

wearable**design**



## **The Factors Reported in a Semen Analysis**

A semen analysis is usually done at a laboratory or a physician's office. The man masturbates and collects the ejaculate into a cup. The semen should then be examined within a few hours, to achieve the most accurate results. The following is evaluated:

### **Total Volume**

2.5 milliliters is a normal volume. A very low volume indicates that the seminal vesicles may not be making enough fluid or that these ducts may be blocked. It may also indicate a problem with the prostate gland.

### **Sperm Count**

40 million to 300 million is the normal range for the number of sperm per milliliter. Counts below 10 million are considered poor; counts of 20 million or more may be fine if motility and morphology are normal.

### **Motility and Velocity**

The number of active cells as a percentage of the total number of cells (rated from 0-100%, at least 50% should be active)

The quality of the movement of the sperm (rated from 0-4. A score of 2 or more is satisfactory.)

### **Morphology**

At least 30% of cells should be of normal shape according to the WHO (world health organization)

### **Kruger (strict) morphology test**

Examines the shape and size of the sperm head. Normal results are when 14% or more of the sperm have normal shaped heads. Men with less than 4% of normal shaped sperm may have a significant infertility problem.

### **Liquefaction**

Normal semen which is liquid at ejaculation immediately coagulates into a pearly gel that liquefies within 20 minutes. Failure to coagulate and then liquefy may indicate a problem with the seminal vesicles, as would increased thickness or the presence of white blood cells.

### **Seminal Fructose**

If no sperm are present, the semen will be tested for seminal fructose, normally produced by the seminal vesicles. If no fructose is present, congenital absence of the vas deferens or seminal vesicles or obstruction of the ejaculatory duct

# ideationinterviews

## **Which vital signs are needed to track and control the IVF process so it can be more effective?**

None. All the people that are sitting in that room are under control. They can have high blood pressure (for example), but they are under control. Vital signs are not important to change our practise, I put it that way. Because what we measure should change what we are doing, right? Vital signs don't. Of course, we do measure them but for personal documentation, not for treatment. What is needed for us (for an IVF) is a woman's age, of course, which reflects the egg quality, egg number and it tells us and her what are her chances of getting pregnant. The more eggs she has it's more likely that some are gonna be able to give raise to a normal embrion. It's a simple equation. If she starts with 10 eggs, only 6, 7 or 8 will be normal. Out of those only 4 or 5 embrions and out of those probably 1 or 2 will be normal and that's their preignancy rate, that's it.

## **Ok. Because there are already some wearables related to preignancy that track the heartbeat or other vital signs...**

That's not western medicine. You are talking about eastern medicine. I'm not saying there is no truth in it, there are some evidences.

## **Then, how do you measure or decide the days that the pacient is going to come to the clinique?**

I think you are asking about the fertile period. First, they are coming for the scan, we look at the egg's size and then they will do something called Ovulation Tracking Kits. They do Urine Tests, so that can tell them (and us) when are they going to ovulate. Otherwise, we make them ovulate by medication. But below that there is the fertile period. They do it home and then they come here to inform us so we can know when is their fertile period.

## **Can you make this process more effective?**

It depends on the patient's characteristics. For a woman that ovulates every month and there are no issues with that, this will do. She will do it at home. For someone who does not ovulate regularly has to be monitored. Sometimes it requires medication (injections) that makes the eggs grow until they reach the correct size.

## **Which external factors that can influcienciate the subject's fertility? Like eating healthy, doing sport, ...**

Again, what Eastern medicine does is check the heartbeat and body temperature and others, but I'm not sure about it. For us, we go by scientific information: egg counts, sperm count. Later we put it all together and then we say the treatment the patient has to go for. If you are talking about the IVF, then we take it inside the lab and we give objective assesments.

**And if you have to say which one is more successful (eastern or western medicine), which one would you choose...**

None. We work together. They are really different things, but not opposite. Actually, we coexist and cooperate. I personally believe in that. What we sometimes do is, when the patients say they want to prepare themselves, we can tell them how to prepare but if they want to go further we suggest acupunctures, yoga, ...And they try this, usually they take like two or three months so they can regulate their body system (or as long as their coach or teacher tells them to). And then they come back to us, where our assessment goes back to the objective scientific evidences.

**Then, is it more effective when they come back?**

Yes, I agree that people that have done other treatments have gone better. When they come for the first time and the outcome is not as expected, some of them go looking for these treatments and, in fact, when they come back their outcome is better.

