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CHAPTER 4

The FTF's expectations in regard to personalized medicine

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Here we take a look at the opinions expressed at the Forum regarding how personalized medicine, as defined in earlier chapters, may develop and the impact it may have. Two approaches were taken:

- First, two work sessions were held at which all Forum members were present. Several papers were read by internationally recognized experts. Each individual had the opportunity to express his/her view, either individually or in groups. Prior to these sessions, diverse information was gathered and distributed as a basis on which to work.
- Second, questionnaires were administered in accordance with the Delphi method. The aim was to determine the overall opinion of the Forum members as to the likely development and impact of personalized medicine.

The results are here summarized in three sections. The first section deals with the most likely developments over periods of five and ten years, the second with the factors that will speed up or inhibit the advent of personalized medicine, and the third with the main effects in the four areas here under study.

4.1. What will happen?

The members are in general quite optimistic regarding the development and introduction of personalized medicine, though slightly less so with respect to the rate of the process. The broad majority believe that the question will be one of evolution rather than revolution, since advances will occur in staggered manner and be prolonged in time. All believe that when we look back fifteen years from now, it will seem like a revolution owing to the great change that will have taken place in treatments and in the understanding of illness.

The predominant feeling is that the first advances, constituting what has been called the base scenario, will be seen within five years, although it will be necessary to wait nearly ten years for the broader results in terms of illnesses and population affected (see illustration).

Specifically, this base scenario will take shape as follows:

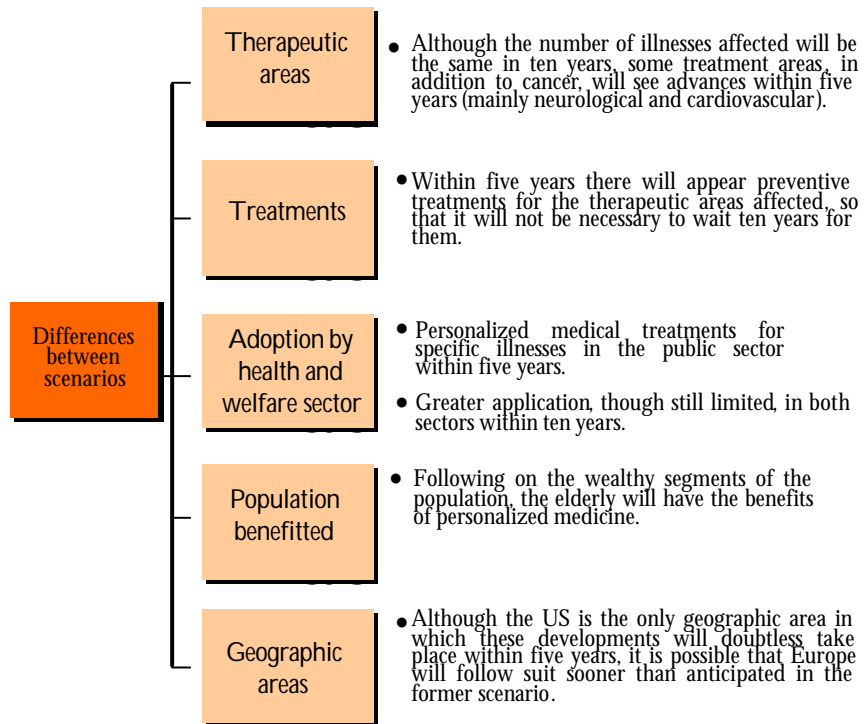
- **Therapeutic areas affected.** Probably the only illness significantly affected by personalized medicine within five years will be cancer. Within ten years, however, advances will also be seen in a broad range of other areas, including diabetes, cardiovascular disease (e.g. hypertension), psychiatric illness (e.g. schizophrenia and depression), and neurological illnesses (e.g. Alzheimer's and Parkinson's).
- **Types of treatment.** Within five years we will see the first medicines aimed at genomic profiles, which will be more effective and will have fewer side effects. At the same time more individualized treatments based on mother cells will begin to have positive effects. On the other hand it will be necessary to wait a few more years, though fewer than ten, for the development of preventive treatments based on genetic profiles.
- **Introduction into the health system.** Within five years the new treatments will have been adopted by a small part of the private sector, with very limited impact in the public sector. In ten years' time these same treatments will be more general in both sectors, although they still do not cover the entire health system or the full range of illnesses.
- **Population benefitting.** Within five years, most of the persons benefitting will be in a high income bracket, while within ten years the benefits will extend to a larger part of the population. In the main the people here referred to will be elderly or will suffer specific illnesses, basically those given more priority, and dealt with on a mass basis, by the public sector.
- **Geographic areas.** It is generally agreed that the first advances in personalized medicine will occur almost exclusively in the US, followed almost simultaneously by the UK, Continental Europe, and a few others countries such as Japan. In general the Forum members believe that developments in Spain will coincide with those in the rest of Continental Europe. In the case of underdeveloped countries it will take longer for these advances to become available to larger population groups.



