The 18th Biennial International Conference
Strength through Diversity:
Creating One Breastfeeding World
Hilton San Francisco & Towers
San Francisco, California USA
July 3 - 6, 2003

Hormone Imbalances and Milk Supply: How Polycystic Ovary Syndrome May Fit into the Picture

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2003 La Leche League International Conference

Session 130: Hormone Imbalances and Milk Supply: How Polycystic Ovary Syndrome May Fit into the Picture

Friday, July 4, 2003 7:00 PM – 8:30 PM (1900-2030)

Lisa Marasco, MA, IBCLC

OBJECTIVES	CONTENT	TIME FRAME	CONTENT SPECIALIST	TEACHING METHOD
Describe the physiology of mammogenesis.	I. Phases of Mammogenesis a. In Utero b. First 2 Years of Life c. Puberty II. Major hormones of mammogenesis a. Insulin b. Cortisol c. Thyroxine d. Prolactin e. Growth Hormone	10 minutes	Lisa Marasco (LM)	Lecture Slides Handouts
Describe the hormonal shift of lactogenesis II. List three major hormones of the Lactogenic Complex.	III. Lactogenesis IV. Lactogenesis II V. Lactogenic Complex VI. Milk Synthesis	20 min	LM	Lecture Slides Handouts
List four hormonal imbalances that are known to impact lactation. List 5 major symptoms and 3 possible hormonal imbalances in PCOS. Give three possible ways PCOS might impact lactation.	VII. Primary Lactation Failure a. Mechanical b. Endocrine c. Insufficient Mammary Tissue d. Literature Review VIII. Overview of Polycystic Ovary Syndrome IX. Potential impact of PCOS on lactation X. Marasco thesis study findings	40 min	LM	Lecture Slides Handouts
Define "targeting" of galactogogues. Describe dilemma of short-term treatments for insufficient milk supply related to insufficient mammary tissue, and potential for longer-term treatments.	XI. Counseling for insufficient milk XII. Dilemma for current baby XIII. Galactogogues XIV. Potential for future babies XV. Hypoplasia: reversible? XVI. Case histories	30 min	LM	Lecture Slides Handouts
Question and Answer.	Participant Questions Discussed.	10 min	LM	Discussion.

Hormone Imbalances and Milk Supply:

How Polycystic Ovary Syndrome May Fit into the Picture

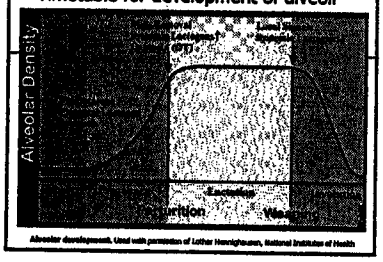
Lisa Marasco MA IBCLC

Overview of mammogenesis and lactogenesis

- Mammary gland undergoes three major phases of growth and development before pregnancy: *in utero, first two years of life, puberty*
- Puberty: estrogen stimulates ductile growth, progesterone stimulates growth of alveoli
- Full differentiation of the gland requires
  - Insulin: stimulates stem cells to proliferate
  - Cortisol: assists in further formation of alveoli
  - Thyroxine: stimulates pituitary, which affects proper production of prolactin and Growth Hormone
  - Prolactin & GH: integral to alveolar development; prolactin also necessary for development of *estrogen receptors.*

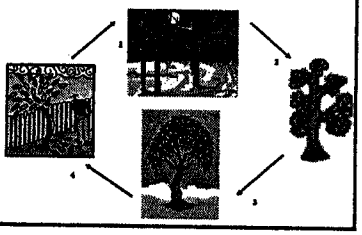
- During **pregnancy**, estrogen, progesterone, prolactin [and HPL] help to complete breast growth, as may GH via IGF-I.
- Cox: Found that changes in breast volume during pregnancy were positively related to the concentration of **HPL.**
- **Sources of mammary stimulating hormones:**
  - Pituitary: Prolactin, Growth Hormone, TSH
  - Ovary: estrogen, progesterone
  - Placenta: HPL, Chorionic gonadotropin
  - Pancreas: Insulin
  - Hormones synthesized locally within the breast by *paracrine activity* include: prolactin, progesterone, estrogen, relaxin, epidermal GF