**Ok. And going back to the IVF, how long can it take since the patient comes for the first time until she gets the IVF done?**

There is not an objective deadline. It depends on the age of the woman. If she is more than 35, the tendency is that within a year they might end up having an IVF. If they are younger, and they never have tried anything (like unsuccessful IVFs) we try other simple things, not IVF straight away. *Not everybody needs IVF, just the most critical cases.* Simple treatments that will go from 6 months to one year.

**Like assisted ovulation...**

Yes, it depends on where they are in their fertility journey. So if they have never tried anything, *we do simple things at home.* Like, we make them ovulate correctly so they can try at the right time. Or else, if it does not happen (that they get pregnant), we escalate the treatment a bit but we do not go straight for IVF, we call the next step IUR which consists in injecting the sperm into the woman.

**I have a general question, is there a tendency that the fertility issue is getting more into younger and younger people? And which one do you think is the root cause for this?**

For women or men? There are two different groups. I would say yes to men. Each time, younger men are having more and more problems, because the sperm count (number of sperms in one milliliter of semen) is bad. Why is it? It is the environment. Most likely is the environment. We can't pinpoint what it is? *We think it is the food that we eat, smoking, our lifestyle, alcohol, ... Men have been poisoned over the years.* (Laugh) Yeah, no kidding, it can be at 28, 29, 30 years old... That's for men. For women it's a bit harder to say because, from the people who come to our clinic, the tendency is to be in their mid 30's. Let's say 34, 35, 36. The younger group that usually comes visit us is when the man has a problem. Generally, women as they get older they start to have this problem. So much more than the younger. But also there is a small group that have some medical problems.

**Which kind of profile tends to be your potential patient? Like in age, social class, gender, ethnology...**

There is no limitation in the age, but typically our patients can go up to 47. There are some people that can not afford to come here. So generally I would say middle and high social class. We can't offer treatment to non-married couples so all of them are married. There are some single woman on their 35-36 coming to freeze their eggs. And I have had some cases of single man coming to freeze their sperm.

**Do you tell you patients about the general health they have? For example, which is the procedure if there is an obese person coming.**

*The closer they are to what we call normal health, the better their chances are.* So we do everything possible to bring them as close as we can to that normality that we have said, which is normal weight (and all these kind of things such as good food, ...). But not everyone can lose weight now, over a majority I will say "lose weight" but some of them, based on their age, we need to push to go on for an IVF.

**Do you give any tips to your patients so they can get pregnant more easily?**

The majority of them they know when they come here, because most of them have gone to see a normal practitioner, a general kinesiologist. They all have done those initial steps. So by the time they come here quite a number of them they know what they are doing. They know when is their fertile period, they know how to track. When they are here they want to do more additional tests and they come because they already know that they need a treatment. There are couples that haven't done anything and from a starting point they say: find, I will go to a fertility center. But *when it comes to give tips I do not generally sit down and give them tips because I do not have enough time.*

**Would you use a system that alerts your patients when they are doing something wrong?**

I would not because I can't stay using an app or a computer all the time. It is a bit difficult for a doctor to do that. Unless we have another person who do that. For example a nurse whose job is completely this, so her job would be to keep track of things. Right now, as a doctor, I keep track to my patients by e-mail. They ask our opinion and communicate by e-mail so far. If you are thinking about a patient portal so far we are not thinking in going on that direction.

**I meant more like a system that can act by itself and detects risks situations and gives alerts to the doctor...**

I can't think of anything that a system can track if something is going wrong. Unless they are starting a treatment, that is different. If they are starting a treatment and some things go wrong during the monitoring process. We are keeping track of this things here. Other than this, what else can go wrong? I'm not based on if they have high blood pressure, this or that. If she loses weight it, does not need to alert me that she is doing it, you get me? There is nothing that important that I must be alerted as a doctor.

**We where thinking about tracking females...**

See? Everybody tracks females, why don't you track men? I am saying this because I run the men's fertility section as well and I know about this.

**It is a market that we still have to explore. Is Malaysia a place in the world where there is less fertility?**

I think it is about the same in the rest of the world. The only thing here is that the man who have to access to treatment do not go for it... Because of cultural things, of the Government, etc. Roughly one on six couples need treatment here, but it's the same in the rest of the world.

**Which is the most important problem you have when you interact with your users?**

The only one could be to detect precisely when they are ovulating. We know that from the scan and the Fertility Test Kits. They use that everyday so they can know when they are going to ovulate, some of them don't see it so they come back here. I do scans, I see if they have ovulated and if not I make them ovulate.