Not of the majority opinion, a small group of Forum members believe that the base scenario defined above may develop more rapidly than that set forth earlier (see the following chart).

This accelerated scenario is one in which, even if the therapeutic areas affected in ten years should fail to vary significantly, in many of them (principally neurological and cardiovascular) there will be advances seen within five years. In addition, preventive treatments will begin to appear for those illnesses before the foregoing scenario, some of them in less than five years. Although only for very specific illnesses, the public health systems will begin sooner to adopt the new treatments, possibly with their limited extension to other therapeutic areas within ten years. Finally, with respect to the people who benefit and to the geographic areas affected, this accelerated scenario is similar to the base scenario, although benefits come a little sooner for the elderly, along with personalized medical techniques in Europe.

Differences between scenarios.



4.2. What will accelerate or impede the process?

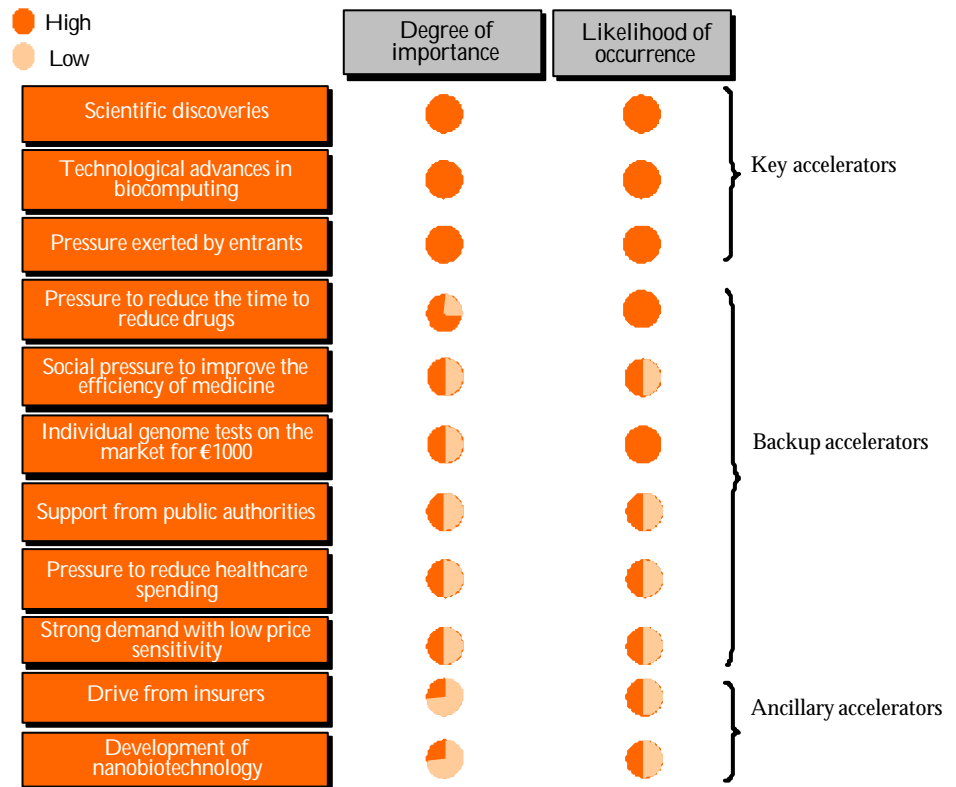
From the point of view of business it is very important to be able to know at any moment what stage a process has reached, as well as to know its rate, so that strategies can be accordingly modified. Premature investments and initiatives left too late may thus be avoided. This is especially the case in situations such as that of personalized medicine, owing to the considerable uncertainty regarding its future.

The aim in this section is to provide firms with a set of indicators, specifically accelerators, or factors that will propitiate the development of personalized medicine, and brakes, or factors that could impede such development. These indicators will make it possible to keep an eye on progress with respect to the base scenario referred to in the foregoing section.

Accelerators

In the illustration below there is a list of the main accelerators considered by the FTF. They are categorized according to their importance in the development of personalized medicine and to the probability of their attaining to reality within the period here contemplated.

As may be seen, the general opinion is that scientific and technological advances (especially in biocomputing), along with the pressure exerted by the new entrants, will be the key accelerators behind personalized medicine. These will be followed in importance by backup accelerators, i.e. social pressure and the desire on the part of institutions to enhance treatments and reduce health costs. Next will come the pressure of market demand and of other components in the value chain. As regards the probability of their attaining to reality, the outlook is quite positive insofar as concerns each of the accelerators here mentioned, especially those regarded as most important.



Hence what we're looking at is a push market, one that is pushed mainly by technological advances but also by demand on the part of individuals, along with institutions, for higher quality and lower costs where health is concerned. The principal indicators in question will be the key accelerators, followed by the backup accelerators. In other words advances in technology and research, the financial health of the new biotechnological firms, and the continuation of society's demand for the quick application of scientific discoveries.

