

# Physical and sport preparation for the *Patrouille de France* (PAF) pilots



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# Disclosure Information

**We have no financial relationships to disclose**





***Why this study ?***



# Fighter pilots



- Interest in physical training demonstrated for a long time
  - Improve acceleration tolerance



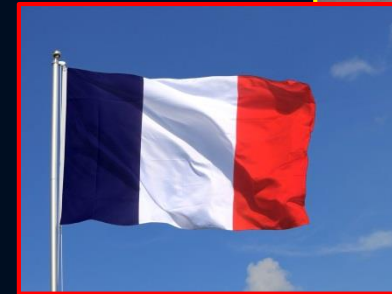
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# Patrouille de France (PAF), since 1953



- The French Air Force flight demonstration squadron
- National emblem, very famous
- Fly French wings and French colors around the world
- Every year, long summer demonstration tour  
(our study, season 2016 = from May 4 to October 15)



ACCUEIL > CALENDRIER DE LA SAISON 2017

SEPTEMBRE
2 Septembre: Saint Jean de Luz
3 Septembre: Rodez
9 Septembre: Les Mureaux
10 Septembre: Lens
16 Septembre: Le Mans
17 Septembre: Royan
17 Septembre: Passage Laval
22 Septembre: Défilé aux Invalides
23 Septembre: Barcelone (ESP)
24 Septembre: Avignon
24 Septembre: Passage Saint Hilaire du Touvet
29 Septembre: Passage Bandol - Toulon
30 Septembre: Cervolix

MEETINGS À L'ÉTRANGER

- 20 Août: Biggin Hill (UK)
- 23 Septembre: Barcelone (ESP)

This month, september 2017

USA Tour, april-may 2017



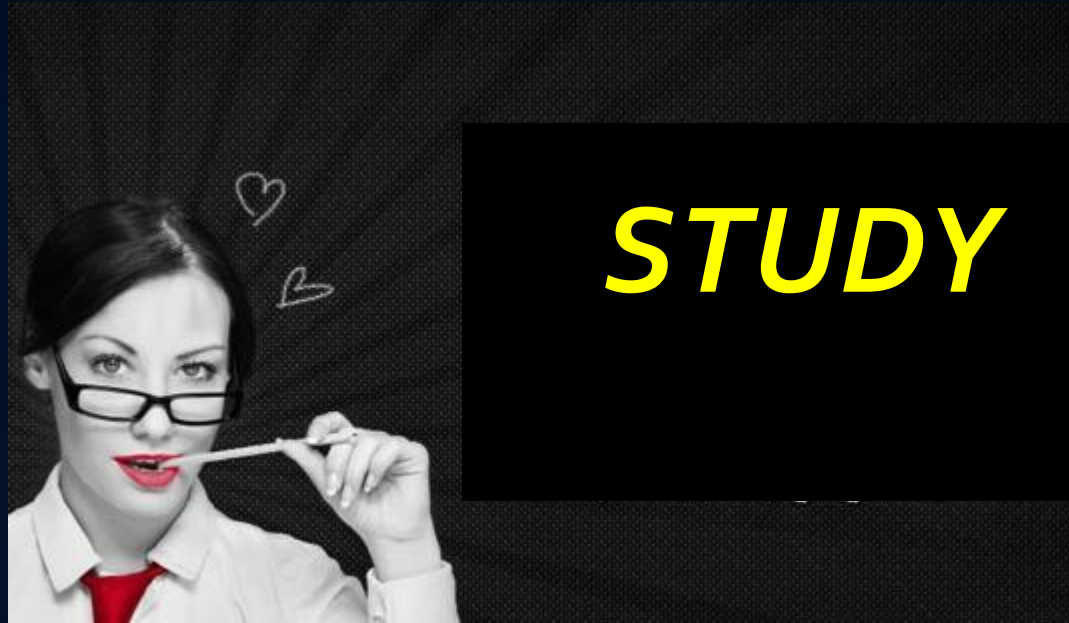


**PAF**



- Very specific rythm
- Maximum aeronautical constraints
- No studies for this group





