

CASE STUDY: **Weight Management through a Hybrid Cardio-Resistance Training Programme**

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Introduction

As an all-rounded fitness trainer, understanding the fundamentals of proper fitness training is not only important, but critical for helping the client reach his fitness goal successfully.

Even more importantly, the trainer should also be well-versed in the fundamental concepts of the ever evolving field of sports and exercise sciences. This rapidly evolving scientific field has generated many surprises and revelations that in turn, have enabled us to reach unprecedented levels of sporting excellence mankind has ever experienced – all within the past few decades.

This paper attempts to distill fundamental concepts within the field of exercise physiology, exercise prescription, sports psychology, and biomechanics, through the case study of a hypothetical fitness client who successfully implemented the hybrid cardiovascular-resistance training programme described herein.

PROFILING OF A CLIENT

James Tan approached us to help him meet his fitness goals of losing excess body weight and tone up his body.

In order to accomplish this, we have ascertained his health status, including a review of his medical history in accordance to industry best practices in line with the recommendations of the American College of Sports Medicine (ACSM) Risks Stratification and Coronary Artery Disease Risk Factor Threshold assessing modules.

Therefore to fully assess James' fitness needs and his current physical condition, it is imperative that an initial consultation be undertaken to assess all these and more.

Indeed, the most important starting point would be of his medical history – one which determines whether any clearance from his physician is required prior to embarking on strenuous physical activity which he may not be accustomed to.

For this client, as he is not currently suffering from any kind of physical impairment or medical conditions, it is ascertained that a “Health History Questionnaire” (HHQ) be appropriate for the initial evaluation, in addition to the ACSM Guidelines.

The following are the major concerns of the HHQ:

Physical Activity Level: Sedentary

Body Fat Composition: 21%

BMI: 26.1 (Moderate Health Risks)

Body Weight: Obese

Co-morbidity Level: Med-High

Alcoholic Consumption: High

Allergies: Allergic Rhinitis and Atopic Dermatitis

Parental Medical Conditions: High Blood Pressure (Father) and Arteriosclerotic Vascular Disease (Mother)

(The HHQ used is attached in Appendix A.)

In addition, based on the above data and his goals, we are going to deploy the ACSM Coronary Artery Disease Risk Factor Threshold (Appendix B), to determine his risks threshold. Accordingly, the only risk James has is his Sedentary Lifestyle, which leads to a total of only one point on the ACSM Risk Stratification index.

This basically means that he does not require any kind of exercise testing in-accordance to the ACSM guideline. However, even so, as his goals is to loss weight and get fit, this entails a substantial increase in physical activity which he may not be accustomed to, therefore we will still need to conduct a thorough assessment in order to prevent unintentional injuries and undue stress.

With his ability to perform strenuous physical activities cleared by his personal physician, we were ready to design parameters of an exercise programme in which he would be required to adhere to, in order to accomplish the best outcome towards his personal goals.

The next section will provide an account of how I have approached the psychological aspect of assisting the client in reaching his fitness goals. Sports Psychology is an emerging field which has gained a stronghold within the industry as being one of the most critical factors in determining the rate of success no matter what the goal may be.

Psychological Aspects of Training

Before we even start on ingraining the right attitude, skills, and knowledge that is required for him to succeed in his laudable mission, we have to start him off on the right track; provide him with the necessary psychological tools to give him the ability to cope with the stresses and emotional rollercoaster that ultimately led to many individuals giving up on the whole weight loss process.

As he has signed up with us for a year's worth of weight loss consultation, we will help him in establishing an emotionally and physiologically realistic set of goals for him to accomplish within this one year period.

However, the skills he has acquired throughout the year will empower him to reestablish more goals in the coming years until he finally reaches his desired body image in the long run. Therefore, our goal as a weight loss coach actually does not just end with the termination of our contract, but it is considered truly successful if the client continues to excel in his mission even after he leaves our office permanently.

For this end, we have identified fundamental concepts in sports and exercise psychology that he will need to master in order to succeed in his plan. First and foremost, he will be required to have acquired the decent skill of setting realistic and achievable Goals.

Mother of All Successes: Goal Setting

Goal-setting is but one of the most important aspect of the whole plan, it enables him to envision the final destination of his journey, and provides him with the much needed motivation, in order for him to be able to stay motivated throughout his journey.

A generally accepted definition of goal-setting is that a goal is something that which you aim to achieve, within a set time-frame. This generally accepted definition is derived across a range of psychological textbooks including: Wehmeier, 2007, p. 664; Weinberg & Gould, 2007; Locke, Shaw, Sarri, & Latham, 1981, p. 145.

By applying this definition to James' scenario, we have established that James' goal will be to loose between 0.5 to 1kg of bodyweight at most, up to the point where he will be able to reach his idea body weight, while on our weight loss programme.

There exist "classical models" whereby goals are classified into five different categories based on the nature of the goals. They are namely:

Objective Goals – this relates to goals that have a specific requirement within a specific time frame. In this type of goals, everything is clearly outlined and pre-determined; therefore nothing is left to ambiguity.

Subjective Goals – this relates to goals that are of a more ambiguous nature. Goals that allow a certain margin of error (leeway), such as, "so be it, I have tried my best", fall under this category.

Outcome Goals – this relates to goals that focus not on the task itself, but the outcome that the task leads to. For example, “I do not care how I do it, but if I win the race, this means my goals’ accomplished.” More well-known examples would include doping by athletes with the sole goal of winning their game, without regard to the methods of accomplishing it.

Performance Goals – this relate to goals where comparisons are made between outcomes either by the same individual or against another. For example, “my goal was accomplished this year as I swam 5 seconds faster than the previous.”

Process Goals – this relates to when the ability/action/task/skill itself is the goal, and accomplishing it directly results in the overall desired outcome.

In general, outcome-oriented goals are better geared toward goals that have a shorter-time span, while performance and process goals are better towards goals that require precise control and execution.