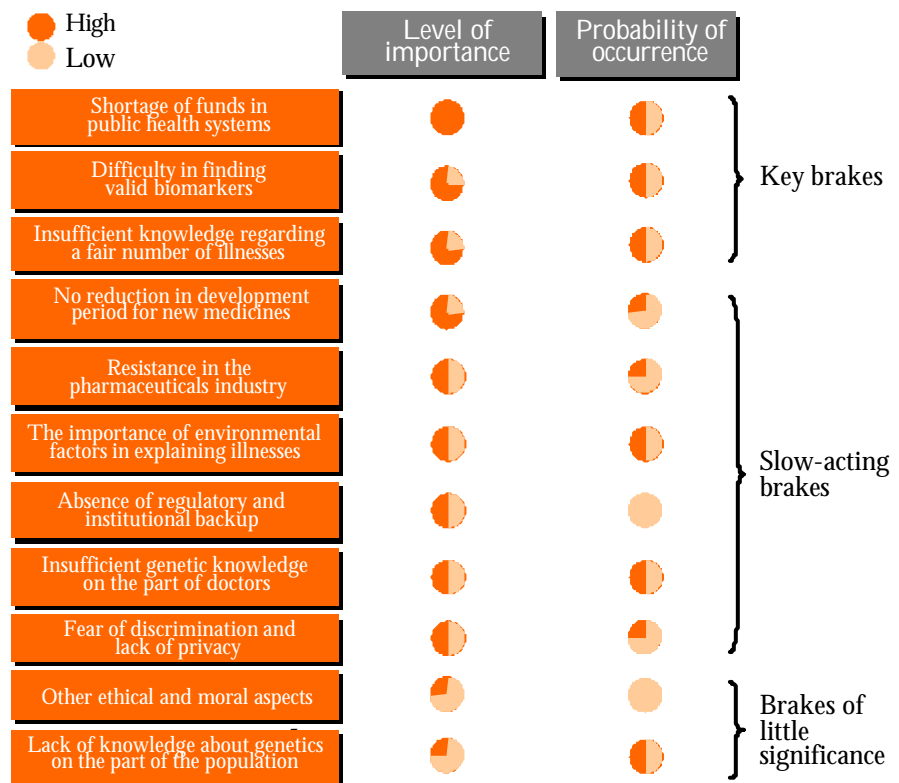
Those members of the FTF who defend the accelerated scenario for the development of personalized medicine take a basically similar view in regard to accelerators in general, but they ascribe even more importance to technological advances. Among key accelerators they include achievements in nanobiotechnology, which they regard as highly probable.

My Notes



Brakes

Similarly the FTF has undertaken to pinpoint and assess those factors, as well as their probability, that might hold back advances in personalized medicine. In the diagram below one can see how such brakes as might occur are regarded as less important than the accelerators, while the greatest difference arises in the probability of their occurrence. The majority opinion is that their occurrence is very unlikely.



The key brakes, those that will most impede the process, are on the one hand scientific, relating mainly to knowledge regarding illness and to the finding of biomarkers that will connect genetic profiles with the appropriate treatments. And on the other, it may happen that shortage of funds in the public health systems greatly impedes the widespread application of medical advances.

Less important, and less likely to arise, are the slow-acting brakes. Among these we find resistance to change on the part of the traditional pharmaceuticals industry, but such resistance is now less feared than it was earlier. Also considered less important and less probable than in the past are the ethical and social factors. While it is conceded that debates may arise in these areas, most members feel that the regulatory measures needed for their undertaking will be established.

It is in the importance and future development of these factors that we find the greatest disagreement within the FTF, i.e. between the majority, which foresees the base scenario, and those who foresee the accelerated scenario. In general these latter ascribe less importance and less probability to the brakes mentioned above. The principal disagreements regarding probability arise in relation to science, such as the difficulty in finding biomarkers, the failure to speed up the development of new medicines, the insufficiency of knowledge regarding numerous illnesses, and the fact that environmental factors may bear on the development of a given illness. At the same time they believe that the traditional pharmaceuticals industry is less likely to be a brake than to be an accelerator.