Timetable for development of alveoli

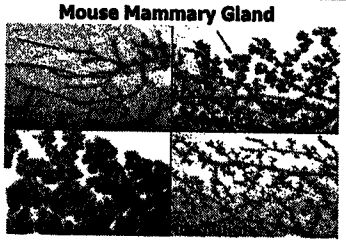


Alveolar development. Used with permission of Lother Henninghausen, National Institutes of Health

Life cycle of breast development



Mouse Mammary Gland

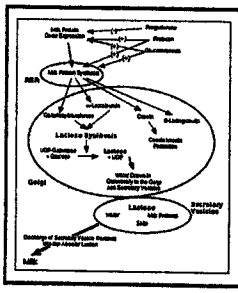


Development of the Mouse Mammary Gland. Used with permission of Lother Henninghausen, National Institutes of Health.

Lactogenesis

- **Progesterone** interferes with **PRL** at the alveolar cell *prolactin receptor level* to inhibit lactation before birth; progesterone and pharmacologic amounts of androgens *reduce prolactin binding*
  - ***"Maintenance of steroidal inhibition (progestin or androgen)... are effective in preventing pp milk synthesis and secretion."***
- **Lactogenesis II** begins at parturition with removal of placenta; apparent within 2-4 days on average

- Hormones necessary to begin lactation **(Lactogenic Complex)**
  - **Prolactin:** needed for lactose synthesis
  - **Insulin:** needed for lactose synthesis, maintenance/survival of lactocytes during lactation (Hartmann)
  - **Cortisol:** low levels cause more alpha-lactalbumin to be made for lactose synthesis; *high levels are inhibitory* (ie, chronic/extreme stress)
- Lactose synthesis is key to milk secretion



Milk synthesis: Like a long recipe with many steps and ingredients

Understanding true lactation failure

- **Delayed**
- **Secondary supply failure-** *generally caused by an outside force*
- **Primary supply failure-** *refers to problems specific to mother's body and are most often irremediable*

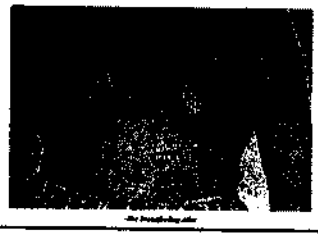
Causes of Primary Failure

- **Mechanical interference**
  - Breast surgery/biopsies, especially peri-areolar incisions
  - Breast reduction
  - Breast augmentation
  - Blunt trauma
  - Radiation therapy
  - Damage from abscess or severe mastitis?

- **Endocrine disturbances**
- **Retained placental fragments-** *high progesterone suppresses prolactin efficacy*
- **Hypopituitarism-** *insufficient stimulation of lactation hormones and/or release*
- **Hemorrhage/Sheehan's** (insult vs. infarct): *damage to pituitary*
- **Uncontrolled diabetes-**
  - *breast is a sensitive target-organ for insulin; insulin necessary for lactogenesis, breast growth?*
  - *Diabetic women tend to have lower levels of PRL, PL, PTH during pregnancy and postpartum*

- **Hypothyroidism-**
  - *Josh/ 1983: "Reproductive failure- infertility, pregnancy wastage, failure of lactation- occurred in 37.5% of hypothyroid and 36.5% of hyperthyroid cases against 16.3% of euthyroid and 16.7% of healthy controls."*
  - **Hurley:** *"Hypothyroidism retards ductal and lobuloalveolar growth."*
  - **Miyake 1988:** *insufficient stimulation of hormones, sometimes even when euthyroid due to treatment*
- **High testosterone:** *down-regulates prolactin and estrogen receptors*

- **Insufficient mammary tissue: Genetic? Hormonal?**



Observations in the literature

Harold Waller(1957)

Left: Almost the whole gland is filled with alveolar tissue- little fat or fiber. Right: secreting tissue is limited to thin streak along base of the gland. There is a large central mass of fibrous tissue and much fat. "The development of a large duct system further suggests hormonal dysfunction."

