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

Bibliography

**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)

This month, september 2017

USA Tour, april-may 2017
• Very specific rhythm
• Maximum aeronautical constraints
• No studies for this group
OBJECTIVES

• Assess fitness
• Evaluate sports training
• Improve its effectiveness

METHOD

• Anonymous questionnaires distributed during annual renewal evaluation Toulon AeMC
• December 2015
• Participation = 9 / 9 PAF Pilots (100 %)
Results
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 years 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%
Sport practice
Sport practice

• = 100 % !

Weekly hours

<table>
<thead>
<tr>
<th>Weekly hours</th>
<th>&lt; 3 H</th>
<th>3-6 H</th>
<th>&gt; 6 H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>11 %</td>
<td>55 %</td>
<td>33 %</td>
</tr>
</tbody>
</table>
# Sport practiced

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

**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

➢ 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)
  \[\Rightarrow\] 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
- Length of time: 4 minutes
- Exercises performed at 170% VO2 max
- Repeated effect of exercises
- 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 %

BACK 100 %

LOWER MEMBERS 44 %

TORSO 44 %

ABDOMINAL STRAP 100 %
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**: 1st planned sport slot
  - Split exercises: Tabata, body and muscle building

- **08H50**: 1st briefing

- **09H45-10H50**: 1st training flight

- **11H00**: lunch (snack)

- **11H30**: 1st flight debriefing
• **11H50**: 2\textsuperscript{nd} briefing but in 2 separate parts (front and back block)

• **12H45-13H50**: 2\textsuperscript{nd} training flight (separately, front and back block)

• **15H00**: 2\textsuperscript{nd} debriefing (separately, front and back block)

• **15H45**: 2\textsuperscript{nd} 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

<table>
<thead>
<tr>
<th></th>
<th>07H55</th>
<th>15H45</th>
<th>17H00</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Morning</strong></td>
<td><strong>Afternoon</strong></td>
<td><strong>Remarks</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Monday</strong></td>
<td>Cardio training 5' + 5' (30''/30'') + 8' tour postural training (exercice 40'')</td>
<td>Indoor football 5 vs 5 (big field, 3 x 8') + stretching + mental preparation (Potential Optimization Techniques)</td>
<td>Personal sports activities</td>
</tr>
<tr>
<td><strong>Tuesday</strong></td>
<td>Cardio 5' + tour group (30'' : 10'' recovery) 9 units // 2 Tours</td>
<td>Ultimate (big field) + stretching + mental preparation</td>
<td>Personal sports activities</td>
</tr>
<tr>
<td><strong>Wednesday</strong></td>
<td>Cardio 5' + 2 x 6' (30''/30'') alternation cardio/strength training + <em>Tabata</em></td>
<td>Shooting (shooting stand)</td>
<td>Personal sports activities</td>
</tr>
<tr>
<td><strong>Thursday</strong></td>
<td>Body pump (upper body muscles) 35 - 40'</td>
<td>Rest/Free slot</td>
<td>Personal sports activities</td>
</tr>
<tr>
<td><strong>Friday</strong></td>
<td>Cardio 5' + stretching with elastic 20' + <em>Tabata</em></td>
<td>Rest/Free slot</td>
<td>Personal sports activities</td>
</tr>
</tbody>
</table>
Conclusion
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
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 contraints and ... solicitations!
Do we have time for a short film “In the heart of a winter training briefing“?

Questions?