Approval by the Ethical Committee  
of Sainte-Anne Military Hospital  
Toulon, 3 November 2015

## OBJECTIVES

- Assess fitness
- Evaluate sports training
- Improve its effectiveness



*Patrouille de France*  
BA 701, Salon de Provence



Toulon

## METHOD

- Anonymous questionnaires distributed during annual renewal evaluation Toulon AeMC
- December 2015
- Participation = 9 / 9 PAF Pilots (100 %)







**Results**

A formation of nine fighter jets flying over a coastal landscape at sunset. The jets are arranged in a staggered pattern, leaving long, thick trails of smoke in red, white, and blue. The background features a large body of water, a dark, forested coastline, and a sky with soft, orange and yellow clouds. The word "Population" is overlaid in white text in the center of the image.

# Population

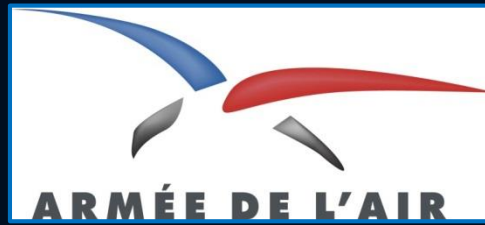


# The Team

- 9 fighter pilots
- French Air Force officers
- Middle age : 35 years and 5 months  
(from 32 to 39 years)
- French Air Force seniority : 15 years
- Flight experience : 1,500 to 2,600 flying hours



# The Team



- Average weight : 72.3 kg
- Average height : 180.2 cm
- Average BMI : 23.6
- None particular medical history
- Flight events : 3 accidents (before to be at *PAF*, no ejection)

# The aircraft

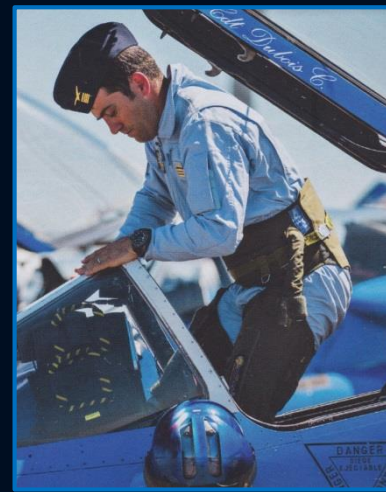


- Alphajet**, Franco-German light 2 reactors fighter built by Dassault and Dornier
- For training and ground attack
- in service since 1979 in the French Air Force and since then 1981 at the Patrouille de France
- Maximum weight = 7,250 kg
- Maximum speed = 1,000 km/h



# Squadron's Structure

- Reminder : 9 pilots
- 1 leader (Commanding Officer)
- 1 second in command (*Executive Officer*) in duty for 1 or 2 year(s) then Leader
- 6 team members in duty for 3 years
- 1 substitute in duty for 1 year
- Newcomers integrated in September (3 / year)
- A new flight demonstration prepared each year
  - 2 parts =
  - ribbon* : 8 mn - 8 planes in close formation
  - synchro* : 11 mn - crosses and percussions of reduced formation of the 2 solos, and 4 or 6 others aircrafts



# Habitus/lifestyle



- Smoking : 44 % (4/9) active smokers (cigarettes) and 11 % (1/9) past smoker
- Alcohol : occasional use
- Varied and well-balanced diet
- Little food supplements
  - 1 energy drink
  - 1 protein complement : spirulina (= seaweed)