Neifert et al study

(1985): Case study of 3 women with lactation failure. Common factors: absence of typical breast changes during pregnancy, failure of pp breast engorgement, at least one abnormal breast, including less density of tissue (by light scan)

(1990) Prospective study of 319 primips. Breast exams were performed in last trimester, then the mothers were followed for outcome. Risk factors: peri-areolar breast incisions; minimal prenatal breast enlargement; minimal post-partum breast engorgement .

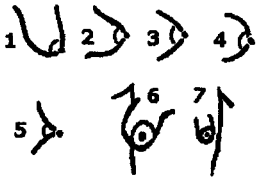
Huggins study

Huggins, Petok & Mireles: Enrolled women who had questionable looking breasts, categorized them by four types, then followed them for breastfeeding outcome. *Major risk factors:*

- intramammary distance >1.5"
- hypoplasia types 2-4
- stretch marks?

Breast Types - Huggins et al

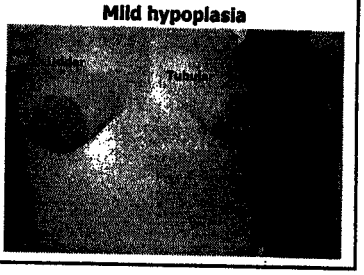
Marmet & Shell



Lactation Forms: A guide to lactation consultant charting

Tubular breasts, impaired supply

Mild hypoplasia



Other correlations to primary failure...

- **Obesity:** *Hilson, Rasmussen, Kjolhede*
  - **"excessive fatness in the reproductive period may inhibit lactation performance in women..."**
  - "Obese rats initiate lactation less successfully, produce less milk than controls, and have a higher concentration of fat but lower concentration of lactose and protein in their milk than do nonobese rats.....Studies in obese rats show that these animals **remain hyperinsulinemic** during transition from pregnancy to lactation, *which may inhibit the delivery of nutrients to the mammary gland for milk biosynthesis"*
  - Additional commentary from Rasmussen: **Fat is a source for progesterone**, so obese women continue to produce progesterone after the placenta is removed- *"it can take them longer to develop a milk supply."*

- **Hypertension?** – Neifert in *Dr. Mom*, 1998
- **Prolactin resistance?** *Zargar et al. (2000)* Mother of 3, insufficient milk, normal prolactin secretion and reserves, normal mammary tissue development- authors theorize *resistance* to prolactin the cause of her repeated lactation failures
- **The unknown and uncharted... *PCOS?***

Clues from induced lactation

- **Traditional cultures expect good supplies when inducing milk production**
- **In U.S. and developed countries, full supplies are rare**
- **Our adoptive moms are often infertility patients**
- ***PCOS is considered leading cause of infertility***

Two intriguing cases...

- **Case 1:** Obese mom in mid-20's presented with second child, FTT. First baby was crisis pg when mom was a teen, with milk supply problems that mother attributed to poor information. Current baby was conceived after experiencing secondary infertility, and mom was determined to "get it right" this time. Further discussion revealed that mom had been diagnosed with Stein-Leventhal.

- **Case 2:** Moderately overweight mom presented a few days later with third baby, who was also FTT at 3 wks of age. This mom described a history of infertility and milk supply problems, but also really wanted to breastfeed this baby. Further discussion revealed that mom had been diagnosed with Polycystic Ovary Syndrome.

Common trait: infertility. Further research revealed that Stein-Leventhal and PCOS were the *same syndrome.*

What is PCOS?

- Also known as *Stein-Leventhal syndrome*
- Leading cause of infertility in women
- Prevalence: effects 4-15% of all women
- Disturbance of hypothalamic-pituitary-ovarian axis
- Some consider it a "disorder of carbohydrate metabolism"
- May represent a number of disorders- **syndrome vs. disease**

Possible endocrine imbalances

- Elevated androgens
- Elevated estrogen
- Elevated cholesterol
- Low progesterone
- Elevated LH:FSH
- Insulin Resistance
- Hyperinsulinemia
- Low SBGH
- Low Thyroid
- Hyperprolactinemia?

