serum Lipids
2. LDL cholesterol

- Flight Personnel



Results & Discussion

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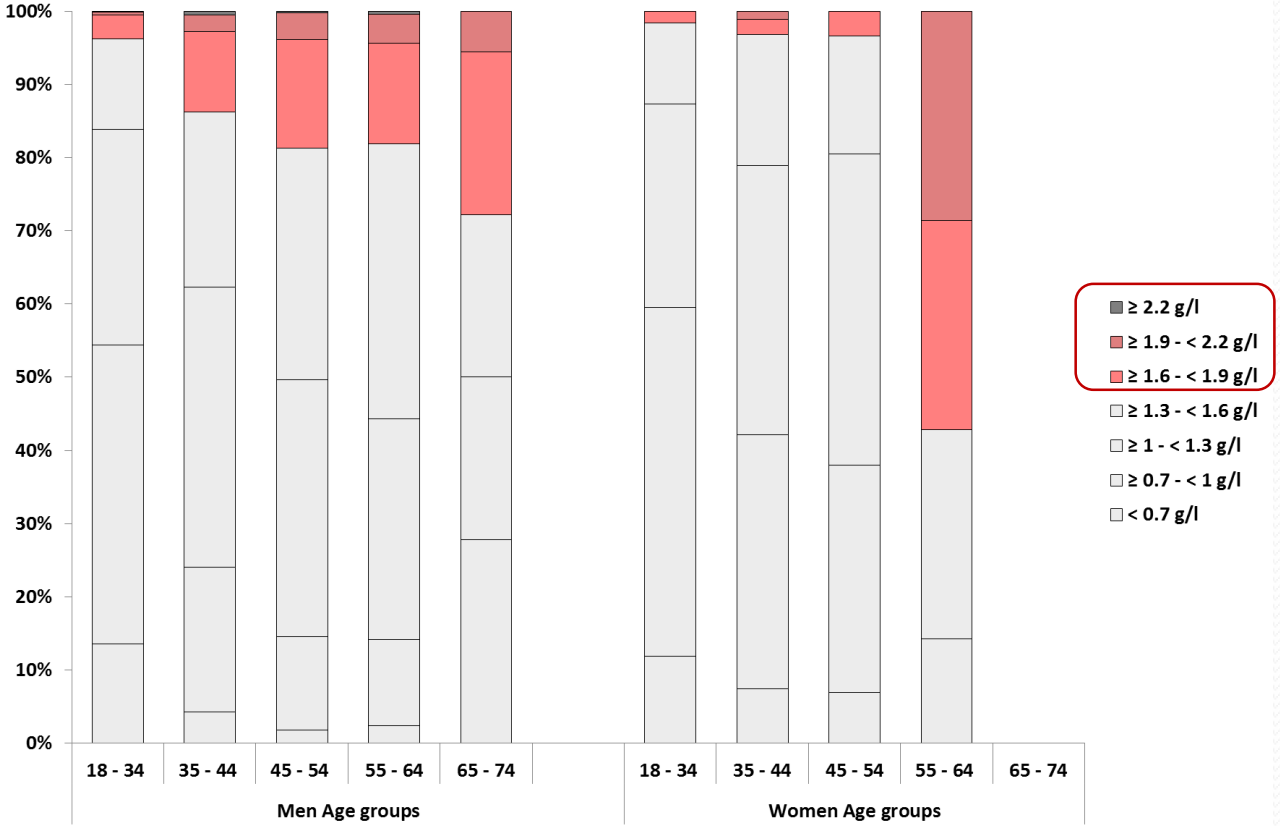
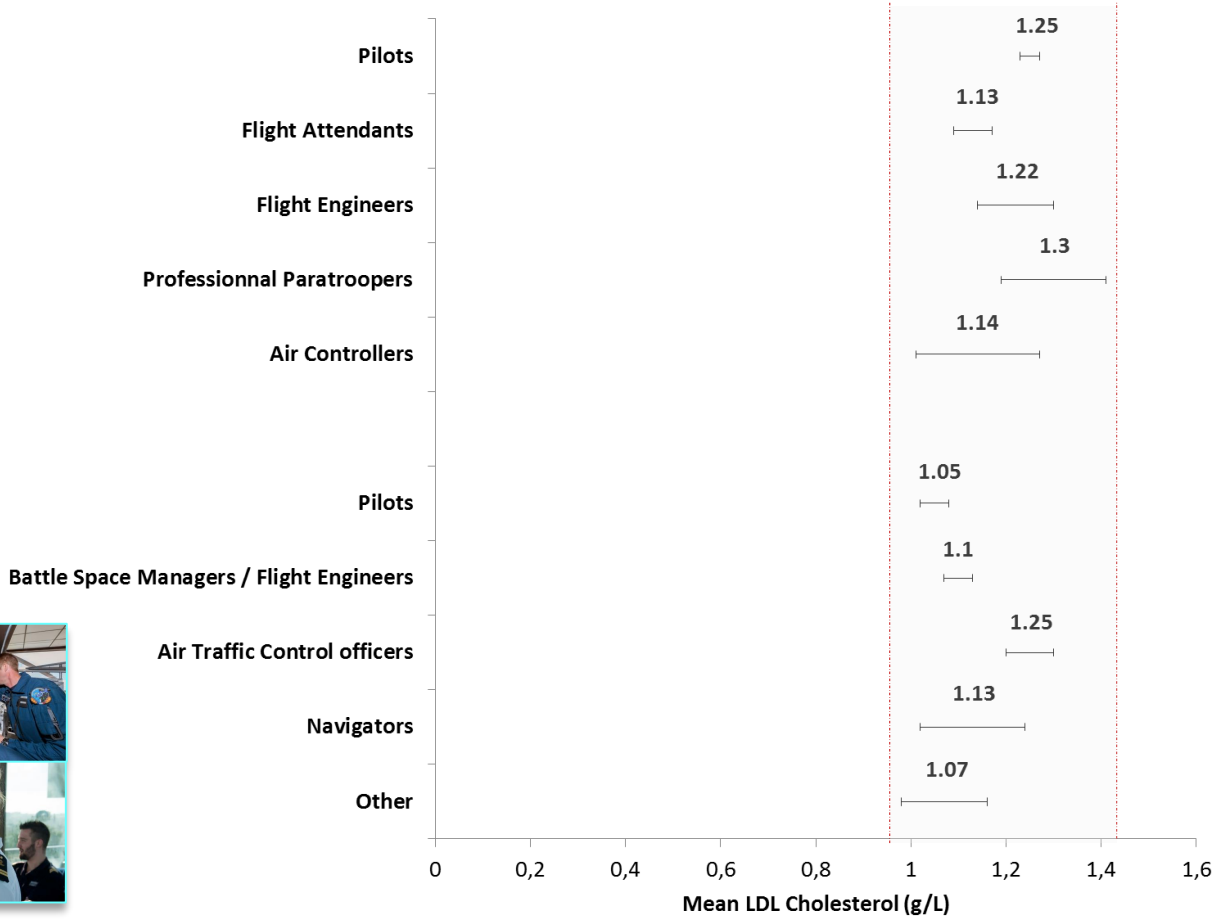