Indicators to be monitored

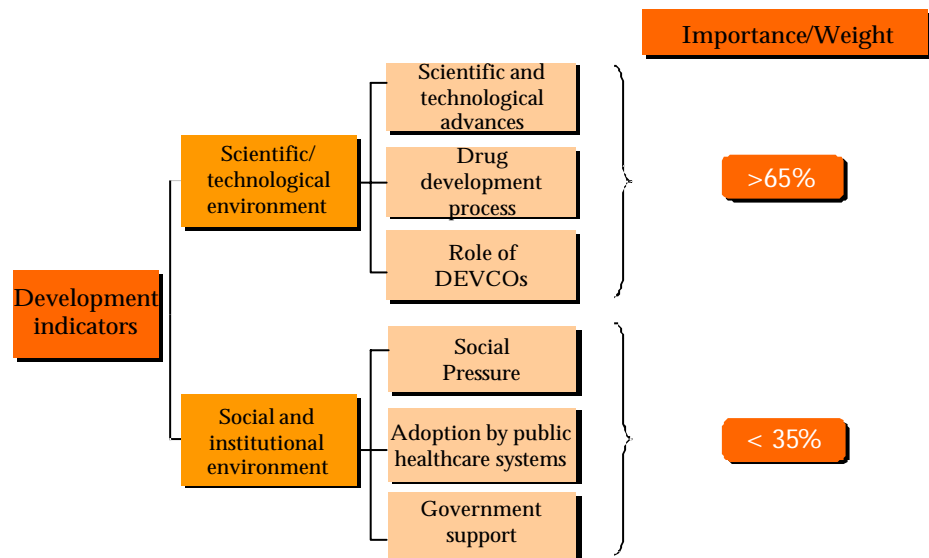
Following replies in the above areas, a framework of indicators is proposed that will make it possible to assess in a more continuous way the development and most probable scenario where personalized medicine is concerned. As shown in the figure below, the indicators are divided into (1) scientific-technological environment and (2) social and institutional environment.

These two groups contain the major factors for the future of personalized medicine. The first will be the most important, although the second may in large measure compensate for differences of performance in the first. To take an example, negative developments in the scientific-technological environment with respect to that predicted will entail delays in introduction in relation to the base scenario, even if the social and institutional environment should develop more favourably than expected by the FTF. If it were desired to assign weights to each group in order to have a tool for prediction



of the development of the base scenario, the suggestion would be to assign to the first group a weight greater than 65%.

The indicators are as follows:



Scientific-Technological Environment

This group contains three categories of variables:

- Scientific and technological advances. All advances in scientific research, mainly biological and medical, as well as relating to storage technologies and mass data calculation. In the case of these variables, follow-up is related to the failure so far to achieve such advances, since the majority opinion at the FTF is that they will be made. Should they not, there would be a delay in the introduction of personalized medicine.
- In relation to the development of new medicines. Brakes on the finding of biomarkers, insufficient knowledge where many illnesses are concerned, and failure to reduce development time for new medicines. These can work either way, since it is expected that they will not have a great hindering effect. Should that effect be more significant, so that not so many new medicines are developed as desired, the base scenario would be held back. If on the other hand, consistently with the majority opinion, their impact should be limited, personalized medicine will develop more swiftly, taking on the tones of the accelerated scenario referred to above.

- **Role of the DEVCOs.** Depending on the role of the new biotechnological companies (which is expected to be salutary) and of the traditional pharmaceutical companies (judged to be neutral), the scenario could go either way. The number of new entrants and their access to the capital market, as well as the strategy of the pharmaceutical firms where genomic research is concerned, will be the factors to watch.

Social and institutional environment

There will be social and institutional factors affecting the adoption of scientific and technological advances. This group includes the following areas:

- **Social pressure.** The public's attitude to personalized medicine will be a key factor where its adoption is concerned. On the one hand we have the demand of society for better healthcare, while on the other there are ethical and moral questions, especially in relation to discrimination and confidentiality. The opinion of the FTF is that the former will indeed take place, while the impact of ethical themes will be limited. If social pressure is focused more on ethical questions, the development of personalized medicine may be delayed.
- **Adoption by the public health systems.** Within the public health systems, the key variables are the pressure to reduce costs and the lack of funds for the adoption of new treatments. In general the members believe that both will be important, especially the second. If the tendency is toward investment with a view to reducing costs, then personalized medicine may be taken up more swiftly by the health authorities and thus more quickly introduced. A related question is the role of the medical insurance companies, which, although not considered critical by the FTF, could accelerate adoption, especially in countries like the US, where private systems have greater weight.
- **Governmental backing.** Backing from governments, along with the development of regulations in the area, will be factors of mean importance, though members believe there will be governmental backing, in the form of grants for research and of legislation allowing application of the new treatments. Otherwise we may clearly expect that the introduction of personalized medicine will be slower than foreseen in the base scenario described in the former section.

4.3. What impact will there be on society and on firms?

Here we consider the point of view of the members regarding the most probable impact in each of the areas here in question, i.e. (1) social aspects, (2) pharmaceutical and biotechnological industries, (3) public health systems, and (4) other sectors affected.

Unless otherwise indicated, the base scenario impact is envisaged as occurring gradually over the coming ten years. In the case of acceleration or retardation with respect to that scenario, such impact will itself affect the rate of change.

Social aspects

Health and quality of life

The predominant opinion is that life expectancy will increase, though not very much. The reasoning behind the qualification is that expectancy for persons free of illness is itself limited, and advances in this area are the result mainly of a fall in mortality rates for persons of age below sixty years. To take a case in point, life expectancy at birth has increased by almost ten years, while for persons of age eighty it has increased less than two years.

Hence ageing of the population will accelerate, mainly in the developed countries, and this may aggravate problems such as the funding of public pension systems. Where quality of life is concerned, however, some members feel that against such a background it will be more common to keep working until a later age, and this could compensate for the ageing effect.