- Sleep : 7.7 h / night

- Self evaluation : « *in form* » = 100 %

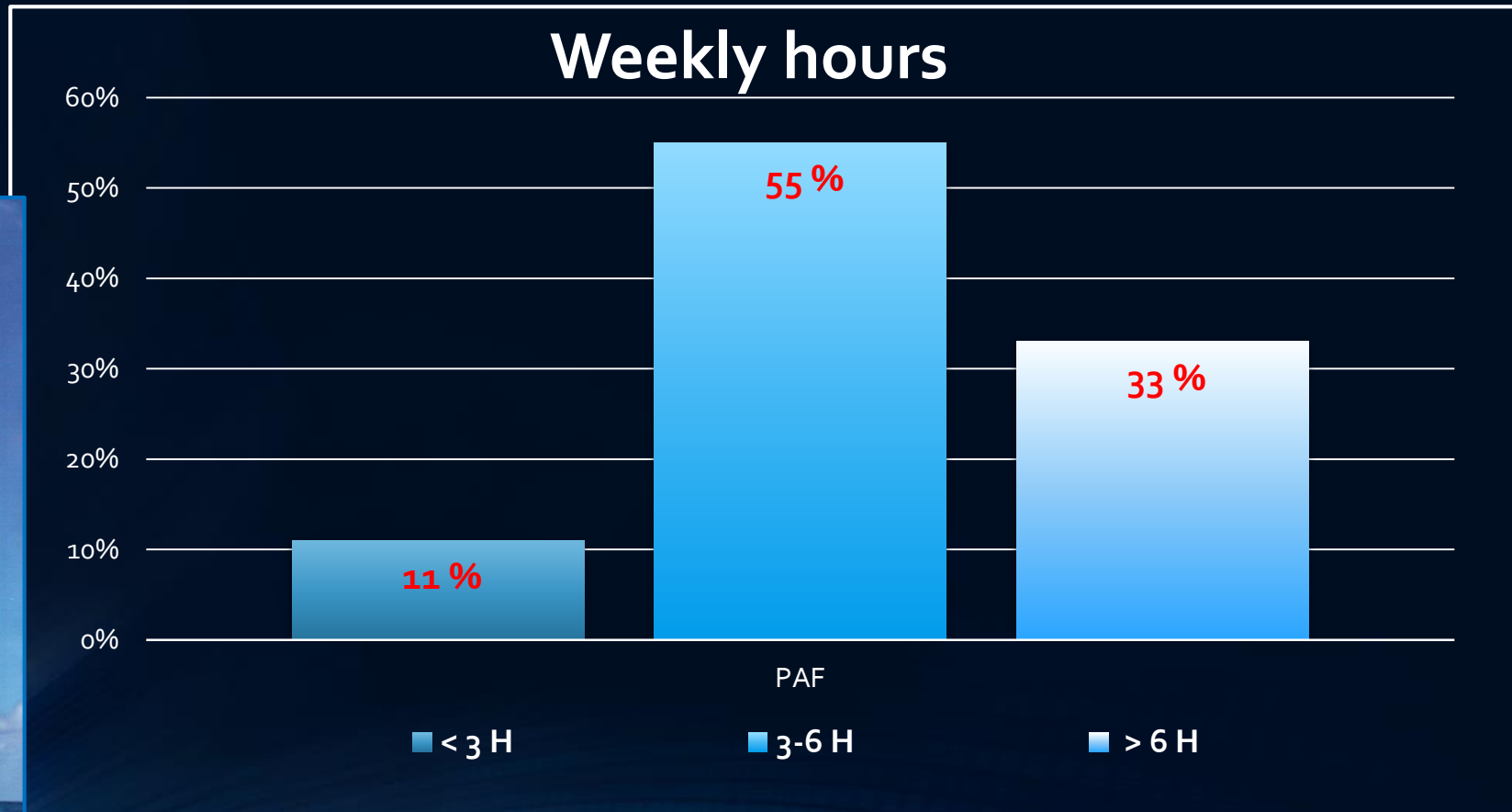
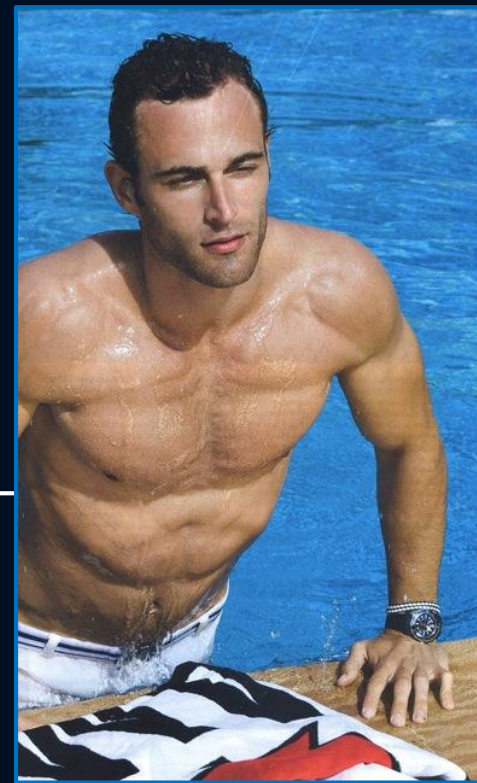