Possible clinical symptoms

- Polycystic Ovaries
- Hirsutism
- Adult Acne
- Male-pattern balding
- Acanthosis nigricans
- Skin tags
- Central obesity
- Oligo- or amenorrhea
- Infertility
- Hx of miscarriages, gestational diabetes, preg hypertension, pre-eclampsia
- Hx of heavy menstrual bleeding (menorrhagia)
- Depression?

Ferriman-Gallwey Assessment Model

Diagnostic criteria: an area of confusion

- *International Classification of Diseases*: clinical hirsutism + oligomenorrhea
- *National Institute of Health* (NIH): menstrual irregularity + evidence of hyperandrogenism + no other illness
- *Carmina & Lobo* (mild form): hyperandrogenism + polycystic ovaries

Criteria con't

- *Charles Glueck MD, researcher:*
  (1) Multiple ovarian cysts OR
  (2) fasting hyperinsulinemia + high serum testosterone OR
  (3) fasting hyperinsulinemia + oligo- or amenorrhea
- Dx excludes CAH, Cushings, thyroid disease, hyperPRL, androgen tumors
- Confounding factors: normoglycemic women can be IR; non-hirsute women can be hyperandrogenic!

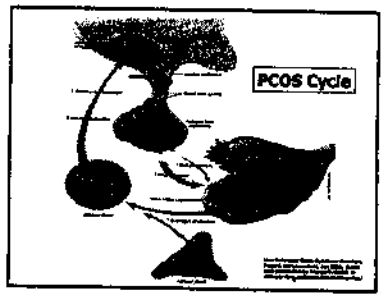
What causes PCOS?

Multiple theories on origin

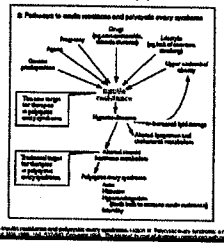
- Fetal exposure to androgens?
- Genetics?
- Familial component
- SGA as infant?
- Other predisposing factors:
  - trauma
  - epileptic meds such as valproate in adolescence
  - lack of insulin in AIM?

PCOS cycle

- Disturbance of hypothalamus/pituitary→
- ↑ LH & ↓ FSH →
- Hyperstimulation of ovarian theca cells →
- ↑ androgen → inadequate follicle maturation
- → menstrual irregularities & infertility
- Adipose tissue converts androstenedione to estrone, affecting GnRH



Insulin resistance and hyperinsulinemia: another entry point



Possible long-term consequences of PCOS

- Type 2 (NIDDM) diabetes, onset age 30-40
- Hypertension
- Heart Disease
- GYN cancers, especially endometrial
- *Major women's health issue!*

How might PCOS affect milk supply? *Theories.....*

Could it affect breast growth?

- In utero exposure to androgens (fetal)
  - Speroff: *"Abnormalities in adult size or shape **may reflect** the impact of hormones (especially presence or absence of testosterone) during this early period of development"*
- Inadequate estrogen, progesterone in adolescence
- Inadequate/ineffective prolactin, progesterone, insulin during pregnancy

Supporting observations for PCOS link in the literature

Irving Stein (1935, 1944, 1949)

- ***"retarded breast development"***
- ***"scant breast development"***
- ***"small, pale, firm" with prolonged amenorrhea***
- ***"in many instances, hypoplasia of the breasts"***

observations con't

Soft Tissue Radiography (Balcar 1972)

- Looked at breast tissue, uterus of PCOS women compared to normal, age corrected
- Identified 5 distinct groups
- Noted that there could be hypoplasia of the gland, hypoplasia of the breast, or both.
- "evidence of marked decrease in the glandular parenchyma.... Even where large breasts with much fatty tissue simulate hypertrophy."

observations con't

Brazilian study (Fonseca, 1985)

- Observed "tangled" glandular tissue: "The breast tissue in the women with PCOS has presented *gross disorders* in the qualitative study of the lobular architecture. The intralobular and the interlobular connective tissue were hypertrophic and partially hyalinized."