Therefore, according to the classical models of goal setting, we can classify James’ goals within the “objective goals” category. His goal of loosing 0.5kg to 1kg per week for a period of 1 year is well within the parameters since “everything is clearly outlined and pre-determined; therefore nothing is left to ambiguity.”

However, as the old adage goes, “nothing is constant except change itself”, we have to acknowledge that plans fail and James will have to expect to sidetrack or loose focus on his journey from time to time. And provisions for such bloopers are an important consideration in goal-setting, as being side-tracked risks loosing faith in the plan and ultimately failing mid-way when success may just be another turn away.

Therefore, we have to apply a “contingency” plan, and provide a way to get back on track, if he does derail from time to time. A goal setting plan with such provisions will however, “overlap” and comprises of more categories than one as defined by the classical model.

This combined goal setting model has been proven by Filby, Maynard, & Graydon (1999) to be far more superior in its success rates, when compared to any single one of the 5 components toward goal setting success.

This goal may, therefore, be readjusted as his body composition changes as well. However for the sake of simplicity and to prevent obsessive-compulsive monitoring and subsequent emotional distress, we have decided to use this generalised goal for establishing our weight loss framework.

Different theories abound with the reasons why goal setting works. However, it is generally believed that goals help facilitate motivation and persistency in the process, while allowing oneself to focus on the task at hand with a more determined drive and persistency.

In the case of James, having a definitive objective that drives his actions to realise his goal, would therefore create a chain reaction to fuel his desire and motivate him further. In its simplest form, without a clear and well defined goal, James will have no way to map out a plan of action, much less following it through with continuous positive feedback to drive him further down the path.

Implementing a Goal Master Plan

With all said and done, we will therefore now move into the implementation phase, to sit down with James and use goal setting protocols to help him map out our so-called master plan for his success.

Although there are many different types of goal setting methodologies available today, in goals geared more towards sports and exercise related areas, we have found that a more specialised goal setting method to be of better relevance as discussed in a previous paper written by this author (*Unpublished Paper*, Jan 20, 2010).

The goal-setting methodology recommended in the aforementioned paper is known as the Boyce & King Method (1993).

As mentioned, this method proposes an approach specifically designed for goal setting in sporting and exercise endeavours; hence, its higher relevancy.

The Boyce & King Method (1993) comprises of a three phase system, of planning, implementation, and evaluation:

PHASE 1: Planning

In the case of James, the skills and actions required by him in order to accomplish the goal can be broken down into both mental and physical skills. Mentally, we are preparing him by providing him with the idea picture that which he ought to be striving towards for the next one year; whereas, for the physical aspect, we will have to teach him various cardiovascular and resistance training methods for him to be able to execute them correctly to improve physical performance while minimising the chances of injury.

As coaches, we have to instill the right sense of personal worth (body image etc), while providing him with realistic goals to which we believe his physiologic makeup would enable him to accomplish reasonably well within the stipulated time frame.

To this end, we have agreed to quantify goal measurements by the use of both body weight and body fat percentage. Since body weight itself constitutes both lean body mass and body fat mass, an overall drop in this index would mean a reasonable loss in body mass – be it from fat or muscle.

However, as he is also put on a strength training programme, the loss from lean body mass should be reduced to a minimum; therefore it would be safe to assume most loss from this index would be predominantly of fat and water alone.

Furthermore, with the introduction of the body fat percentage scale, we can better gauge progress by monitoring whether any weight gain is due to increase in fat mass or muscle mass – the latter of which is one-step closer to our goal of achieving better body composition.

Our basic plan of action will comprise of a customised diet plan (documented separately elsewhere), a cardiovascular and resistance training plan, and psychological coaching – both of which are within the parameters of our control.

It is especially important in the course of this programme, that the client understands that whether the goal is ultimately met is determined by many factors beyond the control of the client. Therefore, such goals must not be overtly reliant on the outcome itself, but concentrating on that of improving one's body composition rather than just attributing success to just an arbitrary numbers/figures.

PHASE 2: Implementation

As coach and overall consultant (except nutrition, as mentioned above), our responsibility is to help ensure the adherence of James to our programme as much as possible. Enforcing the requirements in a disciplinary fashion, albeit positively, would enable him to stay focus on his goal and ultimately reaching it.

PHASE 3: Evaluation

By reaching this stage in his programme, James should begin reviewing his progress and see whether he is working closer towards his goals. Did he loose more weight? Did he increased his lean body mass? Does he feel better about himself? Feels fitter?

As coach, we cannot attempt to force a positive self-image onto him. However, we can guide him towards recognising what is an idea body image for his anthropomorphical make up. But we too cannot force this onto him as well. We can show him what he's got to work with, and help him to realise that being his personal best is really all that really matters.

Therefore, in this phase of his goal setting journey, we concern ourselves with evaluating whether our initial goals were met. Of course, this should never be waited to be done at the end of the year – it would be too late to conduct remedial actions by then. However, reevaluating goals and progress should be done effectively every 3-4 months. And since it is done in shorter periods – expectations should be trimmed down as there is lesser time for drastic progress to be made.

However, the purpose of this quarterly evaluation is to determine whether progress has been made towards the goal measurement markers (body weight and body fat percentage / body composition). If progress markers show the desired improvements as mentioned previously,

then evaluate how it was completed successfully, and new (higher) goals can be made in accordance to the same approach.

If not, the coach will have to sit down with the client again, to assess the problem, determine where and why it failed, and make further adjustments to achieve the goal in the future. Most times, failure from reaching the goals is mostly due to non-adherence to the programme, this could come from not following the diet, exercise regime, or less likely due to medical conditions that interfere with the client's metabolic pathways.

The latter is out of the expertise of the coach and professional opinion should be sought from competent medical professionals.

Psychological Rollercoaster

While we have the basic framework ready for our weight loss programme with James, we will also need to identify potential pitfalls and derailments that James may encounter as roadblocks along the way to his journey in achieving the idea body self-image.

In this respect, building on our sports and exercise psychology background, we will identify these “roadblocks” through what is known as the “potential pitfalls, prevention and rehabilitation” exercise.