A formation of seven jets flying over a coastal landscape at sunset. The jets are arranged in two rows: three in the front and four in the back. They are leaving long, thick trails of smoke in various colors: blue, white, and red. The sky is a mix of orange, yellow, and blue, with some clouds. The landscape below features a body of water, a coastline with hills, and a large, flat-topped mountain in the foreground.

Sport practice

# Sport practice

- = 100 % !





# Sport practiced



Type of sport	Frequency (%)
Bodybuilding / Crossfit / <i>Tabata</i>	88
Team Sports	88
Running	44
Swimming	22
Golf	22
Other (yoga, aerobatic, mountain bike)	33

**NB : Sports Club or competition practice = only 1 pilot (11 %), Golf**



# At work / On base

- Regular and assiduous use of sport slots
- Quality of training = « *Good* »
- Adapted infrastructures

100 %

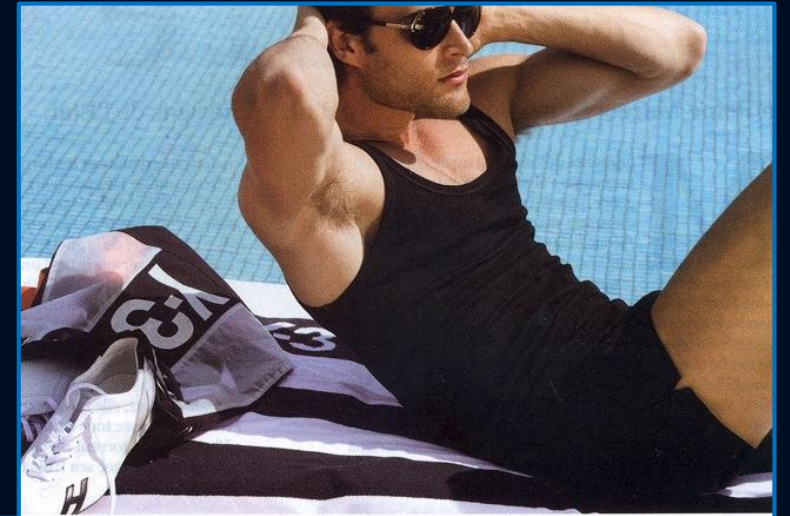
➤ **Despite busy schedule !**





# Other subjective data

- « *sporty* » : 78 % (7/9)
- « *well trained* » : 100 % (9/9)
- « *enough sports in the week* » : 100 % (9/9)
- Remember : « *in form* » : 67 % (6/9)