Results & Discussion

Civilians

Military

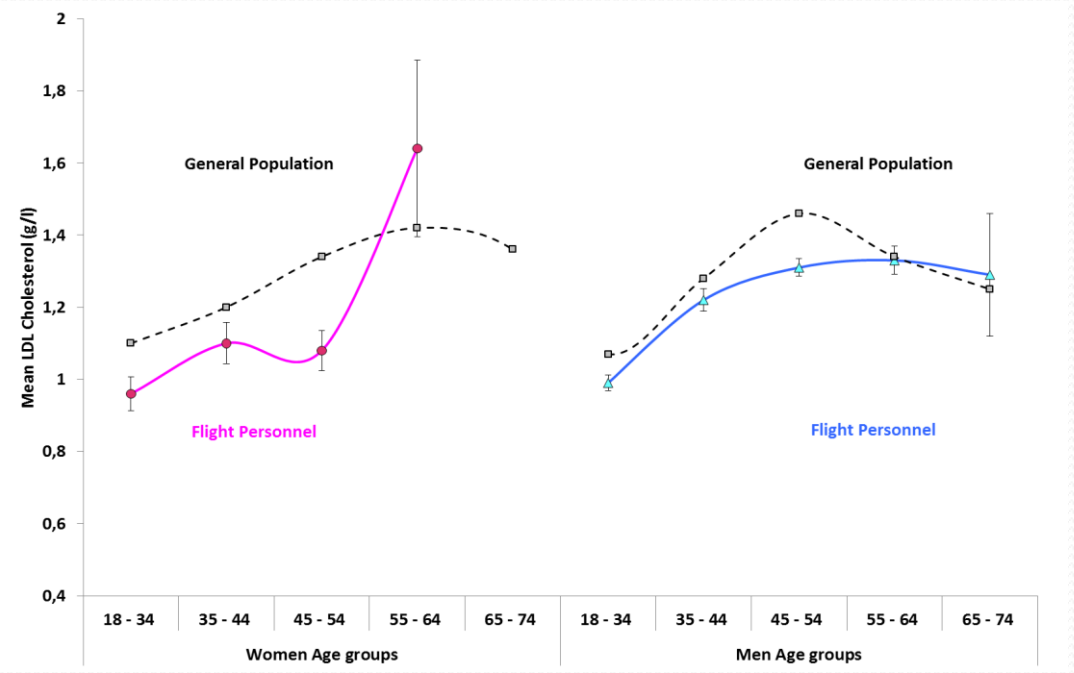


Results & Discussion

1. Serum Lipids

2. LDL cholesterol

- Flight Personne
- Military *vs* Civilians
- Aircrew *vs* General Population



De Peretti C et al. NNHS 2006-2007 (Bull Epidémiol Hebd 2013)

Results & Discussion

1. Serum Lipids

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- Military *vs* Civilians
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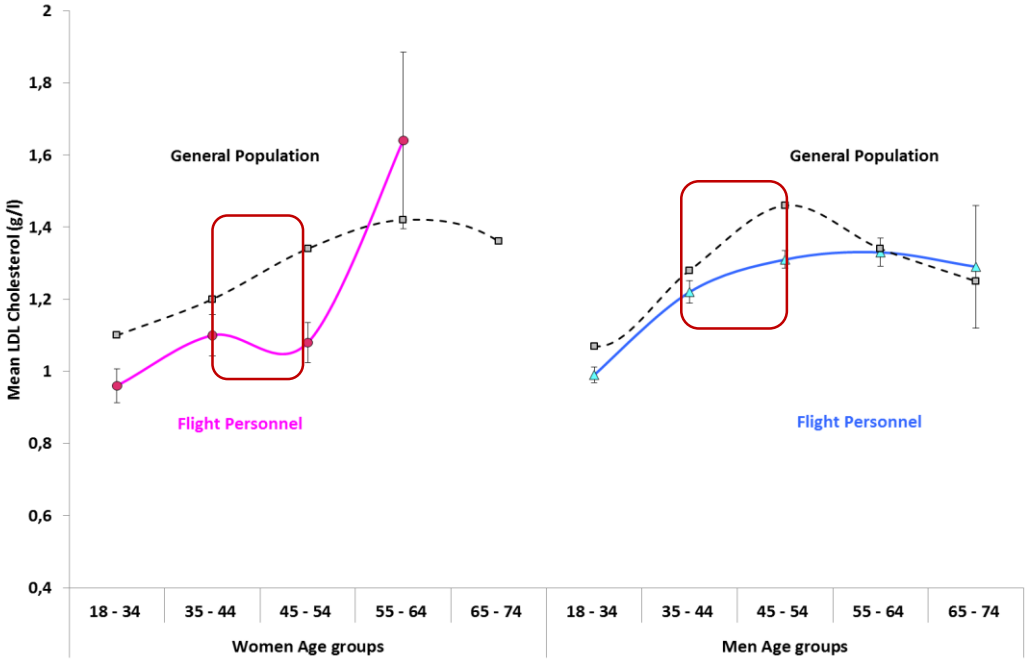
"Airline pilot applicants have favorable lipid profiles which suggest that they will experience a lower incidence of cardiovascular disease during their professional careers. Moreover, their rate of cholesterol increase flattens out in their fifth decade, as opposed to that of the general population which does not exhibit this trend until the seventh decade. The reasons for this difference include their initial selection process, continued self-selection, and periodic health examinations. The result for an air carrier means a lower probability of pilot incapacitation during flight, and less expense for the company which employs the applicant."[3]