Postpartum hormonal interference?

THEORY: High levels of androgens can down-regulate prolactin & estrogen receptors

→**Support:** Testosterone cited for use in lactation suppression in Reproductive Endo text

→**Support:** case study by Kay Hoover theca-lutein cyst suppressed lactation until postpartum testosterone levels fell sufficiently

Interference con't 2

THEORY: Insulin resistance may prevent adequate glucose-uptake in sensitive alveoli, interfering with energy needs and milk synthesis

→**Support:** diabetes known to negatively impact milk production when not well-controlled

→**Support:** (Hurley) Lactogenic complex= insulin + glucocorticoids + prolactin

→**Support:** cited rat study noted problems with hyperinsulinemia after delivery, theorizing interference with delivery of nutrients

Interference cont 3

THEORY: progesterone drop not sufficient to sensitize alveoli for lactogenesis II

THEORY: could PCOS-induced hypertension suppress lactation in certain affected women?

→**Support:** Neifert's observation of hypertension as a risk factor for lactation failure

→**Support:** Hypertension noted as risk factor for early cessation of lactation *(J Peds Nov 2002)*

Interference cont 4

THEORY: hormonal imbalances might disrupt milk production by interfering with one or more links in synthesis chain

→ sufficient lactose needed to draw water into cells for volume

→ other constituents may be missing, resulting in thin, "watery milk"

Interference cont 5

THEORY: concomitant hypothyroidism may cause problems (secondary or subclinical)

→**Support:** Montoro

- *"A hx of menstrual irregularity before pregnancy may be elicited, particularly menorrhagia, which is reported to occur frequently even in patients w/ mild hypothyroidism*
- *"Secondary hypothyroidism may be seen in pituitary or hypothalamic diseases... Anemia may also be seen in hypothyroidism."*

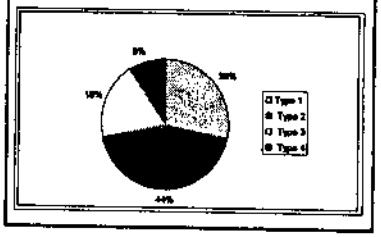
Question.....

Does this mean that PCOS might cause breastfeeding problems for all affected women?

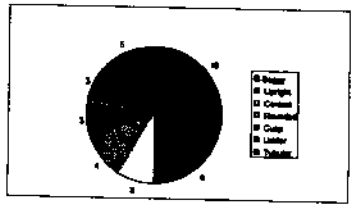
A study of lactation failure from the perspective of PCOS

Marasco 2001: enrolled women with documented supply failure and screened for common factors, looking at clinical sx, hormonal sx, family hx, breast shape, breast size, veining, intramammary distance, day milk reported in. (n=30)

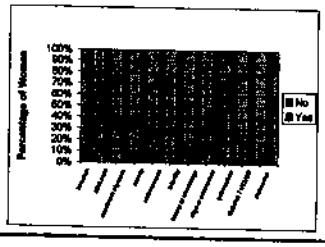
Distribution of breast types



Distribution of breast shapes



Clinical symptoms



Breast growth

Breast growth	0	1	2	Total
Pregnancy	12	8	10	30
percentage	40%	27%	33%	100%
Postpartum	18	8	4	30
percentage	60%	27%	13%	100%

Additional observations.....

- 4 women not diagnosed hypothyroid, yet had hx of borderline low levels. ***Can subclinical levels have an impact?***
- Some women reported sensations of fullness reminiscent of engorgement
- Mother's perceptions of which day milk came in most often based on volume increase vs. color change- latter is most accurate

Significant findings

- 43% officially dx'd PCOS, 30% more likely PCOS
- 50% had signs of androgen excess: hirsutism, acne
- 50% were obese
- 57% experienced infertility
- 67% experienced irregular menstrual cycles
- 67% of women reported little or no breast changes during pregnancy
- Avg. intramammary distance 1.62 inches, with 50% greater than 1.5 inches.