**Which vital signs are needed to track and control the fertility so it can be more effective?**

We collaborate with IVF centres and Western Medicine but we still use our TCM ways.

**People go to IVF and then come to you...**

Yes, we still need to base on individuals condition. Our method is based on pulsation (like pulse taking). To position us to ask some questions to help diagnose their condition.

**Which kind of questions?**

Their sleep quality, how is their appetite. Some other questions like "do they pass motion every day", to check their conditions and diagnose it as an individual.

**Which are the most important of those conditions?**

Their daily activity and their bodies condition, because in Chinese Medicine we emphasize on the Chi. And the part we link the most to the fertility is the kidney's function.

**What about the body temperature, heartbeat and other conditions?**

Indeed, we need to take the body temperature. The best time to do it is in the morning, right after they wake up. Never after their activities. This is called the Basal Body Temperature and it is the lowest temperature that the human body can reach while sleeping. About the heartbeat, we never take track on it.

**And the daily activity or exercise?**

The exercise is to improve the escalation. So they get better chances. But it's something different than what we do here.

**For the patients who have to take an IV. Are they doing it at the same time as this therapy or does this happens before they are taking the IVF?**

Normally, we have 5 different treatments that collaborate with the IVF process. 4 of them can happen and be regulated the before the IVF. If, after that, when they go for the IVF (and this process starts when they start with the injection). Until before the egg retrieval, we focus on the follicle. Then, after the egg collection, we focus on their *uterus lining*.

**How long do your treatment last on average?**

It depends on the person. Because some of them may have started the IVF. But if they are having POF (Premature Ovarian Failure), they don't have the follicle so they will need to use longer time to get the follicle.

**Do you have patients that come to you without going to western medicine first?**

Yes, of course. And sometimes we collaborate with them, meaning that we ask them for scans so we can have a more clear idea of the womb, the ovaries condition and the uterus.



**Then, the only thing that you daily track is the temperature, right?**

Yes. As I said, we need the Basal Body Temperature to track the hormones. So during the period and before the ovulation, the temperature has to be on the lowest. On the other hand, after the temperature increases or, at least, it has to increase due to the hormone changes.

**So, is the reason to track the body temperature to know if they have already ovulated?**

No. In fact, is to let us know how are the hormones levels in the body in normal conditions. Because in some of them, the body temperature will be unstable. Other will have their temperature in a straight line, which means that the subject is not ovulating. But, again, for the ones who have unstable temperature, if after the ovulation is still unstable it is relate to the ... (5.45). This is what is important or us.

**Then, let's say that the two most important things are the temperature and the daily exercise.**

Yeah but it is not the body temperature, it is just the first thing that they do in the morning. They need to use the manual thermometer and they need to write it down in a chart that we give them the first time they come here. Then when they come to visit us, they give it back to us so we can check it.

**Isn't it a bit complicated to write it down everyday and to bring it to you?**

I don't know if it is for the user but I think I would need to see this one. I know that right now, there are a lot of applications that can records this kind of data in the phone, but, for us, it is more clear if we see this chart because during their and after their period or their intercourse they use different symbols and signs. But what we need to see is more clear. So we can say that the temperature is really important but it's not a imprescindible.

**Which kind of profiles do you have coming here?**

Most of them are women, but we have some man coming by as well, to check their sperm quality. For the man, they have to do their sperm test first in the Western Medicine Centres, but later we still base our treatment on our own analisys.

**Let's say that someone with a sperm problem comes in. How would you advice him? And, what do you think that it can be the main cause of this sperm malfunction?**

It depends on their condition. Some of them can have Chi deficiency, Kitney deficiency, some of them it can be in their Blastocyst. It depends on their body, so our treatment will be different.

**I saw an article that said stress kills sperms. Is it a big thing?**

For now it is. Moast of the male customers that come here have a lot of stress in their lifes which directly interferes with their sleep hours. Consequently they go to sleep late and less hours, which directly influentiate the sperms quality.

**Do you usually tell your patients to track their sleep? Or do you consider it important, then?**

No I don't personally keep track on this kind of things, but I always ask them to sleep better. Like going to sleep before 11 pm.

**What about women? Does stress influence their fertility or ovulation?**

It affects them as much as the men. It affects their menstruation cycle which is longer than normal and the egg quality is not as good as it should be.