As coaches, we have to understand the potential pitfalls in a weight loss regime. Since the weight loss regime primarily comprises of an active lifestyle incorporating exercise and sports, it is very much like what an athlete (amateur or otherwise) would experience; therefore we will take our cues from preventative measures as recommended by sports psychologists.

Potential Pitfalls

1) Overtraining

As with any form of physical activity, overtraining may happen either as a result of overzealousness in seeing results, or simply due to physiological reasons like illness (e.g. bouts of flu), or an injury sustained either through exercising or other activities not related to the programme.

It is important to note that, overtraining is different from the concept of “overload”, whereby James “feels” incapable of doing certain exercises at the intensity prescribed per session. This is based on the concept of “progressive overload” in resistance training and is a required step to produce physiological adaptation in order to induce muscle growth – our goal.

2) Staleness

When no improvement in performance level is noted, then the client may be experiencing what is known as “staleness” (O’Connor, 1997). This stage may come after overtraining, and as no improvement is seen, we may identify him as reaching this stage of his psychological wellbeing.

3) Burnout

Based on the Smith (1986) Cognitive-Affective Model of Athletic Burnout, we can identify that when James reaches this stage, he will be experiencing the following psychological symptoms:

- i) **Situation demand:** Feeling stressed about not making progress.
- ii) **Cognitive appraisal:** Feeling that not making progress means he's doom to fail.
- iii) **Physiological responses:** With motivation dropping, his concentration and effort put into the programme will suffer.
- iv) **Behavioral responses:** Feeling defeated, he may feel that he will never succeed and simply drop off from the programme altogether.

If the coach does not intervene at the earlier stages of a potential burnout, then the client will feel lost and distressed. Therefore, it is important for him to motivate, and help to resolve some uncertainties and come up with solutions to overcome obstacles.

Setbacks from injuries

Any kind of physical activity carries with it certain level of risks for injuries no matter how careful the individual or coach is.

Some common factors that precipitate injuries can be broadly classified into the following categories:

- 1) **Physical Factors:** overtraining, muscular imbalance, carelessness due to fatigue, etc.
- 2) **Psychological Factors:** stress leading to short concentration span, burnout, emotional stress, etc.

Rehabilitating a Setback

As coaches, it is important to understand the ways we can assist our client, James, in coping with the injuries sustained in as positive and optimistic a level as possible.

The following are a short list of factors that may be considered for use with rehabilitating a client:

- a) Building rapport with the client. Understand what he is going through and spend time in “hearing him out” rather than just rattling away about your opinion of the situation.
- b) Educating the client about the injuries he has sustained, and explain how a typical recovery path would take.
- c) Continue to encourage him to stick to the remaining aspects of the programme that he is able to accomplish even with his injuries – like diet, or even exercises that do not aggravate the injury, etc.
- d) Provide psychological support in ways that helps the client to cope with the setback.

With the psychological wellbeing of our client in check, we can therefore now move on with the “action plan” to help him achieve his goals.

Programme Design

Client Profile

Name: James Tan
Occupation / Lifestyle: Office Executive / Sedentary
Age: 35
Height: 175cm
Weight: 80kg
BMI: 26.1 kg/m^2 ^
Body Fat %: 21% *

^ Pre-Obesity with moderate to high risk of co-morbidities in accordance to Singapore 2005 revised BMI scale (Health Promotion Board, 2005)

* Measurements made with Accu-Measure Fitness 3000 model (Accu-Measure, n.d.)

In order to be able to measure progress, as discussed extensively in the previous section, we will have to first determine the acceptable goals for which the programme intends to accomplish.

Therefore, we adopted various protocols for measuring his current bodyweight and body fat percentage, in order to assess the amount of weight and changes in body composition that he should expect to make at the end of the programme.

Based on his desire to loose weight and tone up his muscles, we have used the following formulas to determine his idea body weight and composition change:

James' Fat Free Mass (FFM): $80 \times 73.9\%$ (Fat-Free %) = 59kg
Reasonable Body Composition Goal: 12%BF & 88%FFM
Recommended Target Bodyweight: $59/88\%$ = 67kg
Weight Loss Required: $80-67=13\text{kg}$

Accordingly, assuming that his FFM is maintained, he must loose up to 13kg of fat to achieve his idea body weight and Body Fat Percentage.

Programme Rationale

It is acknowledged that diet and nutrition is an important step in achieving his fitness goals. As such, we have counselled, James accordingly through a Dietitian we work with, and he has shown understanding in the basis of our diet plan for him and how it would assist his fitness goals.

However, as nutrition is beyond the scope of this report, we will proceed on to the remaining portions of the programme – cardiovascular and strength training for fat loss.

Based on the widely accepted work of Heyward (2006), we have identified the following integral components that are required for a fat loss plan to work:

1. A negative Energy Balance (as opposed to his current positive balance)
2. Caloric Expenditure > Caloric Intake (as opposed to his current diet choices)
3. Restricted Caloric Intake = Increase in Caloric Expenditure (energy balance becomes negative encouraging weight loss)
4. Combining Diet and Exercise (in addition to a negative energy balance, weight loss is thus possible)

Steps 1, 2, and 3 are best accomplished through the use of a customised diet plan as mentioned previously. Therefore we will concentrate on the second portion of Step 4, which is “Exercise” for now.

Programme Design

There are many different types of training programmes that can be incorporated into James' fat loss plan that would work.

The basis of any kind of fitness programme would comprise of a cardiovascular fitness component and a strength training component. Both are mutually exclusive, yet they are both required in order to create a complete and all-rounded fitness regime. (Roberts, 2005; Heyward, 2006)

Given the busy schedule and little time for exercise, we do not wish to burden James with an intimidating and long fitness routine, like a traditional fitness programme comprising of a cardiovascular training session and a resistance training session.