As regards quality of life, the predominant view is that this will be enhanced in greater or lesser measure for the entire population, although the greatest advances will be in specific segments, not only where health is concerned but also in the capacity to take up different activities. Among these segments we have especially persons of advanced age, those affected by illnesses in the case of which advances first occur, and, in general, the wealthy. Enhanced quality of life will also be enjoyed by persons suffering chronic or degenerative illness. For the majority the benefits will be more moderate.

One thing that is indeed clear is that there will be a positive change in living habits, especially in persons aware of their own propensity for certain illnesses. This change will be consistent with the present trend, among at least some of the population, toward a healthier life style. One of its features will be the greater acceptance of preventive treatments, which the members expect within five to ten years. At the same

time it would appear that negative habits, such as smoking, would not increase even with the advent of a cure for lung cancer, although in this area the view is not so close to unanimity.

Spending on public health, and such savings as personalized medicine may bring, will in large measure depend on the habits adopted. Here education will be very important, as will incentives or restrictions (e.g. in the case of insurance premiums).

Finally, and in the long term, it is probable that patients will tend toward habits typical of consumer markets. There could be strong implications for marketing strategies insofar as concerns the various elements making up the value chain in the health system.

Legal, ethical, and moral aspects

As we have seen above in connection with accelerators and brakes, it is highly possible that ethical questions will become weightier, especially those involving discrimination and privacy of information, although legislators will endeavour to deal with them appropriately and to diminish their impact. Even so, most of the members feel that inevitably there will be subtle cases of discrimination, both labour-related and in connection with health insurance, for genetic reasons.

Again with respect to regulation, in particular where personalized medicine is applied and entails business opportunities, it is anticipated that some countries will become "legal countries" from the point of view of personalized medicine. The majority opinion is that this will indeed happen, for it is already happening, to take an example, in research with stem cells. However, some of the members feel that this will not happen because, while the topic is not very controversial (especially the part less related to stem cells), legislation will not be very strict and will tend to favour extension to a large number of countries.

In any case scientific advances will very probably continue to be ahead of legislation. There may arise problems and controversies while legislation is produced accordingly, with an effect on all the aspects mentioned in this point. Thus again we see how important it is that agents interested in the application of personalized medicine, public but in the main private, play an active role in regulation so that legislation will conduce to the smooth introduction of personalized medicine, while problems that could hinder its general adoption will be avoided.

Pharmaceutical and Biotechnological Industries

Where the pharmaceutical industry is concerned, personalized medicine will very probably mean major changes in the development and profitability of new medicines. Also there may be heightening of competition, owing to advances in science and technology, between traditional companies and newer ones.

Development of new medicines

As mentioned in the previous chapter, there are steadily fewer new medicines approved by health authorities. The main reason is the growing difficulty in finding safe and effective medicines for a broad majority of the population under the present paradigm of medicine for everyone.

What the FTF expects is that, with the development of medicines based on knowledge of a person's genome, this trend will change and there will be an increase in the number of medicines approved annually. However, it will take ten years or more before we see levels of approval similar to those of the 1990s. This moderate growth will be influenced by the difficulty in finding valid biomarkers in the short term, as well as in the reduced number of genomic medicines involved in the development of new ones. In these circumstances it is possible that growth will continue in the number of medicines approved within timespans greater than the one envisioned in this report.

As regards the origin of the new medicines, members of the FTF say that most of them will come from the discovery of new substances. However, it is much less probable that fresh knowledge in genetics should make it possible to recover old molecular entities, discarded earlier, owing to the absence of complete analyses. Such recoveries will be easier in the case of medicines that had problems with efficacy than in the case of those abandoned because of toxicity problems. The fact that the new developments should come from new discoveries will facilitate the appearance of new starters, although in addition it will slow down, and add to the cost of, these new developments in comparison with the retrieval of medicines that failed to pass approval criteria.

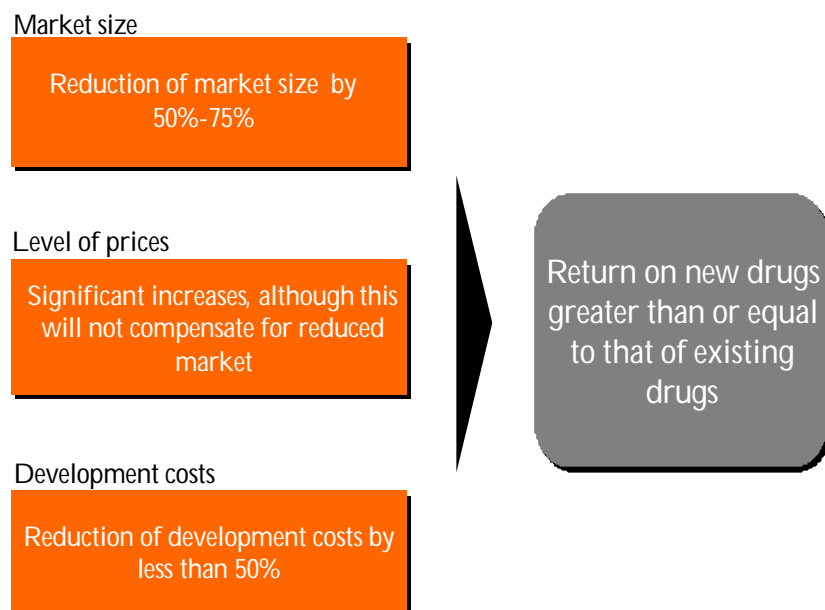
Accordingly it is reasonable to expect that development costs may fall significantly, although not dramatically. These reductions will occur gradually as barriers to new development are reduced.