McCall NJ et al. Aviat Space Environ Med, 1992

Results & Discussion

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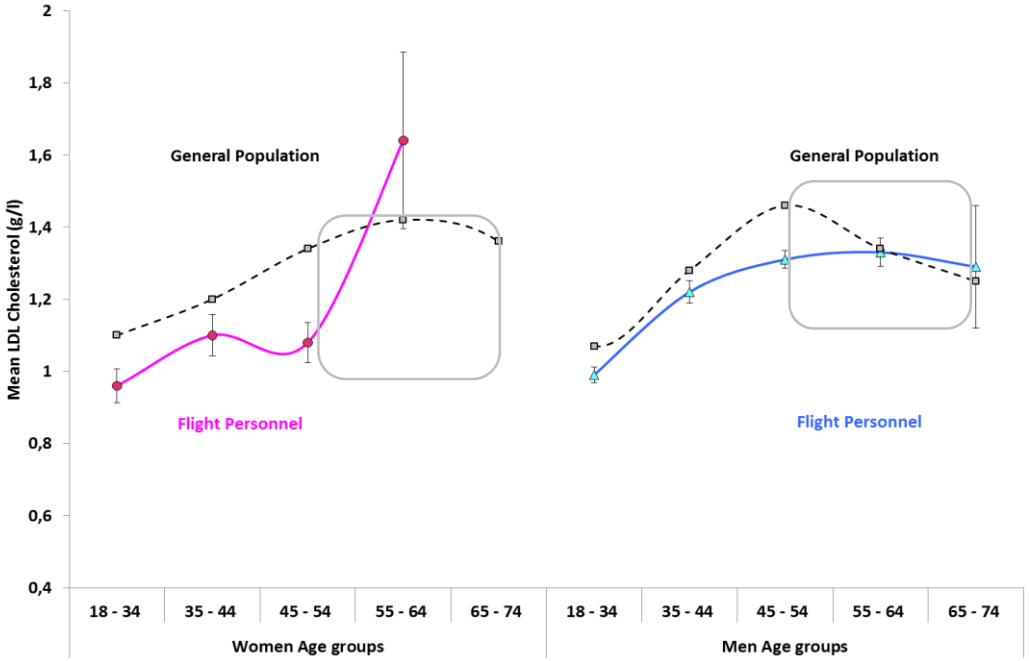


McCall NJ et al. Aviat Space Environ Med, 1992

Results & Discussion

1. Serum Lipids
2. LDL cholesterol

- Flight Personne
- Military vs Civilians
- Aircrew vs General Population
- LDL vs other Risk Factors

Risk Factor				NA	p
Age		< 50 yo (Men) or < 60 yo (Women)	>= 50 yo (Men) or >= 60 yo (Women)		
	Men (N)	1472	533		
	Mean LDL cholesterol (g/l)	1.13 (1.11-1.15)	1.32 (1.29-1.35)		< 0.01
	Women (N)	314	1		
	Mean LDL cholesterol (g/l)	1.05 (1.02-1.08)	1.46		-
Smoking	*Current or Ex < 3 years*	No	Yes		
	Men (N)	1673	332		
	Mean LDL cholesterol (g/l)	1.18 (1.16-1.20)	1.2 (1.04-1.24)		NS
	Women (N)	240	75		
	Mean LDL cholesterol (g/l)	1.03 (0.99-1.07)	1.12 (1.04-1.2)		NS
Hypertension	*>= 140/90 mmHg*	No	Yes		
	Men (N)	1697	303	5	
	Mean LDL cholesterol (g/l)	1.16 (1.14-1.18)	1.28 (1.24-1.32)		< 0.01
	Women (N)	301	13	1	
	Mean LDL cholesterol (g/l)	1.04 (1.01-1.07)	1.34 (1.17-1.51)		< 0.01
Fasting Glucose		< 1 g/l	>= 1 g/l		
	Men (N)	1376	422	207	
	Mean LDL cholesterol (g/l)	1.17 (1.15-1.19)	1.25 (1.22-1.28)		< 0.01
	Women (N)	236	14	65	
	Mean LDL cholesterol (g/l)	1.04 (1.0-1.08)	1.17 (1.01-1.33)		NS
Weist Circumference		< 94 cm (Men) or < 80 cm (Women)	>= 94 cm (Men) or >= 80 cm (Women)		
	Men (N)	1480	514	11	
	Mean LDL cholesterol (g/l)	1.14 (1.12-1.16	1.31 (1.28-1.34)		< 0.01
	Women (N)	213	98	4	
	Mean LDL cholesterol (g/l)	1.0 (0.96-1.04)	1.18 (1.12-1.24)		< 0.01
Obesity		BMI < 30 kg/m2	BMI >= 30 kg/m2		
	Men (N)	1885	117	3	
	Mean LDL cholesterol (g/l)	1.17 (1.15-1.19)	1.29 (1.23-1.35)		< 0.01
	Women (N)	304	10	1	
	Mean LDL cholesterol (g/l)	1.05 (1.02-1.08)	1.23 (0.99-1.47)		NS
Metabolic Syndrom	*IDF 2005 criteria*	No	Yes		
	Men (N)	1768	237		
	Mean LDL cholesterol (g/l)	1.16 (1.14-1.18)	1.32 (1.28-1.36)		< 0.01
	Women (N)	306	9		
	Mean LDL cholesterol (g/l)	1.05 (0.98-1.12)	1.25 (1.08-1.12)		NS