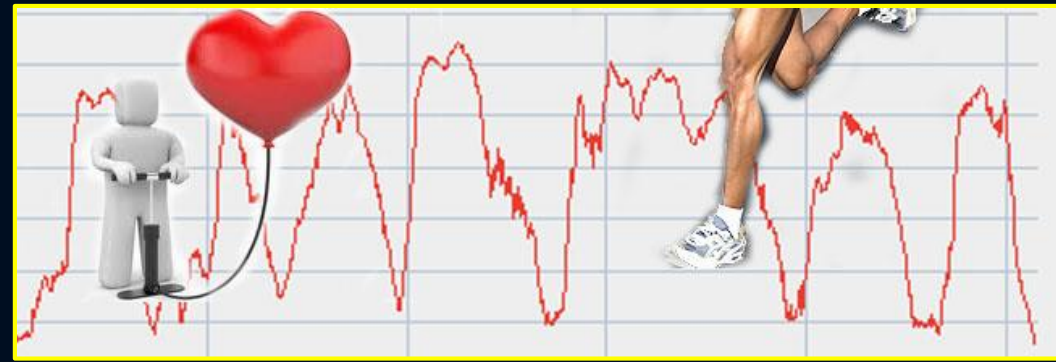
# Types of training





# Endurance exercises

- Practiced by 89 % of subjects (8/9)
  - ⇒ running and mountain bike
- 1 to 2 sessions / week
- Length of time : 45 to 60 minutes
- Average speed : 10.75 km/h for running



# Split exercises / Interval Training

- Practiced by 78 % of subjects (7/9)

- Types

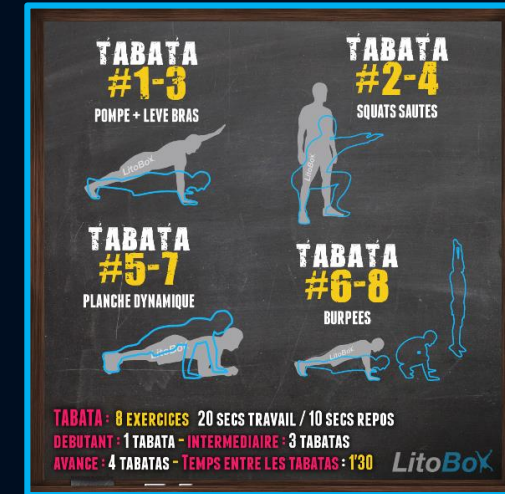
- ✓ *Tabata*
- ✓ 30'' / 30''
- ✓ Bike, rower





# The « Tabata »

- Izumi Tabata, Japanese sports researcher, 1990s
- Cardio training, High intensity interval training (HIIT)
- Extreme and intense version
- 20 seconds exercise / 10 seconds rest / repeated 8 times
- Leng of time : 4 minutes
- Exercices performed at 170 % VO<sub>2</sub> max
- Repeated effect of exercices
- Increases the contribution of aerobic metabolism



# 4 advantages of *Tabata*

- Time saving
- Realizable easily and everywhere
- Improved cardiovascular capacity
- Effect on weight and carbohydrate metabolism

[↑ *Excess post exercise oxygen consumption* (EPOC)]



# The bodybuilding

- Practiced by 100 % of subjects (9/9)
- Almost daily
- Short training  
(30 minutes on average)





# Muscle groups worked

UPPER MEMBERS 66 %



TORSO 44 %

BACK 100 %

LOWER MEMBERS 44 %



ABDOMINAL STRAP 100 %

A black and white photograph capturing a group of pilots on an airfield. In the background, a fighter jet is parked with its canopy open. The tail fin of the aircraft features a large number '1'. Several pilots, dressed in flight suits, are engaged in conversation. One pilot in the center-right stands with his hands on his hips, looking towards the others. The scene is set outdoors on a paved surface, with some equipment and bags scattered on the ground. The text 'Around sport' is overlaid in a white, sans-serif font in the center of the image.