As regards drugs now on the market, most members are sure that the new drugs will have an impact on some of the current blockbusters, main feature of which is that they are designed for the immense majority of the population, for a broad spectrum of illnesses, and with few or none side effects. Another opinion is that the development of new medicines will be aimed at areas in which there are no blockbusters established. Each of these opinions would seem to be coherent, since everything points to a process in which new developments will in the short term be directed toward areas for which there do not exist effective treatments, and later on will extend to others in which the number of treatments already established is greater. Thus it will be necessary to wait a few years in order to see effects on the profit-and-loss accounts of the traditional pharmaceutical firms. Such effects may become significant within ten years.

Profitability of the new medicines

The profitability of the new medicines for the pharmaceutical and biotechnological industry is one of the most discussed questions in the sector. As shown in the illustration below, the FTF predicts that such profitability will be equal to, or even greater than that of current medicines, the reason being the performance of the key variables in question. These variables are as follows:



- **Market size.** The orientation of new medicines toward particular population segments may mean that their market shrinks appreciably. The opinion of the members is that between two and four medicines will be developed per illness¹, which will mean a market reduction of 50%-75%. This effect may be compensated for with increases in the overall market, these in consequence of greater efficacy and few side effects.
- **Prices.** Prices could increase significantly, although most members expect that increases will not compensate for smaller market size. A minority believe that enormous pressure from public health systems will deter price rises. Others object that the cost of medicines will be less in relation to overall health costs, which will be much below savings in health costs (nearly 70% of the overall amount as opposed to 15-20% accounted for by medicines).
- **Development costs.** As pointed out earlier, the expectation is for a reduction in development costs, although it is highly improbable that this reduction should be as much as 50%.

The members who anticipate a fall in profitability are in general more pessimistic in regard to the three variables, especially where prices of the new medicines are concerned.

Business models

The development of new technologies entails the appearance of new players on stage: firms working in genomic medicines, technology firms for the processing of information, insurance companies, medical associations, and public health systems.

The immense majority of the members believe that personalized medicine will represent an opportunity for the emerging biotechnology firms, which have methods for the development of genomic products.

With respect to the strategy adopted by the great pharmaceutical industry, many members believe that this industry will invest heavily in R&D for genomic medicines. Others are more cautious, and feel that the industry must set costs and recover from the consolidation of recent years before investing large sums.

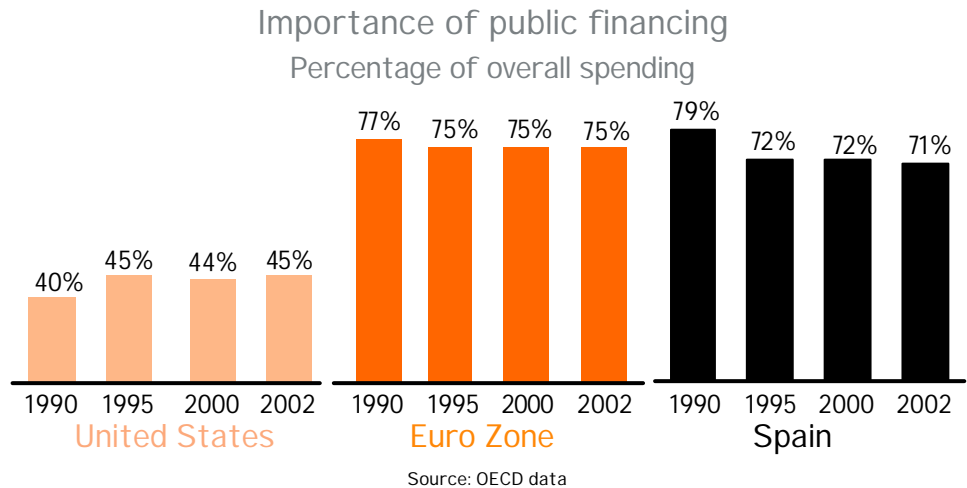
1. According to the scientific criteria, there will be identified between 2 and 4 variables which were previously considered one illness.

Some members believe that the market share held by emerging firms over the next ten years will range between 3% and 10%. The main reason is that these firms do not have all the resources necessary for the development of medicines. They will need backing from the big pharmaceutical companies, which have the funds, the commercial networks, and the legal knowledge.