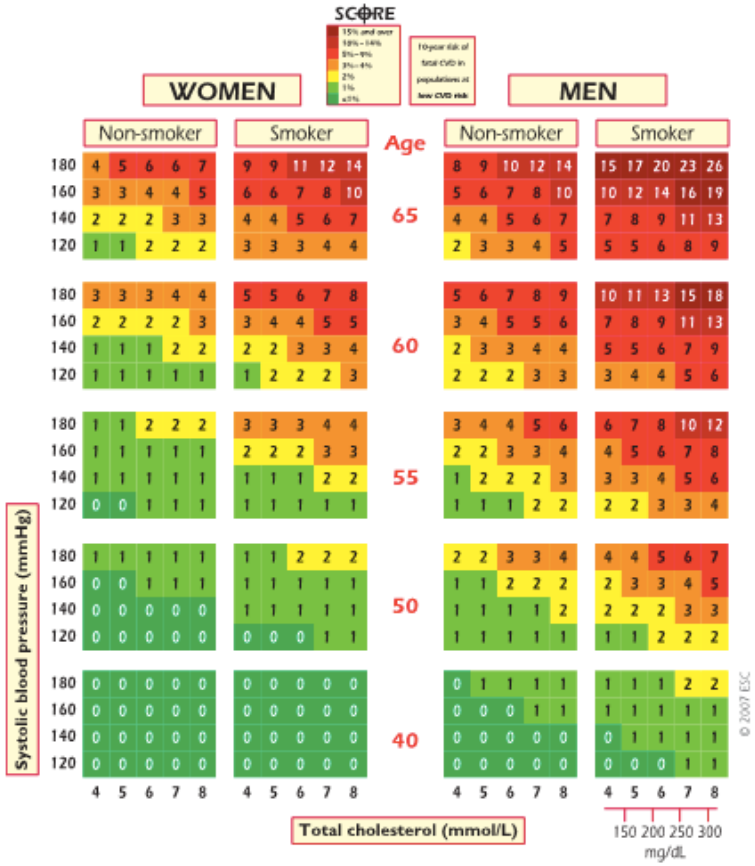
Results & Discussion

1. Serum Lipids
2. LDL cholesterol
3. Dyslipidemia

- Guidelines

Total CV risk (SCORE) %	LDL-C levels				
	<70 mg/dL <1.8 mmol/L	70 to <100 mg/dL 1.8 to <2.5 mmol/L	100 to <155 mg/dL 2.5 to <4.0 mmol/L	155 to <190 mg/dL 4.0 to <4.9 mmol/L	>190 mg/dL >4.9 mmol/L
<1	No lipid intervention	No lipid intervention	Lifestyle intervention	Lifestyle intervention	Lifestyle intervention, consider drug if uncontrolled
Class[a]/Level[b]	I/C	I/C	I/C	I/C	IIa/A
≥1 to <5	Lifestyle intervention	Lifestyle intervention	Lifestyle intervention, consider drug if uncontrolled	Lifestyle intervention, consider drug if uncontrolled	Lifestyle intervention, consider drug if uncontrolled
Class[a]/Level[b]	I/C	I/C	IIa/A	IIa/A	I/A
>5 to <10, or high risk	Lifestyle intervention, consider drug*	Lifestyle intervention, consider drug*	Lifestyle intervention and immediate drug intervention	Lifestyle intervention and immediate drug intervention	Lifestyle intervention and immediate drug intervention
Class[a]/Level[b]	IIa/A	IIa/A	IIa/A	I/A	I/A
≥10 or very high risk	Lifestyle intervention, consider drug*	Lifestyle intervention and immediate drug intervention	Lifestyle intervention and immediate drug intervention	Lifestyle intervention and immediate drug intervention	Lifestyle intervention and immediate drug intervention
Class[a]/Level[b]	IIa/A	IIa/A	I/A	I/A	I/A

ESC/EAS Guidelines for the management of dyslipidemias 2016



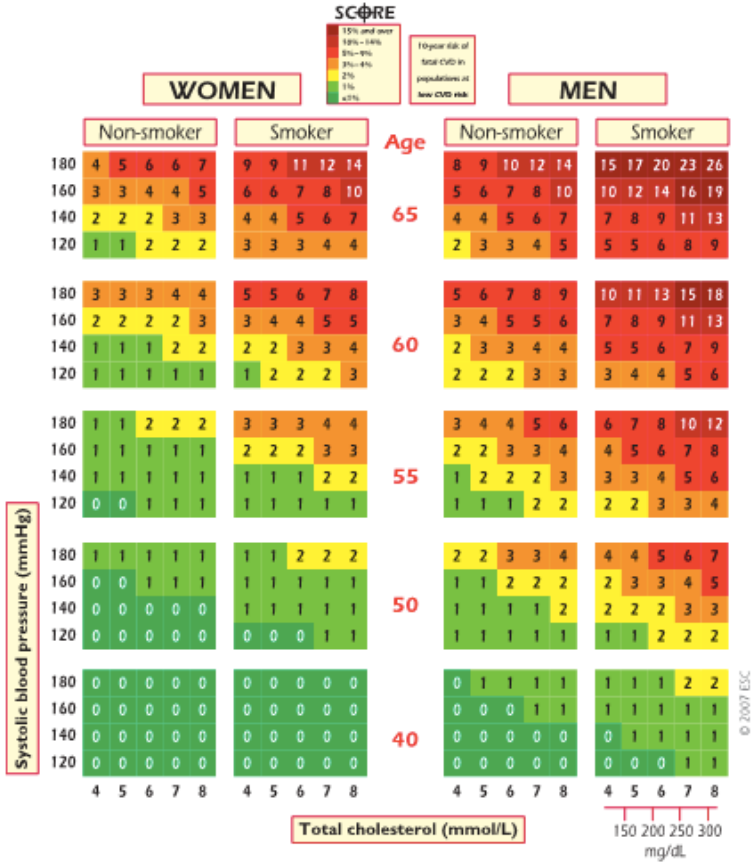
Results & Discussion

1. Serum Lipids
2. LDL cholesterol
3. Dyslipidemia

- Guidelines

Cardiovascular Risk Level		LDL-c goals to attempt
Low	*<1% Risk SCORE*	<1.9 g/L (4.9 mmol/L)
Moderate	*1 to 5% Risk SCORE*	<1.3 g/L (3.4 mmol/L)
High	*>5% Risk SCORE*	<1.0 g/L (2.6 mmol/L)
Very High	*Secondary prevention or >10% Risk SCORE*	<0.7 g/L (1.3 mmol/L)

HAS French Guidelines for the management of dyslipidemias 2017



Results & Discussion

1. Serum Lipids
2. LDL cholesterol
3. Dyslipidemia

- Guidelines
- Flight Personnel

SCORE Risk	Low	Moderate	High	Very High	Global	%	NA
N	1768	510	23	15	2316	100.0	4
No dyslipidemia	1737	187	3	0	1927	83.2	-
High LDL or TTT	31	323	20	15	389	16.8	-

Results & Discussion

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2. LDL cholesterol
3. Dyslipidemia

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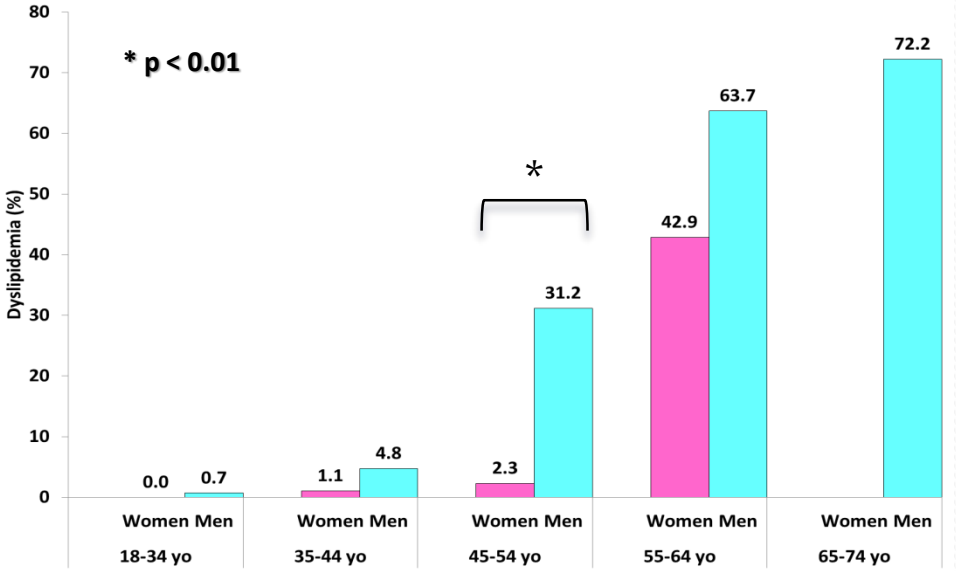