As general fitness is the primary goal of James', it is arguable that a training programme developed exclusively for his purpose would be required to accomplish two goals:

- i) Improve General Fitness (Essential Cardiovascular and Strength required for daily life)
- ii) Increase Energy Expenditure (Weight loss)

With part I, we do not require any real targeted cardiovascular or strength improvement to meet a particular demand, like in the case of training for specific sports or physical demand. We only need components of these two strategies to improve his physical fitness enough, so that he can meet the physical demand of his day-to-day life.

For part II, the goal of the programme is to create a negative balance for James, so that energy expenditure would exceed energy intake steadily throughout the whole duration of the programme, to make weight loss possible.

Programme Fundamentals

As we have already determined that a drawn-out traditional fitness programme is not necessary for our goals, we have decided to adopt an exercise system known as “Peripheral Heart Action” (PHA).

PHA training is a training concept developed by Dr. Arthur H. Steinhaus, designed to keep the blood circulating throughout the entire body during the whole duration of a workout. (Steinhaus, 1954)

In essence, the goal of PHA training is to mimic the benefits of both cardiovascular exercise and strength training within a single workout session. (Fornicola, 2008)

Since the fastest way for individuals to get fitter is through continuous exertion on the heart and lungs to their theoretical limit (Max Heart Rate and VO2 Max), PHA training attempts to achieve both of these benefits within a shorter time frame through the use of an exercise sequence that alternate between upper and lower body muscles throughout every exercise. (Roberts, 2005)

This continuous exertion also assists in fatiguing all fibre muscles within the body (Type I, IIa, and IIb), in turn providing stimulus for muscular growth across all sections of the muscle, which is not commonly possible through conventional resistance training programmes with a fixed repetition scheme adjusted according to traditional training goals (Earle & Baechle, 2004).

Unlike traditional resistance training programmes, PHA is designed to circulate blood from the smaller muscles around the heart first, then towards all the extremities of the body. In this

way, blood is continuously circulated throughout the body, hence the term “peripheral” in PHA.

By this design, PHA lowers the chance of having localised lactic acid build up in the muscles being worked on, unlike conventional strength training which always causes lactic acid induced fatigue on the muscles worked at through localised lactic acid accumulation. (Fornicola, 2008)

In short, what the PHA programme aims to accomplish are two fold:

- i) Working on maintaining a higher working heart rate in relation to one’s Maximal Heart Rate. This is generally accomplished through cardiopulmonary training.
- ii) Incorporating resistance training into the programme. Although this in itself does not generally burn enough energy in a workout to create a significant energy balance deficient, it increases muscle synthesis. With more muscle mass, the body’s metabolic rate increases, which contribute to burning more fat for fuel. It also indirectly stimulates the muscles to burn energy more readily. (Roberts, 2005)

Therefore, from these goals, it can be understood why a PHA programme works best for James’ goals: minute-for-minute it burns more energy throughout a PHA workout session, on top of a raised metabolic rate that continues to burn more fat hours after training – up to 36 hours in a moderate capacity. (Roberts, 2005)

As the success of PHA relies on maintaining a cardiopulmonary training effect while training, it is important for James to consistently maintain his heart rate within the “aerobic zone” of between 75-85% of his maximal heart rate. In other words, intensity is critical throughout the whole duration of a workout session. (Roberts, 2005)

To simplify measurement of target heart rate, we use a Polar® Heart Rate Monitor to measure working heart rate in real-time throughout the duration of a workout, and use the Fox and Haskell HRmax Equation to derive the theoretical maximal heart rate he can safely reach: $220 - (\text{age}) = \text{Maximum Heart Beats Per Minute}$ for James. Therefore, James should strive to maintain a heart rate of between 140 to 158 bmp (75% - 85% of HRmax) throughout the duration of his workout session. (Heyward, 2006)

Programme Structure

As James comes from a sedentary background with no previous physical conditioning, we must ensure that he is broken into physical activities in a controlled and gradual manner. This would prevent risks of injury, loss of interest, and burn-out both physically and mentally. (Smith 1986; O'Connor, 1997)

With a typical fat-loss programme, a session will last around 40-45 minutes, but with our PHA programme, it can be effectively reduced to 20 minutes per session with comparable, if not even better results.

In order to prevent overtraining and to measure progress, we use a “self-adjusting” protocol for weights lifted. What this means is that all exercises should always begin with light weights at the prescribed number of repetitions. When this becomes easy, then the number of reps can be increased at the predetermined rate. When all rep range has been exhausted, the weights itself can be increased by around 10% during the next session.

Programme Components

The prescribed exercises are selected with the fundamental concept of PHA as discussed in the previous section in mind.

The following are a description of the prescribed exercises, their sequence, repetition range (reps), and progression methodology:

(An illustration of the human body musculature can be found in **Appendix C** for the ease of visualising the muscles each of the following exercise targets.)

WARM-UP	1) Modified Push Up	2) Bodyweight Squat
3) Step Up	4) Bodyweight Lunge	5) Dumbbell Lateral Raise
6) Bodyweight Single Leg Raise	7) Bodyweight Side Leg Raise	8) Step Jog
9) Dumbbell Reverse Fly	10) Fitness Ball Squat	11) Dumbbell Shoulder Press
12) Fitness Ball Hamstring Curl	13) Basic Crunch	14) Reverse Curl
COOL-DOWN/STRETCHING		

1) Modified Push Up (Compound Movement; Targets Pectoralis Major (Sternal Head))



Figure 1. Push-up (on knees) (2010). Note: ExRx on the net. Copyright 2010 by ExRx.net LLC. Reprinted with permission.

20 Reps	25 Reps	30 Reps
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Due to the lack of upper body strength in untrained individuals compounded with heavy bodyweight, James may not be able to accomplish any meaningful number of standard push-

ups. Therefore, with this modified version with knees on the ground, he may be able to accomplish a much higher number of repetitions.

The push up targets the Pectoralis Major (Sternal Head) muscles the most, directing blood flow to the upper body.

The rep range prescribed above may be beyond what James is currently capable. Hence, he should start at a number that he is able to complete, and make increments in reps of 5 until he reaches the 30 reps mark.