Clear risk factors

- Pregnancy breast growth & shape
  - Agrees with Neifert et al, Huggins et al; disagrees with Cox et al
- Intramammary space >1.5"
  - Agrees with Huggins et al
- Non-prominent veining
  - Agrees with Huggins et al, Cox et al

Reconciling breast growth significance

- Cox (*n*=8) found no relationship between milk production and breast volume or breast growth, but rather a relationship between milk production and *storage capacity*
- Neifert, Huggins, Marasco & Cox all had different populations.
- Is it possible that some women experience growth in gland (storage capacity?) that is balanced by decrease in connective and fatty tissues for little or no measurable net change in volume?

reconcile con't

"...while proliferation of breast tissue is necessary for sufficient milk production to sustain an infant, the breast does not need to be enlarged above pre-conception size to continue significant milk production. ***Further studies are needed to identify the proportions of different tissues in the lactating and quiescent breast.***"

Interesting observations:

- Breast growth, areolar growth, and breast volume influenced by hPL
- Nipple growth and rate of excretion of lactose related to concentration of PRL
- Rate of breast growth high until ~5 mos

What can be done for affected mothers?

Dilemma for the current baby

- **Relative lack of success for usual measures**
  - **Pumping alone:** little or no change
  - **Pharmaceutical:** Reglan, domperidone: some effect, but not great
  - **Herbs:** Marginal improvement, may be due to *inappropriate targeting* or *inadequate dosage amounts*. Most commonly tried: fenugreek, blessed thistle, nettle, fennel, goat's rue.

targeting issues

- Lawrence: "except in extreme cases (Sheehan's), hormone depletion is rarely an issue, *but hormone release and target-organ sensitivity are*... For any hormone to exert its biological effects, specific receptors for the hormone must be present in the target tissue. Changes in serum concentration have no effect if receptors are not present in the mammary gland to bind the hormone."

- **Confounding treatment variables**
  - **Endocrine imbalances** unknown
  - **Prolactin:** no direct relationship between levels and milk production, yet it matters
    - Prolactin tests often revealed either perfectly normal or borderline levels for time postpartum. Might the poor supply in the presence of adequate hormone be due to down-regulated receptors, or **prolactin resistance** as theorized by Zargar et al? Or is it, at this point, a matter of not enough alveoli to provide enough milk for baby?

variables...

- Thyroid: treatment may not always "cure"
- Testosterone? Intriguing theca-lutein cyst case study by Kay Hoover
- Huggins, et al: showed that continued pumping resulted in gradual increase in milk supply in many mothers; max potential may take 3 mos to know
  - Sperroff: *"mild deficiencies in estrogen, progesterone, thyroxine, cortisol, insulin, prolactin, GH, can be compensated for by excess prolactin."*

The special case of PCOS

- **Multiple problems make it difficult to determine and target the cause; exact endocrinopathy unknown**
  - **Prolactin-** *Levels often normal. Is the real issue prolactin resistance, or is it a matter of not enough alveoli to provide enough milk for baby?*
  - **Thyroid-** *deficiency may not respond to galactogogues and even treatment may not always "cure"*
    - Contreras, 1981: "The PRL response to metoclopramide in women with spontaneous disease was significantly smaller than in controls"
  - **Testosterone-** *serum levels do not always reflect clinical symptoms*
  - **Progesterone-** *if deficient for breast growth, cannot "redo" this after delivery*

- **Look at the big picture**
  - A good maternal health history is important, including any medical conditions, allergies, history of depression, current medications
  - What is the basic problem? Is there a lactogenic medication or herb that seems to target this issue?
  - What is mother's comfort and philosophy regarding medications or herbs?
  - Are there institutional or HCP restrictions on what can be used? *Must work carefully within framework of mother's HCPs*

Galactogogue choices for pcos

Herbal:

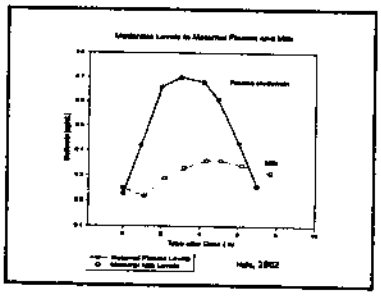
- Goat's Rue- may possibly have similar action to metformin. *Added benefit: increase needed breast tissue?*
- Fenugreek- also reputed to increase breast tissue; also a hypoglycemic. *Check for hx of hypoglycemia for fenugreek or goat's rue*
- Vitex/Chasteberry has been used to treat PCOS because of reputation for balancing hormones; *could act indirectly as a galactogogue*

Pharmaceutical:

- Reglan -SPECIAL CAUTION- women with PCOS appear more prone to depression. Screen history, and watch carefully if used
- Domperidone: best choice if available

pcos...