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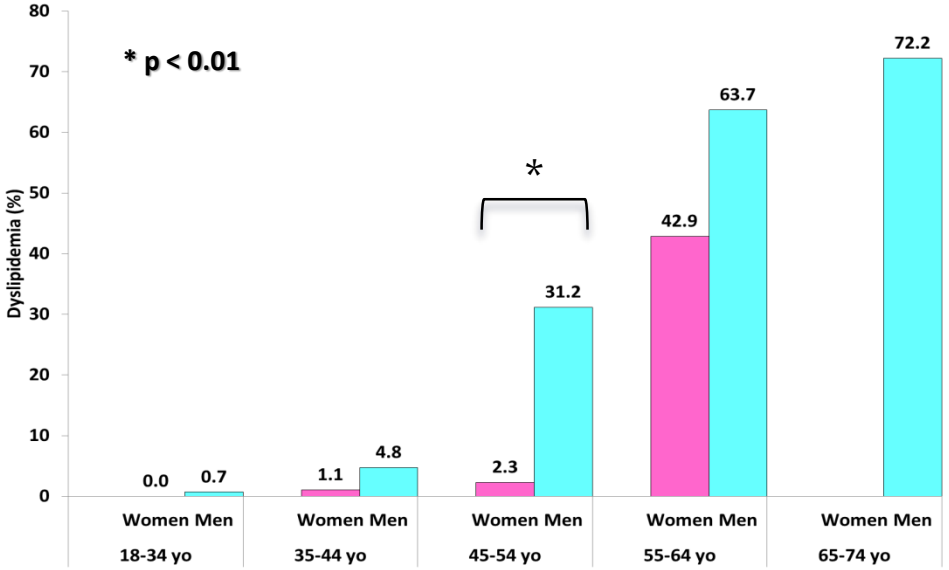
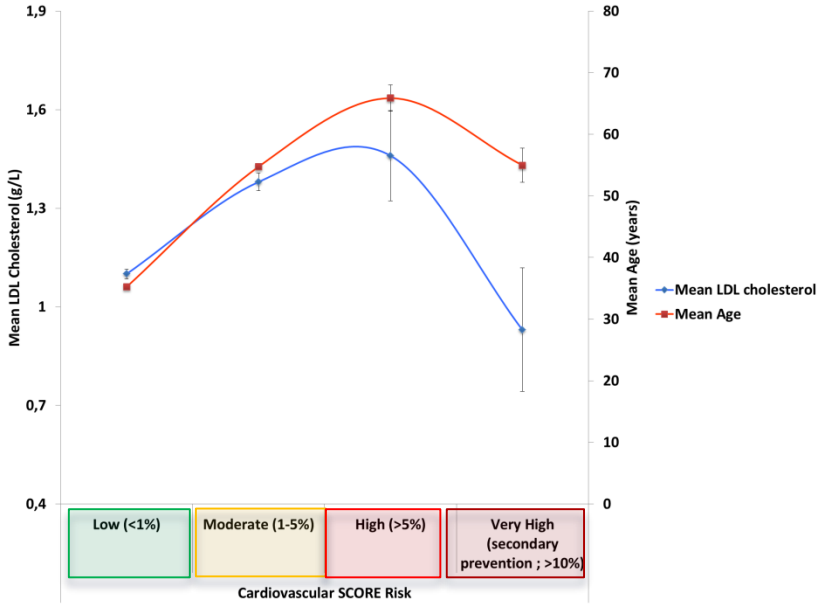
- Flight Personnel



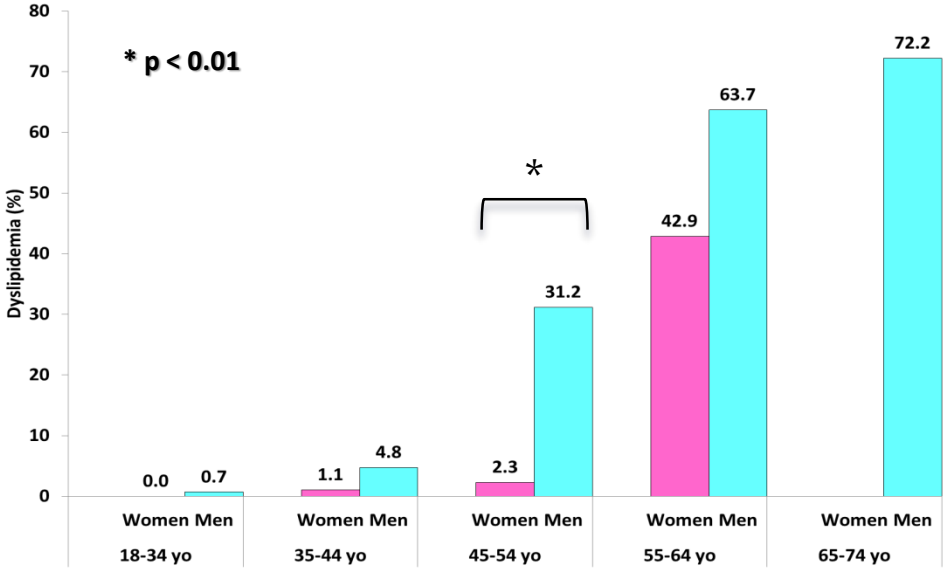


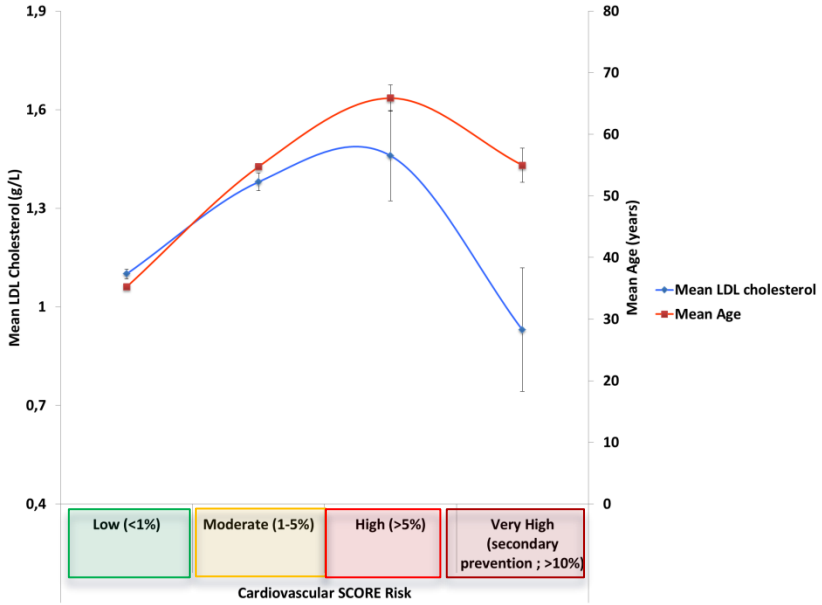
Results & Discussion

1. Serum Lipids
2. LDL cholesterol
3. Dyslipidemia

SCORE Risk	Low	Moderate	High	Very High	Global	%	NA
N	1768	510	23	15	2316	100.0	4
No dyslipidemia	1737	187	3	0	1927	83.2	-
High LDL or TTT	31	323	20	15	389	16.8	-