2) Bodyweight Squat (Compound Movement; Targets Quadriceps)



Figure 2. Weighted Sissy Squat (on apparatus) (2010). Note: ExRx on the net. Copyright 2010 by ExRx.net LLC. Reprinted with permission.

20 Reps	25 Reps	30 Reps
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This exercise works most of the lower body muscle groups, including the thighs, buttocks, and lower leg muscles, thus causing blood to circulate downwards towards the lower body. It also causes a substantial rise in heart rate, thus significantly improving cardiopulmonary capacity.

The rep range prescribed above may be beyond what James is currently capable. Hence, he should start at a number that he is able to complete, and make increments in reps of 5 until he reaches the 30 reps mark.

3) Step Up (Compound Movement; Targets Quadriceps)



Figure 3. Step-up (2009). Note: ExRx on the net. Copyright 2009 by ExRx.net LLC. Reprinted with permission.

1 minute each leg	1 minute each leg	1 minute each leg
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This exercise works the quadriceps muscles the most (lower body), although the further the distance of the platform may alter the target muscles to work more of the gluteus maximus muscle.

There is no rep limitation here. James will perform as many as he can in 1 minute per leg. As his fitness level increases, he would do more and more reps without increasing the duration.

4) Bodyweight Lunge (Compound Movement; Targets Quadriceps)



Figure 4. Bodyweight Lunge (2009). Note: Women's Health Magazine. Copyright 2009 by Women's Health Online. Reprinted with permission.

1 minute each leg	1 minute each leg	1 minute each leg
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This exercise works the quadriceps muscles the most (lower body), although the further the distance the feet are apart the more of the gluteus maximus muscle is targeted.

There is no rep limitation here. James will perform as many as he can in 1 minute per leg. As his fitness level increases, he would do more and more reps without increasing the duration.

5) Dumbbell Lateral Raise (Isolated Movement; Target Lateral Deltoids)



Figure 5. Dumbbell Lateral Raise (2004). Note: ExRx on the net. Copyright 2004 by ExRx.net LLC. Reprinted with permission.

15 reps	18 reps	20 reps
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This exercise works the lateral deltoid muscles the most, and the emphasis on the upper body muscle directs the blood flow upwards away from the lower body, thus encouraging full body blood circulation, thus enhancing fat metabolism (Roberts, 2005).

The rep range prescribed above may be beyond what James is currently capable. Hence, he should start at a number that he is able to complete, and make increments in reps of 5 until he reaches the 30 reps mark. Weights should be selected to produce sufficient resistance to elicit muscular force against the action while still able to complete the prescribed rep range.

6) Bodyweight Single Leg Raise (Compound Movement; Target Iliopsoas and Core)

20 seconds each leg	25 seconds each leg	30 seconds each leg
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This exercise works the Iliopsoas muscles together with the quadriceps and hamstrings muscles, while also building on agility & balance.

There is no rep limitation here. James will perform as many as he can within the prescribed length of time per leg at his level of ability. As his fitness level increases, he would do more and more reps without increasing the duration further than prescribed for his level.

7) Bodyweight Side Leg Raise (Compound Movement; Targets Side of Hip & Thigh)

30 seconds each leg	30 seconds each leg	30 seconds each leg
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This exercise works the side muscles of the leg (side muscles of hip and thigh) the most, which is important for good balance.

There is no rep limitation here. James will perform as many as he can in 30 seconds per leg. As his fitness level increases, he would do more and more reps without increasing the duration.

8) Step Jog (Compound Movement; Target Quadriceps)



Figure 6. Step-up (2009). Note: ExRx on the net. Copyright 2009 by ExRx.net LLC. Reprinted with permission.

30 seconds each leg	45 seconds each leg	1 minute each leg
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This exercise is similar to the “Step Up” and works the quadriceps muscles the most. Again, the further the distance of the platform may alter the target muscles to work more of the gluteus maximus muscle. The primary difference in this version is that the pace is increased, which further enhances the cardiopulmonary training factor of this particular exercise.

There is no rep limitation here. James will perform as many as he can according to his level of fitness. As his fitness level increases, he would do more and more reps without increasing the duration beyond that which is prescribed for the 3 fitness levels.

9) Dumbbell Reverse Fly (Isolated Movement; Target Posterior Deltoids)

15 Reps	15 Reps	15 Reps
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This exercise works most of the posterior deltoids and Pectoralis Major (Sternal Head) muscles which is part of the upper body, thus redirecting blood flow upwards from the lower body again.

The rep range prescribed above may be beyond what James is currently capable. Hence, weights should be selected to produce sufficient resistance to elicit muscular force against the action while still being able to complete the prescribed rep range. Once it becomes easy, weights may be increased so that 15 reps is the maximum that can be completed (15RM) again.

10) Fitness Ball Squat (Compound Movement; Target Quadriceps)

20 reps	25 reps	30 reps
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Like its bodyweight squat counterpart, this exercise works the quadriceps muscles the most, and is an excellent cardiopulmonary capacity trainer, causing substantial rise in heart rate, thus significantly improving cardiopulmonary fitness.

The rep range prescribed above may be beyond what James is currently capable. Hence, he should start at a number that he is able to complete, and make increments in reps of 5 until he reaches the 30 reps mark.

11) Dumbbell Shoulder Press (Compound Movement; Target Anterior Deltoids)



Figure 7. Dumbbell Shoulder Press (2009). Note: ExRx on the net. Copyright 2009 by ExRx.net LLC. Reprinted with permission.

20 reps	20 reps	20 reps
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This exercise works the Anterior Deltoid muscles the most, and the emphasis on the upper body muscle directs the blood flow upwards away from the lower body, thus encouraging full body blood circulation.

The rep range prescribed above may be beyond what James is currently capable. Hence, weights should be selected to produce sufficient resistance to elicit muscular force against the action while still able to complete the prescribed rep range. Once it becomes easy, weights may be increased so that 20 reps is the maximum that can be completed (20RM) again.