**What do you recommend to those women so they can low down their stress?**

I recommend them to go for a walk or to do more exercise. But if it does not work I would use our traditional chinese medication. What this medication does is help them smooth their Chi mechanism. So we still base our diagnoses on the Chinese way. These medication consists in various traditional herbs that are boiled and cooked. We also give them some acupuncture treatments. This combined to the herbs is the best to distress.

**Let's go back to your user profiles...**

Most of them are 25 years old or above. The eldest patient I have had is 55 years old. At this age, we always collaborate with a Western Medicine Clinique so they can get an IVF. The younger ones, they do use IVF also. But in this case it's because *they block their fallopian tubes* so they can only get pregnant through an IVF, it's impossible for them to do it through the natural way. Also, most of them are middle-class.

**Also, do you ask them for other aspects of their general health?**

Yes. For example, their weight. If they have obesity, their follicle's quality will be clearly affected. If this is the case, then they have to control their diet. And if it's a really extreme case we would recommend to go swimming first. Also they have to avoid eating raw food and drinking cold drinks. So for example sashimi is not good for the body health (laughs). In Chinese medicine raw food and cold drinks will conduce cold, so it will affect directly to their wombs.

**Which is the frequency that you expect your users to come visit you?**

It depends on their condition. But, in general, they come once a week. But they have to come here because I need to see their tongue and I have to take their pulsations. It can't be done by taking pictures and sending them because I can't appreciate the details that much. We take the pulsations with our hand, like in the traditional way. In case of IVF, before they have to do the transfer they come twice a week.

**What's the first thing you do when a patient comes in? And which is the procedure afterwards?**

I would check their condition. From those general conditions there's the pulse, I ask them few important questions and, later, I base on how they look. If you want to know the kind of questions I ask it would be *their sleep, their appetite, if they feel bloated* after eating. Mostly it is due to their digestive system, in Chinese medicine it

is really important. We also ask them for their *pass motion*, if they went to the toilet everyday. Also about the night urination, if they wake in the middle of the night to urinate. We give them medication to prevent them urinating during the night. Because this is not good for the kidney. This is something that western medicine can't solve. You can go for a scan in a Western clinic and they may say that the kidney is fine but this is different for Chinese medicine. After, I would suggest them to go for the tests, scans... Step by step so we can know which is the problem.

**How many people that goes to IVF comes here?**

Not everyone, but a high percentage.

**Last questions about your personal opinion. How do you get in touch with your customers and can this communication be difficult sometimes?**

Normally, we communicate by e-mail or they call me, but I don't personally think that there are any lacks in the communication channel.

**Do you think that an app could improve the effectivity of your service?**

I think so. Mostly, because the patients don't remember about a lot of things. I do recommend to some of them to download them so they can keep a better register of the things they have done within a week time.

**Could you predict when someone is gonna ovulate just basing on the subject's body temperature?**

It can be predicted but it won't be accurate, because some of them have really unstable temperatures and patterns, so for us is not easy to predict when is the exact date of the ovulation happening. You can do it but normally the scan is gonna be more accurate normally. The temperature that we normally ask is for us to ask them more questions and try to figure out what's going on but it's not a predictive tool.

**Which is the toughest patient that you ever had?**

She is a woman around 40 years old whose period has already stopped. There may be other reasons but it also stopped because of her age. The ovarian function is not working. I'm still trying it with her, she had to go take scans and bring them back to me. She just came one month ago. Normally for the POF is the toughest cases. I have seen successes but it takes time. It can be from 6 months to two years or more. Some of them when they already give up, they get pregnant. Probably, because they take all their pressure away or maybe it's just luck.

# insights

**Not everybody needs IVF, just the most critical cases.**

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**We do simple things at home.**

**We take the Basal Body Temperature every morning. It consists in the lowest temperature that the human body can reach while sleeping.**


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**Egg quality and egg number tells us the chances a woman has for getting pregnant.**

# framework



As the most critical users are already attended by the laboratory (with microscopical observation), we do not consider the option of treating IVF users. Our product has to try help the user avoid the IVF. WE DO NOT TREAT AN IVF PROCESS. We help the user become more effectively fertile so they can avoid this process. This services has to act daily and can cooperate with the simple treatments done at home.



A sensor to constantly track the temperature will be needed. This sensor has to send the information to a database which can process the temperature.

## valueproposal

A device that helps the user become more effectively fertile so they can avoid the process of IVF. This services has to act daily and can cooperate with the simple treatments done at home. It runs by itself it does not need support from doctors. It tracks the BBT.

# bench**marking**