Over that same period the expectation is for collaboration between pharmaceutical companies and biotechnology firms, although some members refer to the possibility that these latter will be taken over by the big pharmaceutical companies.

Public health systems

We now look at the opinion of the members as to the impact that the development of personalized medicine could have on current public health systems. The focus is on Continental Europe, where its relative importance within the overall health system of each country is enormous:



My Notes

First we look at health spending and each of its components, then at the role of the public systems within this new framework, the aim being to assess such opportunities as may arise for the private health sector.

Increase in health costs

Over the next five years

Where the short term is concerned, most members believe that the national health bill as percentage of GNP will in general increase by at least 10%, i.e. 5000 million 2002 euros in the Spanish case.

As for the various headings, the members make different predictions. Where spending on pharmaceuticals is concerned, few believe that these will remain stable. Most believe that they will increase, in general by at least 10%. An even greater number believe there will be an increase, slightly below 10%, in the costs of hospitalization and of treatment at clinics.

Over the coming ten years

As regards the long term, the members agree that overall health spending in most countries will continue to increase, although there is some disagreement as to whether the amount will be less than or more than 10%.

Where components are concerned, quite a number of members believe that pharmaceutical and hospital costs, as well as costs for treatment in clinics, will increase, though in all cases below 10%.

		Over next five years	From five to ten years
Health spending in relation to GNP	Spending on pharmaceuticals	• More than 10%	• About 10%
	Spending on hospitalization	• Less than 10%	• Less than 10%
	Spending on clinics	• Less than 10%	• Less than 10%
	Overall spending	• More than 10%	• About 10%

2. If the annual cost is an 8% of the GDP, a 10% increase will place it at a 8.8% of the GDP.



Another factor that will push up health spending is the increase in life expectancy that medicine of this sort may produce, although the members agree this impact will be moderate.

Along with the two foregoing factors we have tests being carried out that make it possible to obtain a fairly complete description of the genome. In the Spanish case this could have an impact up to 0.8% of the GNP, assuming such tests were carried out annually on 15% of the population.

However, enhanced efficacy and, in greater measure, reduction of side effects will help to reduce the growth of health spending, mainly in the mid term. This saving will occur in hospitalization costs more than in those relating to treatment in clinics.

Insofar as concerns the orientation of medicine towards the prevention and changes in life habits among the users of public health systems, there is little consensus regarding the impact on health costs, at least for the period here under consideration. The same thing happens with the need to train doctors in the new technologies, and there is little agreement over the impact of this, although here one does observe a slight tendency toward an increase in spending.

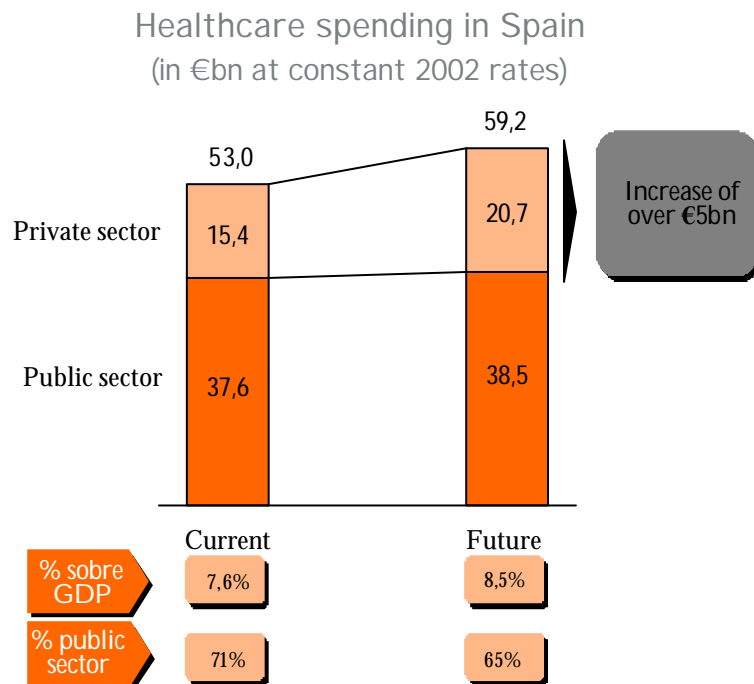
The role of the public health systems

Once we have looked at how health costs will likely continue to rise in the coming years, in spite of personalized medicine, the next step is to understand predictions regarding the role that the public systems will play in the development of personalized medicine.

The members of the Bankinter Foundation agree that these public systems will not assume leadership in the development of personalized medicine, but that they will have a much more reactive role. It will be public demand that induces the public health systems to take up the new treatments. Probably the first treatments they provide will be for chronic illnesses, such as diabetes, since that is where the new treatments could most quickly result in savings.

Accepting the prediction of the FTF regarding the role of the public health systems, the experts believe that these will reduce their holdings from the current 75% to 70-65% of overall health spending.