12) Fitness Ball Hamstring Curl (Compound Movement; Target Gluteus Maximus & Hamstrings)

20 reps	25 reps	30 reps
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This exercise works the Gluteus Maximus and Hamstrings the most, and with dynamic balancing on the fitness ball, it also enhances balance while exerting stress on the cardiopulmonary system to elicit cardiopulmonary training.

The rep range prescribed above may be beyond what James is currently capable – especially given his heavy bodyweight. Hence, he should start at a number that he is able to complete, and make increments in reps of 5 until he reaches the 30 reps mark.

13) Basic Crunch (Isolated Movement; Targets Rectus Abdominis)

30 reps	40 reps	50 reps
---------	---------	---------

This exercise works the rectus abdominis the most, while also causing the obliques to work as synergists.

The rep range prescribed above may be beyond what James is currently capable – especially given his heavy bodyweight and fitness level. Hence, he should start at a number that he is able to complete, and make increments in reps of 5 until he reaches the 30 reps mark.

14) Reserve Curl (Isolated Movement; Targets Rectus Abdominis)

20 reps	25 reps	30 reps
---------	---------	---------

This exercise works the lower abdominis the most, while also causing the obliques to work as synergists. Due to its nature, it also helps in maintaining good posture (neutral spine) through better control of the pelvic tilt.

The rep range prescribed above may be beyond what James is currently capable – especially given his heavy bodyweight and fitness level. Hence, he should start at a number that he is able to complete, and make increments in reps of 5 until he reaches the 30 reps mark.

Programme Frequency & Progression

This programme is designed to be implemented on a consistent basis – 4 times weekly in lieu of any additional training; although enjoyable cardiopulmonary based exercises (non-resistance based to allow ample time for muscle recovery from the PHA training) may be added according to the client's preference on non-training days.

The whole programme will last a total of 6 months, and progression during this period is measurement of increased muscular strength and endurance (general fitness), and bodyweight / body composition changes. If no changes are made after 3 months on the programme, a re-evaluation of programme adherence is recommended to ensure client compliance and consistency.

Conclusion

At the end of our six month stint of the prescribed programme, James has loss a total of 10kg (weighing in at 70kg) which translates to missing his goal by a mere 3kg. As a result, he is extremely motivated to continue on with the plan to loose that extra 3kg off, before moving on to a new goal – one of building more muscles on his frame to look more like a “fitness model”.

About the Author

Edward Yah is a Master Fitness Instructor certified through the IFA, and holds a graduate diploma in Sports and Exercise Science from Republic Polytechnic in Singapore. Edward hopes to bridge the gap between theoretical frameworks and the practical application of sports science to the benefit of both the recreational and professional athlete. A marketing communications consultant by profession, Edward also holds a BA in Communication from the University of South Australia, and an MSc in Marketing from the National University of Ireland, Dublin. Edward can be contacted at edyah@edyah.com.

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APPENDIX

Appendix A

Original Date: 03-03-2009
Dates Revised:

HEALTH HISTORY QUESTIONNAIRE

All questions contained in this questionnaire are strictly confidential and will become part of your medical record.

Name (Last, First, M.I.): James Tan Meng Huat	<input checked="" type="checkbox"/> M <input type="checkbox"/> F	DOB: 21/01/1975
Marital status:	<input checked="" type="checkbox"/> Single <input type="checkbox"/> Partnered <input type="checkbox"/> Married <input type="checkbox"/> Separated <input type="checkbox"/> Divorced <input type="checkbox"/> Widowed	
Previous or referring doctor:	NIL	Date of last physical exam: 28/03/2009

PERSONAL HEALTH HISTORY

Childhood illness:	<input type="checkbox"/> Measles <input type="checkbox"/> Mumps <input type="checkbox"/> Rubella <input checked="" type="checkbox"/> Chickenpox <input type="checkbox"/> Rheumatic Fever <input type="checkbox"/> Polio	
Immunizations and dates:	<input type="checkbox"/> Tetanus	<input type="checkbox"/> Pneumonia
	<input checked="" type="checkbox"/> Hepatitis 1998; Type A & B	<input type="checkbox"/> Chickenpox
	<input checked="" type="checkbox"/> Influenza 28/03/2009	<input type="checkbox"/> MMR Measles, Mumps, Rubella
List any medical problems that other doctors have diagnosed		
NIL		

--

Surgeries		
------------------	--	--

Year	Reason	Hospital
	NIL	

Other hospitalizations		
-------------------------------	--	--

Year	Reason	Hospital
	NIL	

Have you ever had a blood transfusion?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
--	------------------------------	--

Please turn to next page

List your prescribed drugs and over-the-counter drugs, such as vitamins and inhalers		
---	--	--

Name the Drug	Strength	Frequency Taken
Flixonase®	N/A	Once daily
Loratadine	10mg	Once daily

Allergies to medications		
Name the Drug	Reaction You Had	
NIL		

HEALTH HABITS AND PERSONAL SAFETY

All questions contained in this questionnaire are optional and will be kept strictly confidential.

Exercise	<input checked="" type="checkbox"/> Sedentary (No exercise)		
	<input type="checkbox"/> Mild exercise (i.e., climb stairs, walk 3 blocks, golf)		
	<input type="checkbox"/> Occasional vigorous exercise (i.e., work or recreation, less than 4x/week for 30 min.)		
	<input type="checkbox"/> Regular vigorous exercise (i.e., work or recreation 4x/week for 30 minutes)		
Diet	Are you dieting?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	If yes, are you on a physician prescribed medical diet?		<input type="checkbox"/> Yes <input type="checkbox"/> No
	# of meals you eat in an average day?		
	Rank salt intake	<input type="checkbox"/> Hi <input checked="" type="checkbox"/> Med <input type="checkbox"/> Low	
	Rank fat intake	<input type="checkbox"/> Hi <input checked="" type="checkbox"/> Med <input type="checkbox"/> Low	
Caffeine	<input type="checkbox"/> None	<input checked="" type="checkbox"/> Coffee	<input checked="" type="checkbox"/> Tea <input checked="" type="checkbox"/> Cola
	# of cups/cans per day? Coffee: 2 cups Tea: 1 cup Cola: 1 can		
Alcohol	Do you drink alcohol?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	If yes, what kind? Tiger Beer		
	How many drinks per week? 7-10 drinks		