- **Metformin:** potential to correct multiple unknown imbalances
  - Best potential when there is moderate breast development already in place
  - Metformin improves insulin resistance, does not act directly on insulin or glucose
  - Tom Hale recently studied 6 milk samples from women taking metformin; levels in milk were extremely low. (*Diabetologia* online, 2002) Rating is being changed from L3 to L2.

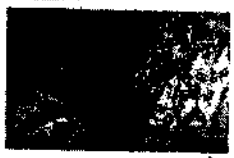


Case studies with metformin

- With first case mother, researched and then started on metformin @ approx 2 mos pp. She reported that she felt her milk supply coming up..... *until*..... .
- Mom, para 3, IBCLC, not dx'd PCOS until after recognizing sx during presentation. Had already experimented positively with vitex (2 caps qid); now added metformin 500mg SR, decreased vitex & domperidone by 50%- noted increase in baby's diaper output after 1 mo. of therapy (baby age 6 mos)

- Two pcos moms w/ low supply prescribed metformin by their MD/LC– one mother's output doubled, the other came up dramatically
- Mom of 6yr & 4 mo old started back on metformin after experiencing 15lb wt gain and rebound of PCOS symptoms.
  - After 3 days of 1000mg then upping to 1500mg, she noted: *"All day my breasts have been very full and my son has been gorging himself silly! The Met is the only thing that has changed and it seems that my volume has gone way up."*

Hope for future babies?



Permanent or reversible hypoplasia?

- Stein 1944, after ovarian wedge resection:
  "In one case of primary amenorrhea there was practically no visible breast development.....
  Most remarkable and rapid development after surgery.... Breasts enlarged and nipples and areolae developed noticeably in a few months. After marriage and birth of a child, lactation occurred..... successfully."
  and
  "there was a notable improvement.... The breasts developed markedly, especially in those young women with primary amenorrhea and in whom the breasts were formerly immature."

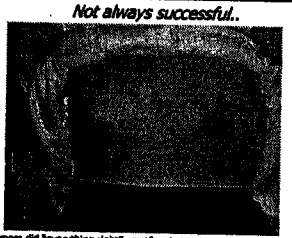
hypoplasia

- Bodley & Powers, 1999, Luteal Phase Insufficiency case
- Breast growth windows?
  Gigantomastia: sensitivity to prolactin... could there be under-sensitivity with hypoplasia?
- Cancer gene cell research- trying to close growth windows may lead to learning how to re-open them.

hypoplasia

- Potential relationships between obesity, diabetes, PCOS, hypoplasia. Treatments such as metformin may correct underlying problems and allow for proper growth and effective hormones
  - Latest research shows that metformin through first trimester reduces miscarriage rate from 65% to 15% and risk of GD from ~40% & ~29% to 3%
- Progesterone cream/supplement therapy during pregnancy... Katharina Dalton
  - Red raspberry leaf?

Not always successful..



This mom did "everything right"- metformin treatment before and during pregnancy, progesterone rx, good start to breastfeeding, but only drops of milk even with herbal galactogogues

One mom's experience

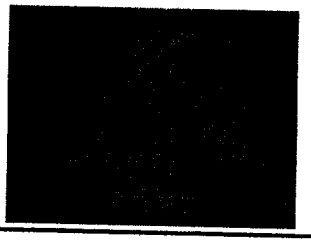
LACTATION BREW:

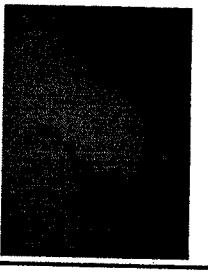
- **Pregnancy**- tea of red raspberry leaf, nettles, alfalfa, clover
- **Postpartum**- to the above added hops flower, blessed thistle, marshmallow root, fenugreek powder and goat's rue powder

Another mom's experience.....