- Guidelines
- Flight Personnel





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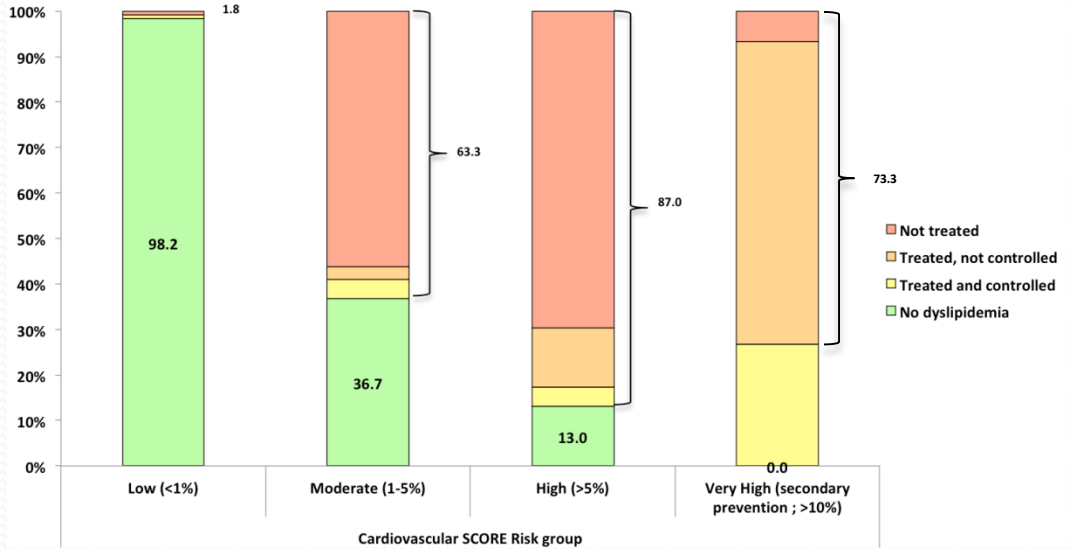

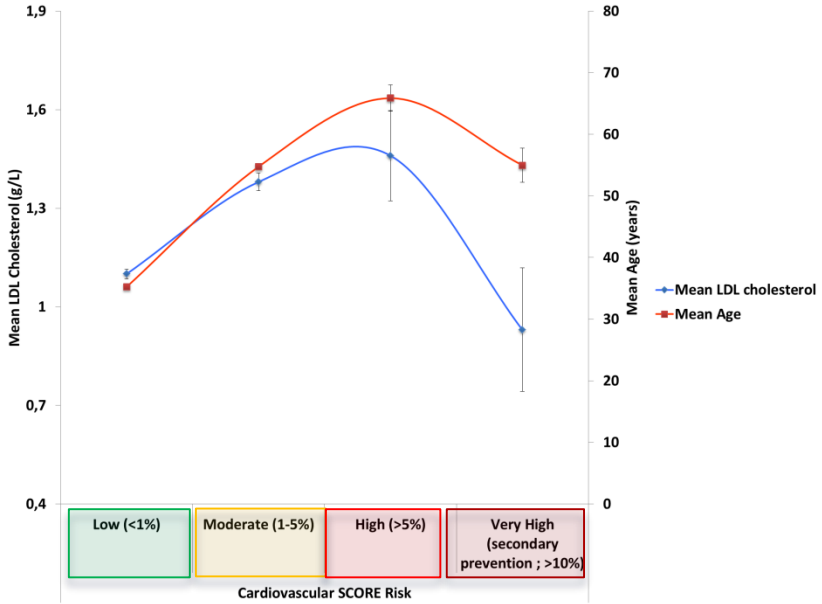

Results & Discussion

1. Serum Lipids
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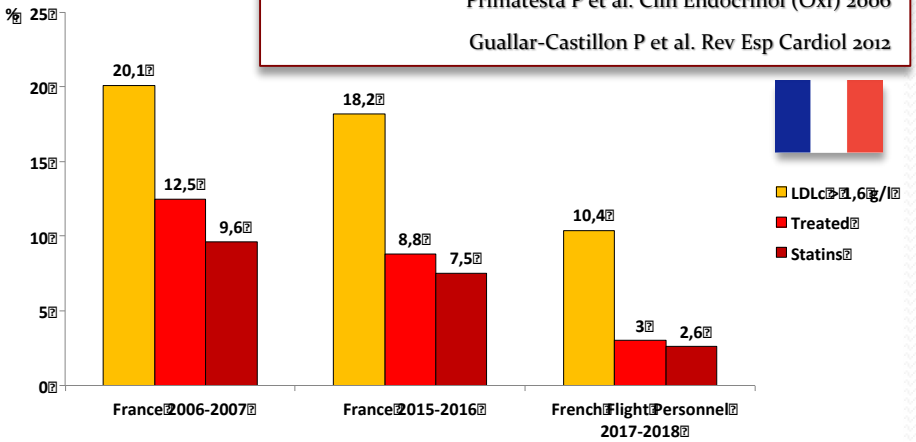
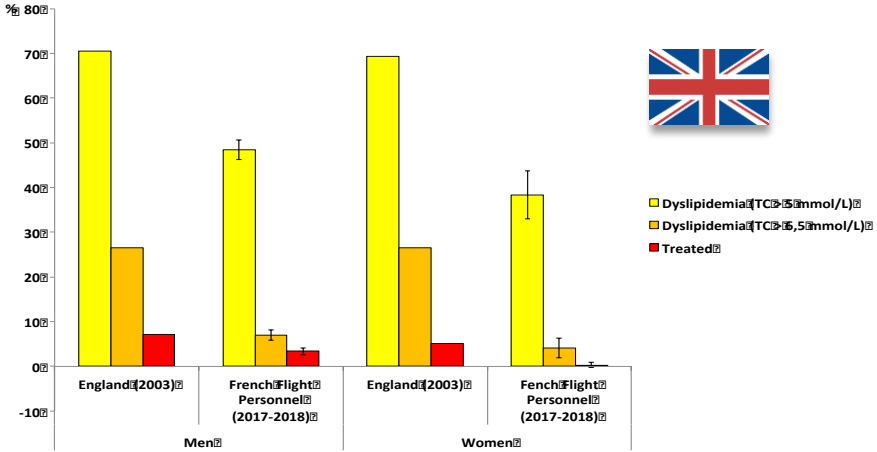
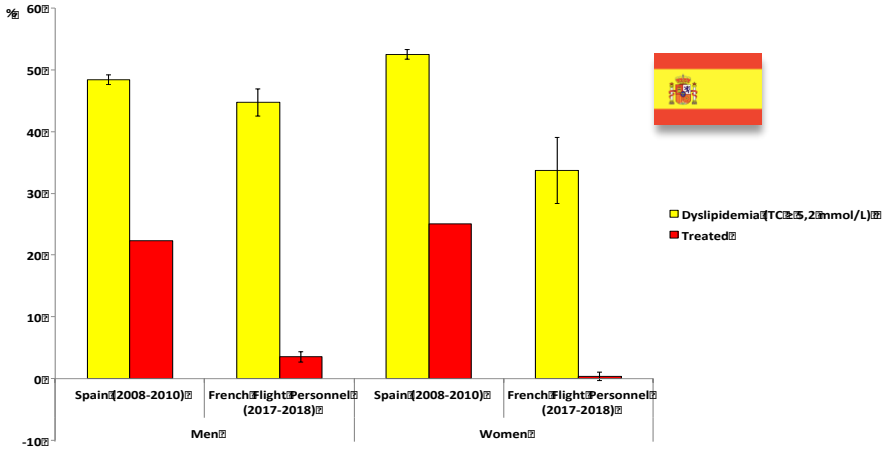
- Guidelines
- Flight Personnel
- Aircrew *vs* General Population