	Are you concerned about the amount you drink?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Have you considered stopping?	<input checked="" type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	Have you ever experienced blackouts?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	Are you prone to “binge” drinking?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	Do you drive after drinking?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Tobacco	Do you use tobacco?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	<input type="checkbox"/> Cigarettes – pks./day	<input type="checkbox"/> Chew - #/day	<input type="checkbox"/> Pipe - #/day
	<input type="checkbox"/> # of years	<input type="checkbox"/> Or year quit	
Drugs	Do you currently use recreational or street drugs?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	Have you ever given yourself street drugs with a needle?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Sex	Are you sexually active?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	If yes, are you trying for a pregnancy?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	If not trying for a pregnancy list contraceptive or barrier method used:		
	Any discomfort with intercourse?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	Illness related to the Human Immunodeficiency Virus (HIV), such as AIDS, has become a major public health problem. Risk factors for this illness include intravenous drug use and unprotected sexual intercourse. Would you like to speak with your provider about your risk of this illness?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Personal Safety	Do you live alone?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	Do you have frequent falls?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	Do you have vision or hearing loss?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	Do you have an Advance Directive or Living Will?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
	Would you like information on the preparation of these?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	Physical and/or mental abuse have also become major public health issues in this country. This often takes the form of verbally threatening behavior or actual physical or sexual abuse. Would you like to discuss this issue with your provider?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

FAMILY HEALTH HISTORY

	Age	Significant Health Problems		Age	Significant Health Problems
Father	65	High Blood Pressure	Children	<input type="checkbox"/> M <input type="checkbox"/> F	
Mother	61	Arteriosclerotic Vascular Disease		<input type="checkbox"/> M <input type="checkbox"/> F	
Sibling	<input type="checkbox"/> M <input type="checkbox"/> F			<input type="checkbox"/> M <input type="checkbox"/> F	
	<input type="checkbox"/> M <input type="checkbox"/> F		<input type="checkbox"/> M <input type="checkbox"/> F		
	<input type="checkbox"/> M <input type="checkbox"/> F		Grandmother Maternal		
	<input type="checkbox"/> M <input type="checkbox"/> F		Grandfather Maternal		
	<input type="checkbox"/> M <input type="checkbox"/> F		Grandmother Paternal		
	<input type="checkbox"/> M <input type="checkbox"/> F		Grandfather Paternal		

MENTAL HEALTH

Is stress a major problem for you?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Do you feel depressed?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Do you panic when stressed?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Do you have problems with eating or your appetite?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Do you cry frequently?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Have you ever attempted suicide?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Have you ever seriously thought about hurting yourself?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have trouble sleeping?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have you ever been to a counselor?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
WOMEN ONLY		

Age at onset of menstruation:		
Date of last menstruation:		
Period every _____ days		
Heavy periods, irregularity, spotting, pain, or discharge?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Number of pregnancies _____ Number of live births _____		
Are you pregnant or breastfeeding?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have you had a D&C, hysterectomy, or Cesarean?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Any urinary tract, bladder, or kidney infections within the last year?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Any blood in your urine?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Any problems with control of urination?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Any hot flashes or sweating at night?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have menstrual tension, pain, bloating, irritability, or other symptoms at or around time of period?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Experienced any recent breast tenderness, lumps, or nipple discharge?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Date of last pap and rectal exam?		

MEN ONLY

Do you usually get up to urinate during the night?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, # of times _____		
Do you feel pain or burning with urination?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Any blood in your urine?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you feel burning discharge from penis?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Has the force of your urination decreased?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Have you had any kidney, bladder, or prostate infections within the last 12 months?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Do you have any problems emptying your bladder completely?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Any difficulty with erection or ejaculation?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Any testicle pain or swelling?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Date of last prostate and rectal exam?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

OTHER PROBLEMS

Check if you have, or have had, any symptoms in the following areas to a significant degree and briefly explain.

<input checked="" type="checkbox"/> Skin (Atopic Dermatitis)	<input type="checkbox"/> Chest/Heart	<input type="checkbox"/> Recent changes in:
<input type="checkbox"/> Head/Neck	<input type="checkbox"/> Back	<input type="checkbox"/> Weight
<input type="checkbox"/> Ears	<input type="checkbox"/> Intestinal	<input type="checkbox"/> Energy level
<input checked="" type="checkbox"/> Nose (Allergic Rhinitis)	<input type="checkbox"/> Bladder	<input type="checkbox"/> Ability to sleep
<input type="checkbox"/> Throat	<input type="checkbox"/> Bowel	<input type="checkbox"/> Other pain/discomfort:
<input type="checkbox"/> Lungs	<input type="checkbox"/> Circulation	

Appendix B

ACSM Coronary Artery Disease Risk Factor Thresholds

Risk Factors	Defining Criteria	Score
Family history	MI, coronary revascularization, or sudden death in an immediate relative (male <55 years or female <65 years)	+1
Cigarette Smoking	Current smoker or those who quit within the past 6 months	+1
Hypertension	SBP \geq 140 mmHg or DBP \geq 90 mmHg confirmed by measurements on at least two separate occasions, or on antihypertensive medication	+1
Dyslipidemia	Total $>$ 200 mg/dL or HDL $<$ 40 mg/dL or LDL $>$ 130 mg/dL; if LDL $>$ 130 mg/dL, use LDL rather than total $>$ 200 mg/dL, or on lipid-lowering medication	+1
Impaired Fasting Glucose	Fasting blood glucose \geq 100 mg/dL confirmed on two separate occasions	+1
Obesity	BMI $>$ 30, or waist girth $>$ 102 cm (40 in) for men and $>$ 88 cm (35 in) for women, or waist-to-hip ratio \geq 0.95 for men and \geq 0.86 for women	+1
Sedentary Lifestyle	Persons not participating in a regular exercise program or accumulating 30 minutes or more of moderate physical activity on most days of the week	+1
High Serum HDL	$>$ 60 mg/dL	- 1