Around sport



# BEFORE

- Modified diet : 33 % (3/9)  
⇒ light meals with slow glucids



- Regular warm-up : 78 % (7/9)  
⇒ average : 5 minutes

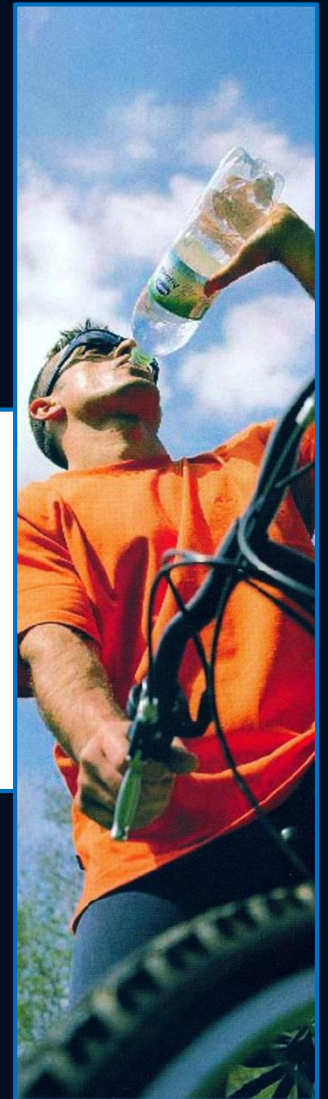
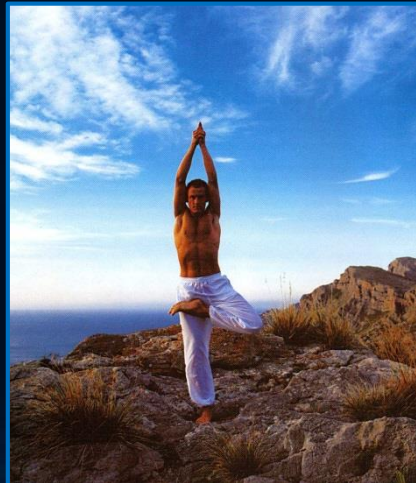


# AFTER

- ↑ Hydration : 100 % (9/9)
- Average 0.5 à 1 L
- Energy drinks in post-effort : 11 % (1/9)
- Regular stretching exercises : 67 % (6/9)

⇒ average : 5 to 10 minutes

⇒ promote muscle recovery







*A typical winter day in PAF Squadron*





- 07H55 : arrival at the squadron



- 08H00-08H30 : **1<sup>st</sup> planned sport slot**

  - **Split exercices : Tabata, body and muscle building**



- 08H50 : 1<sup>st</sup> briefing



- 09H45-10H50 : 1<sup>st</sup> training flight

- 11H00 : lunch (snack)

- 11H30 : 1<sup>st</sup> flight debriefing



- 11H50 : 2<sup>sd</sup> briefing but in 2 separate parts (front and back block)



- 12H45-13H50 : 2<sup>sd</sup> training flight (separately, front and back block)

- 15H00 : 2<sup>sd</sup> debriefing (separately, front and back block)



- 15H45 : 2<sup>sd</sup> planned sport slot

➤ Team sports

- Development of cohesion and trust in the group, essential ingredients to cement team spirit



- 17H00 : end of the aeronautical day (but administrative military activities)





# A typical weekly sports schedule in PAF Squadron

W 48	07H55	15H45	17H00
	Morning	Afternoon	Remarks
Monday	Cardio training 5' + 5' (30"/30") + 8' tour postural training (exercice 40")	Indoor football 5 vs 5 (big field, 3 x 8') + stretching + mental preparation (Potential Optimization Techniques)	Personal sports activities
Tuesday	Cardio 5' + tour group (30" : 10" recovery) 9 units // 2 Tours	Ultimate (big field) + stretching + mental preparation	Personal sports activities
Wednesday	Cardio 5' + 2 x 6' (30"/30") alternation cardio/strength training + <i>Tabata</i>	Shooting (shooting stand)	Personal sports activities
Thursday	Body pump (upper body muscles) 35 - 40'	Rest/Free slot	Personal sports activities
Friday	Cardio 5' + stretching with elastic 20' + <i>Tabata</i>	Rest/Free slot	Personal sports activities



# Patrouille de France (PAF)



- Selected, young and sporty population : fighter pilots
- Sports training 6 months / 12
- Basic work in winter season
- **Tabata** : to charm the pilots and to vary the pleasures
- Goal : physically support the airshows summer season



PAF formation signature  
= *Diamond*



# What advice to give ?

A good balanced combination

- ✓ **endurance exercises : 30-40 min twice a week** (ex. running max = 25 km/week)
- ✓ **low weight bodybulding, many repetitions, twice a week**
- ✓ **to be maintained as much as possible during the airshows season**
  - and its constraints and ... solicitations !







**MERCI DE VOTRE ATTENTION**



Do we have time for a short film  
“ *In the heart of a winter training briefing* ” ?



Questions ?