De Peretti C et al. NNHS 2006-2007 (Bull Epidémiol Hebd 2013)
Lecoffre C et al. ESTEBAN 2015-2016 (Rev Epid Santé Pub 2018)
Primatesta P et al. Clin Endocrinol (Oxf) 2006
Guallar-Castillon P et al. Rev Esp Cardiol 2012







Results & Discussion

1. Serum Lipids
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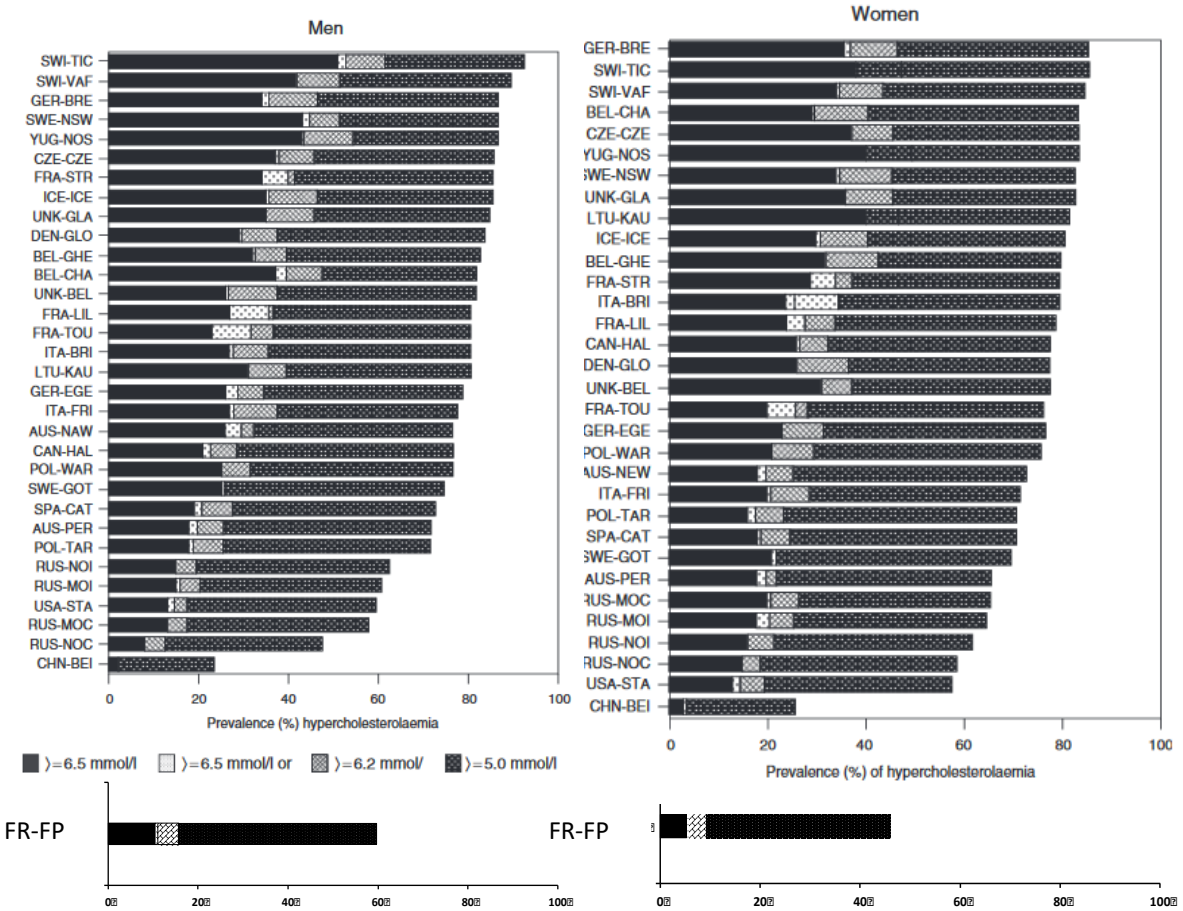
- Guidelines
- Flight Personnel
- Aircrew *vs* General Population

Prevalence, awareness and treatment of hypercholesterolaemia in 32 populations: results from the WHO MONICA Project

Hanna Tolonen,[1] Ulrich Keil,[2] Marco Ferrario[3] and Alun Evans[4] for the WHO MONICA Project[5]