SCORE

Initial ACSM Risk Stratification

Low Risk (younger)

- Men <45 years of age AND no more than one positive risk factor
- Women <55 years of age AND no more than one positive risk factor

Moderate Risk (older)

- Men 45 or older
- Women 55 or older
- Those who meet the threshold for two or more positive risk factors

High Risk

- Cardiac, peripheral vascular, or cerebrovascular disease
- Chronic OPD, asthma, interstitial lung disease, or cystic fibrosis
- Diabetes mellitus type 1 or 2, thyroid disorders, renal, or liver disease

Those with one or more of the following signs or symptoms:

- | | |
|---|--|
| <input type="checkbox"/> Angina | <input type="checkbox"/> Ankle edema |
| <input type="checkbox"/> Shortness of breath at rest or with mild exertion | <input type="checkbox"/> Palpitations or tachycardia |
| <input type="checkbox"/> Dizziness or syncope | <input type="checkbox"/> Intermittent claudication |
| <input type="checkbox"/> Orthopnea or paroxysmal nocturnal dyspnea | <input type="checkbox"/> Known heart murmur |
| <input type="checkbox"/> Unusual fatigue or shortness of breath with usual activities | |

ACSM Recommendations for (A) Current Medical Examination and Exercise Testing Prior to Participation and (B) Physician Supervision of Exercise Tests

	Low Risk	Moderate Risk	High Risk
A.			
Moderate Exercise (40–60% VO ₂ max)	Not Necessary	Not Necessary	Recommended
Vigorous Exercise (>60% VO ₂ max)	Not Necessary	Recommended	Recommended
B.			
Submaximal Test	Not Necessary	Not Necessary	Recommended
Maximal Test	Not Necessary	Recommended	Recommended

Appendix C

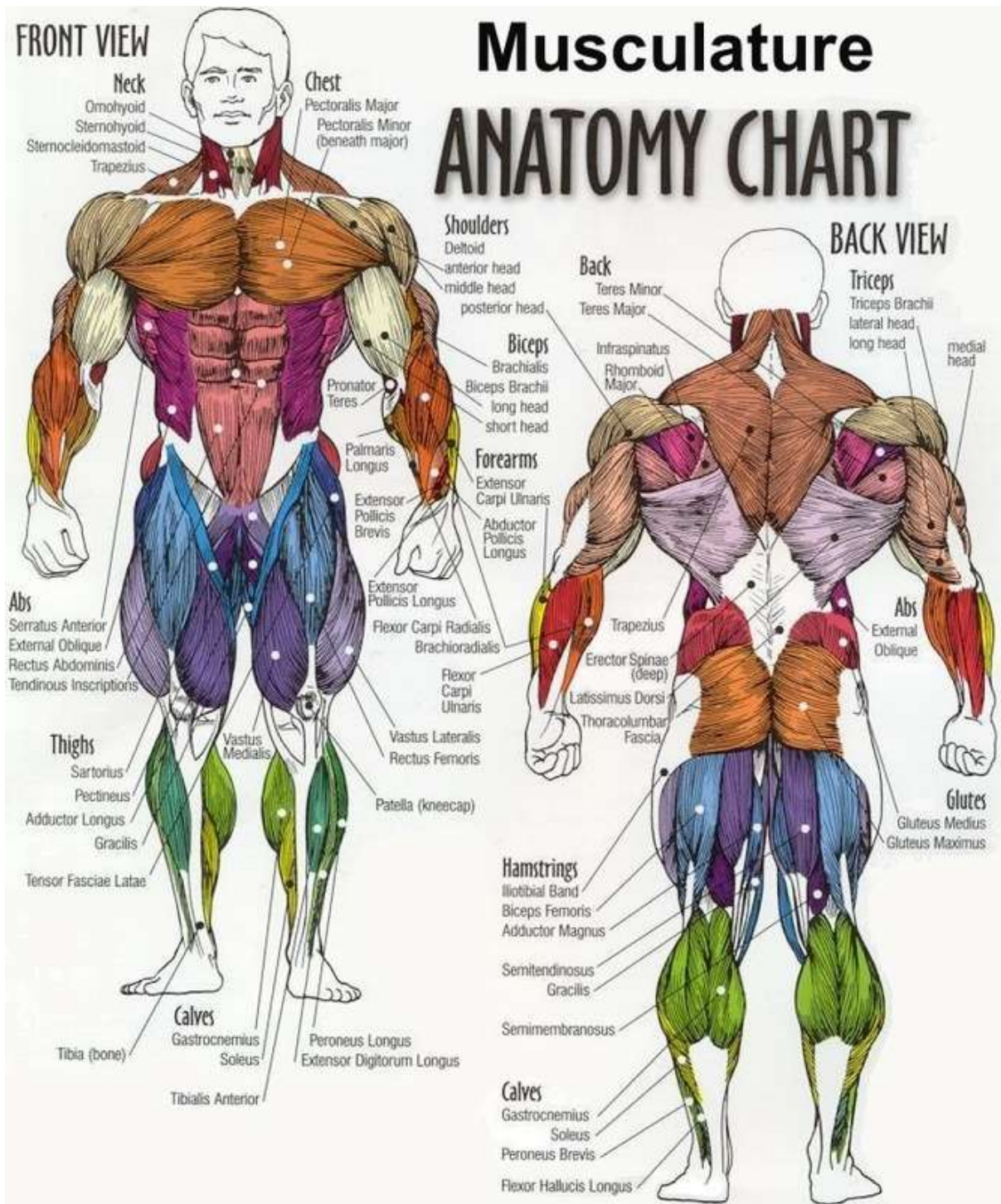


Figure A1. Musculature Anatomy Chart (2009). Note: Mid Peninsula Chiropractic. Copyright 2009 by Mid Peninsula Chiropractic. Reprinted with permission.