- Type 2 breasts, 30ccs q 2-3 hours @ 1 wk
- Started on *More Milk Plus* & *Goat's Rue* 10-12x/24 hours
- Enhanced breast growth
- Recently added *Mother's milk* and *raspberry leaf tea*, plus eating oatmeal
- Intake @ 6wks = 104ccs
- ***Inconclusive but encouraging***

Significant veining and breast growth after several weeks of Goat's rue & More Milk Plus





Breasts now heavy with milk

Online resources

- Collection of lactation biology articles: http://mammary.nih.gov/reviews
- PCOS Pavilion on OB/GYN net: http://www.obgyn.net/pcos/pcos.asp
- Polycystic Ovary Syndrome Association: http://www.pcosupport.org/
- Herb profiles by Health World Online http://www.healthy.net/clinic/therapy/herbal/herbic/herbs/
- Brief Herb monographs http://www.nutritionofocus.com/nutrition_supplementation/herbs/index.htm
- Longwood task force in-depth monographs http://www.mcp.edu/herbal

My email: lisa.marasco@gte.net

ASSESSING FOR INSUFFICIENT MILK SUPPLY

PRIMARY FACTORS

- ❑ Breast augmentation
- ❑ Breast reduction
- ❑ Breast biopsy/surgery
- ❑ Breast radiation
- ❑ Blunt trauma to chest or burn wounds
- ❑ Retained placental fragment
- ❑ Hemorrhage
- ❑ Anemia
- ❑ Hypertension
- ❑ *Hypothyroidism OR Low thyroid
- ❑ *Diabetes
- ❑ *Infertility
- ❑ *Hormonal problems
- ❑ *Insufficient mammary tissue

Insufficient mammary tissue: (p26; 45-46)

- ❑ Breast type 2, 3 or 4?
- ❑ Unusual breast shape? _____
- ❑ Distance between breasts > 1.5"?
- ❑ Markedly asymmetric?
- ❑ Prenatal breast growth? 0 1 2
- ❑ Postpartum breast growth? 0 1 2
- ❑ Lack of significant vascularization (poor veining of the breast)

SECONDARY FACTORS

Mother:

- ❑ Poor latch
- ❑ Poor breast/mouth fit
- ❑ Firm, inelastic breast tissue
- ❑ Infrequent feeds (<8x/24 hrs)
- ❑ Restricted feeding times
- ❑ Scheduling
- ❑ Infrequent pumping sessions
- ❑ Medications _____
- ❑ Hormonal birth control
- ❑ Pregnancy
- ❑ Breast infection
- ❑ Herbs _____
- ❑ Delayed lactogenesis: edema, labor drugs, hypertension/mag sulfate, Diabetes, theca-lutein cyst

Baby:

- ❑ Cardiac or respiratory problems
- ❑ High or low muscle tone
- ❑ SGA/IUGR or borderline early
- ❑ Hard/soft cleft palate
- ❑ Palatal variations
- ❑ Micrognathia
- ❑ Tongue-tie
  Improper suck

*PCOS/hormonal assessment

_____ Infertility (40) OR miscarriage (20)

_____ Chronic anovulation OR oligo/amenorrhea (40)

_____ Hyperandrogenism (30) OR hirsutism or acne (10 each)

_____ Insulin resistance or skin tags or acanthosis nigricans or hyperinsulinemia (30) OR gestational or Type 2 diabetes (15)

_____ Polycystic ovaries (30)

_____ Obesity (20)

_____ Low progesterone (20)

_____ Family history of two or more risk factors (20)

_____ Elevated cholesterol (10)

_____ History of heavy menstrual bleeding or endometriosis (10)

_____ **Total Score** (>70, suspect hormonal problems/interference with lactation)

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