Hence the fact that overall health spending will continue to rise (as a percentage of GNP), along with a fall in the weight of the public sector in this area, means new markets and opportunities for the private sector. In the case of Spain, as may be seen in the following illustration, additional revenue for the private sector could exceed 5000 million 2002 euros, which figure would represent an increase of 35%³. This increase, as pointed out above, will occur in all the major components of public health spending, so that there will be opportunities for various participants in the value chain of the health system.



3. Assuming an increase in healthcare spending to 8.5% of GDP and a public sector share falling to 65% of total spending.

Source: OECD: Own preparation

Other sectors affected

As mentioned above, the development and introduction of personalized medicine will have an impact on many sectors owing to the changes it will bring about in life expectancy, population pyramid, quality of life, and habits.

The FTF has sought to assess business opportunity for the various sectors most directly connected with personalized medicine.

Within these, and, since the great technological challenge of personalized medicine will be the processing of information, the members agree that the sectors with the most business opportunity will be the genetic databases and the suppliers of technology for laboratories. Since the general view is that new firms will be set up in these environments, these opportunities will extend to capital risk companies, which will be among the principal suppliers of capital for the new companies.

Some members point out that even without the development of personalized medicine there would be a considerable expansion in sectors connected with data processing owing to the great quantity of information to be managed in different areas of medicine, as is the case with the development of electronic files, which will gradually go further in American and European markets.

We now summarize the sectors here looked at. They fall into three groups depending on the opportunity for business that, in the opinion of the FTF, they afford:

Sectors that afford great business opportunity:

My Notes

Suppliers of technology for laboratories
Genetic databases
Capital risk firms
Consultants specializing in biotechnological markets

Sectors that afford a medium-high level of business opportunity

Clinical laboratories
Suppliers of computer technology for processing and massive data storage
Private clinics
Health consultancy

Sectors that afford a more modest level of business opportunity

Insurance companies
Legal firms
Pharmacies

In view of their special position within the value chain of the health system, we now take a closer look at the impact that these three industries might have on business, i.e. insurance companies, legal firms, and pharmacies.

Health insurance companies

Many experts believe that the insurance companies will not play a key and proactive role in personalized medicine. On the other hand, how the insurance business will incorporate and process the data is one of the areas in which opinions diverge.

It is more widely agreed that incentives will be offered to those insurance companies that are prepared to carry out genomic tests. However, there is strong disagreement as to whether the industry will go further and use genetic data on a mass basis in calculating premiums, and whether it will perhaps oblige all insurance companies to make such tests obligatory, the source of this controversy being expectations in regard to legislation. The majority opinion is that the insurance companies will not use genetic data on a mass basis because of regulations protecting confidentiality and discrimination based thereon, although they will be permitted to promote the furnishing of such information by policyholders.

It is not clearly agreed how personalized medicine will affect the profitability of these companies in the long term. Some members believe that in the short term profits may increase, but that in the long term they will fall back to current levels. Some feel that better profits will result from better health among the population, not from the exclusion of high-risk patients.



Pharmacies

Most members believe that the principal activity of the pharmacies will not change radically and that they will continue to sell standard medicines.

A minority believe that the pharmacies will broaden their operation to include personalized medicine. Nearly all members of this minority believe that they will play an important role in measuring out and distributing medicines, but not in genomic testing or on prescribing medicines based on such tests.

Doctors

As regards the doctor, the FTF believes that personalized medicine will add to the importance of his/her role. The relation between doctor and patient will continue to be the main pillar of the system, since technological discoveries cannot replace the medic. The decision whether to prescribe, as well as the corresponding responsibility, will lie with him/her.

The FTF laid stress on the importance of training and specialization in personalized medicine.

4.4. Conclusions

Personalized medicine is inevitable. It will come gradually and stealthily, but within ten or fifteen years it will be seen as a great revolution in medicine, hence also in the health of the population and its quality of life.

The FTF recognizes that it will bring a great many changes. There will be effective treatment for a greater number of illnesses, with an increase in life expectation, quality of life, and, as a percentage of GNP, expenditure on the part of the health system. The participation of the public sector in overall health spending will decrease, the private sector will have more weight, there will be new agents and business models in the pharmaceuticals industry, there will be a moderate increase in the number of medicines approved, and these medicines will be more profitable.

These changes will have great social and economic impact, not only because of their weight in a country's GNP but also because their influence on people's health and behaviour will have a greater or lesser effect on all economic sectors.

In this setting each industry will have to assess impact and adopt a strategy in line with personalized medicine. Given the uncertainty regarding the rate of its development, the present report seeks to provide some indicators that could help in this regard. The members are sure that the rate of development will depend especially on technological factors. Also important and requiring attention will be social and institutional factors that could facilitate or impede technological advances in the health system. It is hoped that reference in this chapter to scenarios, indicators, economic impact, and social impact will throw some light on the question as to how firms and industry should respond to the inexorable approach of personalized medicine.