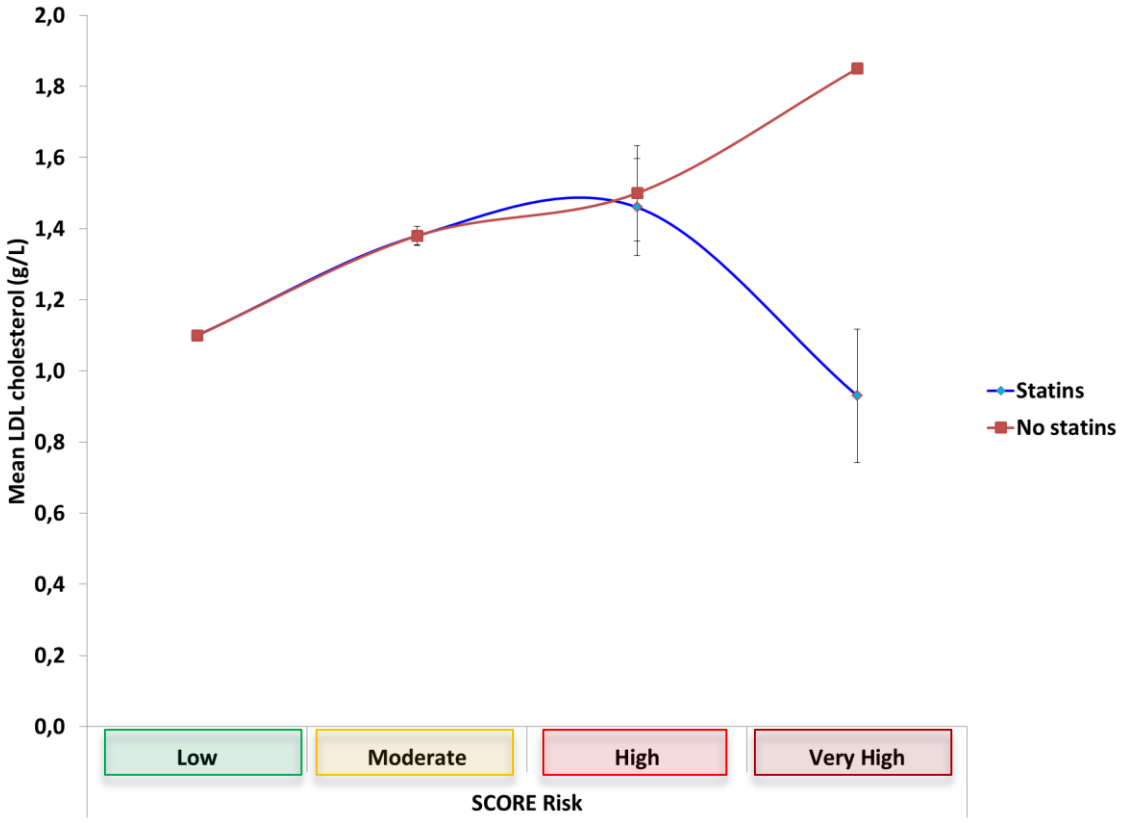


Tolonen H et al. Int J Epidemiol 2005

Results & Discussion

1. Serum Lipids
2. LDL cholesterol
3. Dyslipidemia

- Guidelines
- Flight Personnel
- Aircrew *vs* General Population
- « Statins Effect »



Results & Discussion

1. Serum Lipids
2. LDL cholesterol
3. Dyslipidemia
4. Non LDL-c Risk Factors

« Healthy Worker Effect » ?

	Men (French Aircrew)	Men (French General Population)	p
N	2005	734	
Age			***
18-34	723 (36.0)	195 (26.6)	
35-44	400 (20.0)	139 (19.0)	
45-54	616 (30.7)	197 (26.9)	
55-64	248 (12.4)	121 (16.5)	
65-74	18 (0.9)	82 (11.0)	
Age ≥ 50 years (Men) or ≥ 60 years (Women)	533 (26.6)	303 (41.3)	***
Smoking			***
Current	332 (16.6)	230 (31.3)	
Non-Smokers (or ex-Smokers > 3 years)	1673 (83.4)	504 (68.7)	
Hypertension (treated)	82 (4.1)	101 (13.7)	***
Diabetes (treated)	2 (0.1)	33 (4.5)	***
HDL-Cholesterol			***
HDLc < 0.40 g/l	19 (0.9)	126 (17.2)	
HDLc ≥ 0.60 g/l	80 (4.1)	205 (27.9)	
N	2005	14259	
Overweight	787 (39.6)	5846 (40.0)	NS
Obesity	117 (5.8)	2253 (15.8)	***

	Women (French Aircrew)	Women (French General Population)	p
N	315	1251	
Age			***
18-34	126 (40.0)	313 (25.0)	
35-44	95 (30.2)	224 (17.9)	
45-54	87 (27.6)	345 (27.6)	
55-64	7 (2.2)	209 (16.7)	
65-74	0	160 (12.8)	
Age ≥ 50 years (Men) or ≥ 60 years (Women)	0	248 (19.8)	***
Smoking			NS
Current	75 (23.8)	293 (23.4)	
Non-Smokers (or ex-Smokers > 3 years)	240 (76.2)	958 (76.6)	
Hypertension (treated)	7 (2.2)	205 (16.4)	***
Diabetes (treated)	0	24(1.9)	*
HDL-Cholesterol			**
HDLc < 0.40 g/l	2 (0.6)	53 (4.2)	
HDLc ≥ 0.60 g/l	211 (67.0)	737 (58.9)	
N	315	14634	
Overweight	57 (18.1)	3702 (25.3)	**
Obesity	10 (3.2)	2283 (15.6)	***

* $p < 0.05$
** $p < 0.01$
*** $p < 10\text{-}3$

Matta J et al. The French CONSTANCES cohort (Bull Epidémiol Hebd, 2016)
De Peretti C et al. NNHS 2006-2007 (Bull Epidémiol Hebd 2013)

Results & Discussion

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4. Non LDL-c Risk Factors

Statistic	UK commercial Pilots	FR commercial Pilots	p
Males			
Mean BMI (kg/m2)	26.0 (23.4-28.6)	25.2 (25.0-25.4)	NS
Prevalence overweight (%)	46.8 (45.4-48.2)	44.1 (40.7-47.5)	NS
Prevalence obesity (%)	12.4 (11.4-13.3)	6.9 (5.9-8.6)	***
Prevalence current smoking (%)	7.7 (6.8-8.5)	13.7 (11.3-16.1)	***
Prevalence hypertension (%)	28.7 (27.3-30.0)	20.0 (17.2-22.8)	***
Females			
Mean BMI (kg/m2)	23.9 (20.0-27.7)	22.5 (21.1-23.9)	NS
Prevalence overweight (%)	27.5 (21.3-33.7)	23.1 (6.9-39.3)	NS
Prevalence obesity (%)	5.6 (2.5-8.8)	3.8 (0.0-11.1)	NS
Prevalence current smoking (%)	6.0 (3.5-8.6)	7.7 (0.0-17.9)	NS
Prevalence hypertension (%)	13.9 (8.3-19.5)	3.8 (0.0-11.1)	NS

*** $p < 10^{-3}$

Houston S et al. Eur J Cardiovasc Prev Rehabil 2011

Conclusion

Conclusion

Design

- Original study *vs* Aeromedical recent data
- The largest French recent cohort

Results

- A favorable trend …
  - mean LDL = 1.16 g/l ; Dyslipidemia : 1 case per 6
- … due to :
  - initial and continued selection process ?
  - periodic health examination ?
  - effective prevention messages ?

Areas for improvement

- Screening vs Moderate / High CV Risk
- Goals to attempt in secondary prevention

Conclu

Des

Res

Are
improvement

Goals to attempt in secondary prevention

Reflections: *The Strategy of Preventive Medicine*

« […] most cases of a particular disease in a population occur not in those at highest risk of that disease, but in those at moderate risk – because there are usually far more moderate than high risk individuals around.

So concentrating one's preventive efforts only on those at highest risk would not much dent the incidence of a disease. […] »

Warlow CP, Practical Neurology 2012

Thank you for your attention

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